Technical Program

Photonics WEST

An SPIE Event

21–26 January 2006

San Jose Convention Center • San Jose, California USA

The International Society for Optical Engineering

IF YOU HAVE VISIONS OF OPTICAL SYSTEMS OR FOCAL PLANES DANCING IN YOUR HEAD

LET'S TALK.

At Ball, we're looking into space. Deep space. Our projects enable us to look from space as well. And one of the keys to how well we'll be able to see is our optical and focal plane engineers. They work on a variety of projects from civil programs such as Deep Impact, JWST, the Hubble Instrument upgrades and Kepler to operational space programs like the NPOESS ozone mapping. They may even be asked to contribute their expertise to one of our many defense programs. At Ball, our scientists have the freedom and flexibility to follow their interests. And Ball offers something else, a great place to live and raise a family. We're located in Boulder, Colorado at the base of the Rocky Mountains just 30 minutes from Denver.

So if you eat, sleep, and dream optical engineering or focal plane technology, direct your focus to the current Colorado-based opportunities listed below.

We will be conducting interviews during the Photonics West Conference at the:

Hilton San Jose
300 Almaden Boulevard
San Jose, CA
10:00 am – 4:00 pm
Tuesday, January 24th and Wednesday, January 25th
Recruiter Phone: 303-638-7901

Engineering Mgr. Sr., Chief Engineer, Focal Planes, Optical (133820) will lead a team in the development of focal plane subsystem requirements, trade studies, and end-to-end system modeling. Lead cross functional teams. Provide management of cost, schedule, and system performance to meet programs' objectives and goals. Organize and lead senior engineering teams to perform in-house reviews of proposals, concepts and detailed designs. Develop processes and metrics to increase effectiveness in delivering focal plane subsystems. Established track record managing the development of custom CCD, CMOS, CID, and IR camera systems for high reliability applications. Experience with modeling and performance analysis of CCD, CID, and/or IR detectors. Experience with mechanical packaging of detectors, focal plane design, breadboard fabrication and test.

Project Engineer Senior, Optical (108866) will manage space-based and terrestrial electro-optical systems from concept development through operational implementation including planning and control of cost and schedule. Responsible for leading a multi-discipline instrument development team. Provide technical leadership in support of proposals and programs. Generate, interpret, implement, and monitor instrument requirements from system, detail design, and contract specifications through operational capability. Generate cost estimates and track performance. Develop detailed development schedules. Manage company-wide technical and programmatic priorities in relation to customer technical and programmatic priorities. Responsibilities also include technical management of major aerospace subcontracts. Strong presentation skills. Experience in the development of aerospace optical systems. Internal leader and customer-level participant capable of negotiating the technical, cost, schedule and risk scopes of the program before and after contract signing.

Microelectronic Assembly Technician Specialist – Principal (111317) is a senior-level micro-electronic technician capable of independent manufacture of custom hybrids, focal plane assemblies, and prototype detector assemblies in a cleanroom environment (in Advanced Packaging and Detector Laboratory). Hands-on experience in the microelectronic, hermetic packaging of custom hybrids (MCMs) or focal plane imaging devices. Must have experience in the following processing technologies: die attach; wire-bonding, ribbon-bonding; soldering and surface mount technology; adhesive technology; critical cleaning; precision optical assembly; assembly technique in a Class-100-cleanroom environment; critical cleaning, contamination control; seam-sealing; wafer/substrate sawing. In addition, skills in thin-film deposition and photolithographic thin film processing are desired.

Project Engineer I, Optical (108867) will be responsible for leading a multi-discipline instrument development team to meet cost, schedule, and technical requirements for space-based and terrestrial electro-optical systems. Technical responsibilities include generation and/or oversight of conceptual optical design, detailed optical design, statistical fabrication, alignment tolerancing, performance analysis, and risk mitigation. Generate cost estimates and track performance. Develop detailed development schedules. Responsibilities could also include technical management of major aerospace subcontracts. Understanding of how requirements affect cost/schedule with ability to identify issues. Ability to generate time-phased staffing estimates for his/her area of responsibility. Strong presentation skills. Experience in the development of aerospace optical systems.

Ball Aerospace & Technologies Corp. requires U.S. citizenship or permanent residency. For a complete listing of all our jobs, including some in Dayton, OH and Albuquerque, NM, and to submit your resume, please go to **www.ballaerospace.com/careers.html.** Ball Aerospace is proud to be an equal opportunity employer committed to a diverse workforce.

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San Jose Convention Center • San Jose, California USA

BiOS

LASE

MOEMS-MEMS

OPTO

Courses

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SPIE would like to express its deepest appreciation to the program chairs, conference chairs, cochairs, program committees, and session chairs who have so generously given of their time and advice to make this symposium possible. The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members.

This program is based on commitments received up to the time of publication and is subject to change without notice.

Sponsored by

The International Society for Optical Engineering

BiOS 41–108
Biomedical Optics

BIOS Daily Conference Schedule . . . 42–43

Symposium Chairs
James Fujimoto, Massachusetts Institute of Technology
R. Rox Anderson, M.D., Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine

LASE 111–143
Lasers and Applications in Science and Engineering

LASE Daily Conference Schedule . 112–113

Symposium Chairs
L. N. Durvasula, DARPA
Jan J. Dubowski, Université de Sherbrooke (Canada)
Symposium Cochairs
Friedrich G. Bachmann, ROFIN-SINAR Laser GmbH (Germany)
Henry Helvajian, The Aerospace Corp.

MOEMS-MEMS. . 144–157
Micro & Nanofabrication

Daily Conference Schedule 145

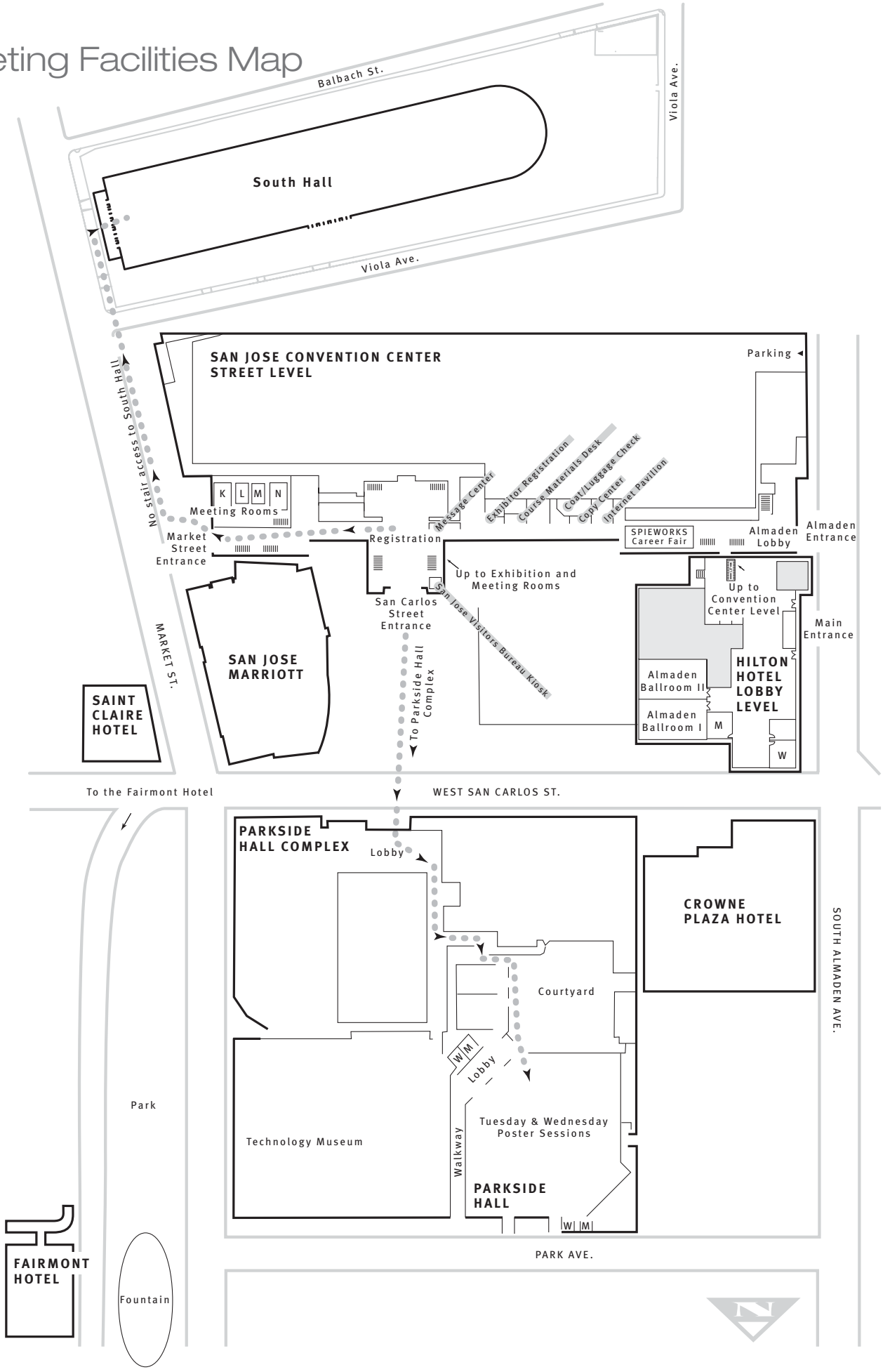
Symposium Chair: **Rajeshuni Ramesham,** Jet Propulsion Laboratory
Symposium Chair: **M. Edward Motamedi,** Revoltech Microsystems

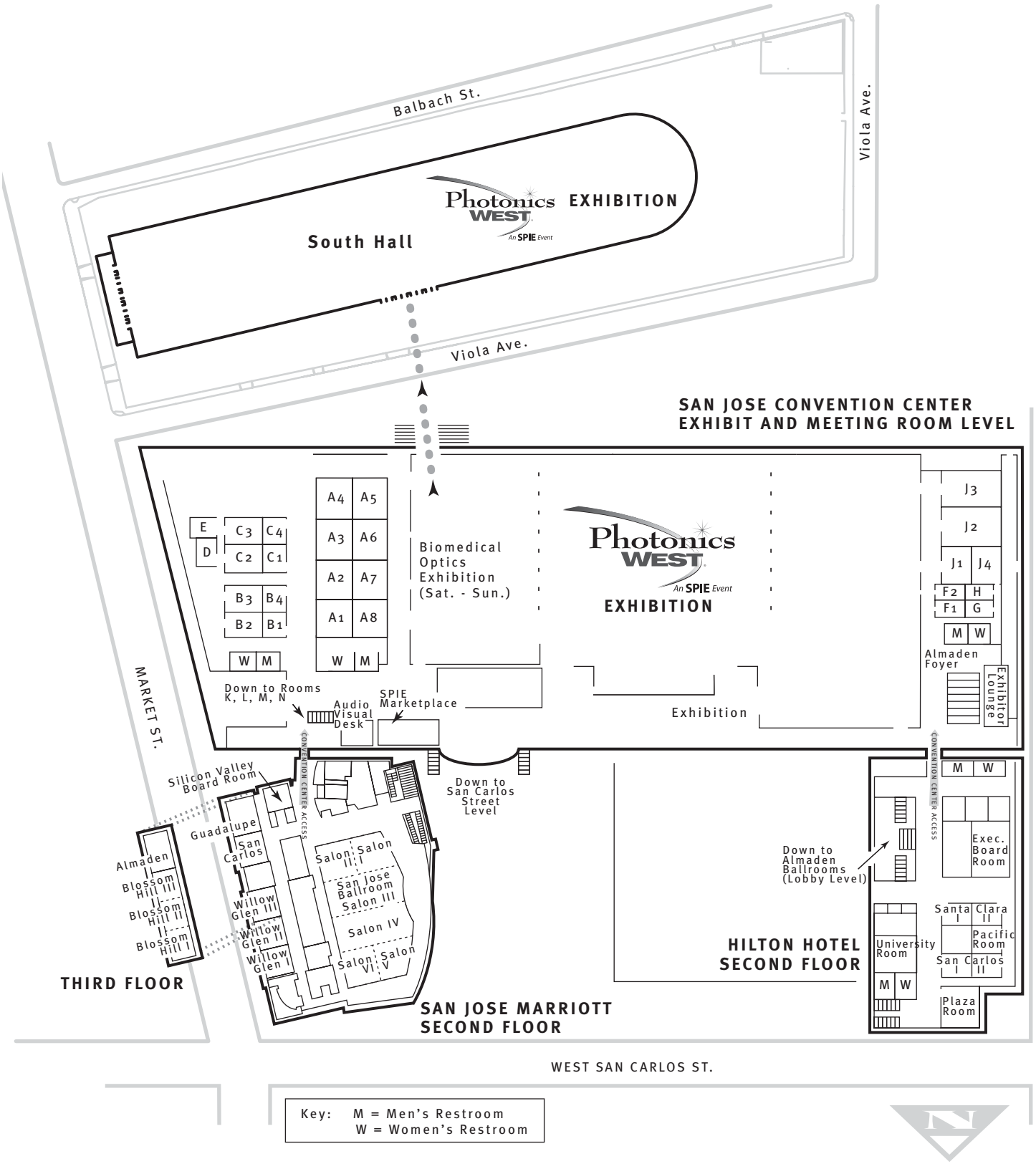
Optoelectronics.159–211
Integrated Optoelectronic Devices

OPTO Daily Conference Schedule 160–161

Symposium Chair: **Seppo Honkanen,** Optical Sciences Ctr./ Univ. of Arizona
Symposium Co-Chair: **Yakov Sidorin,** Photineer Technology Group

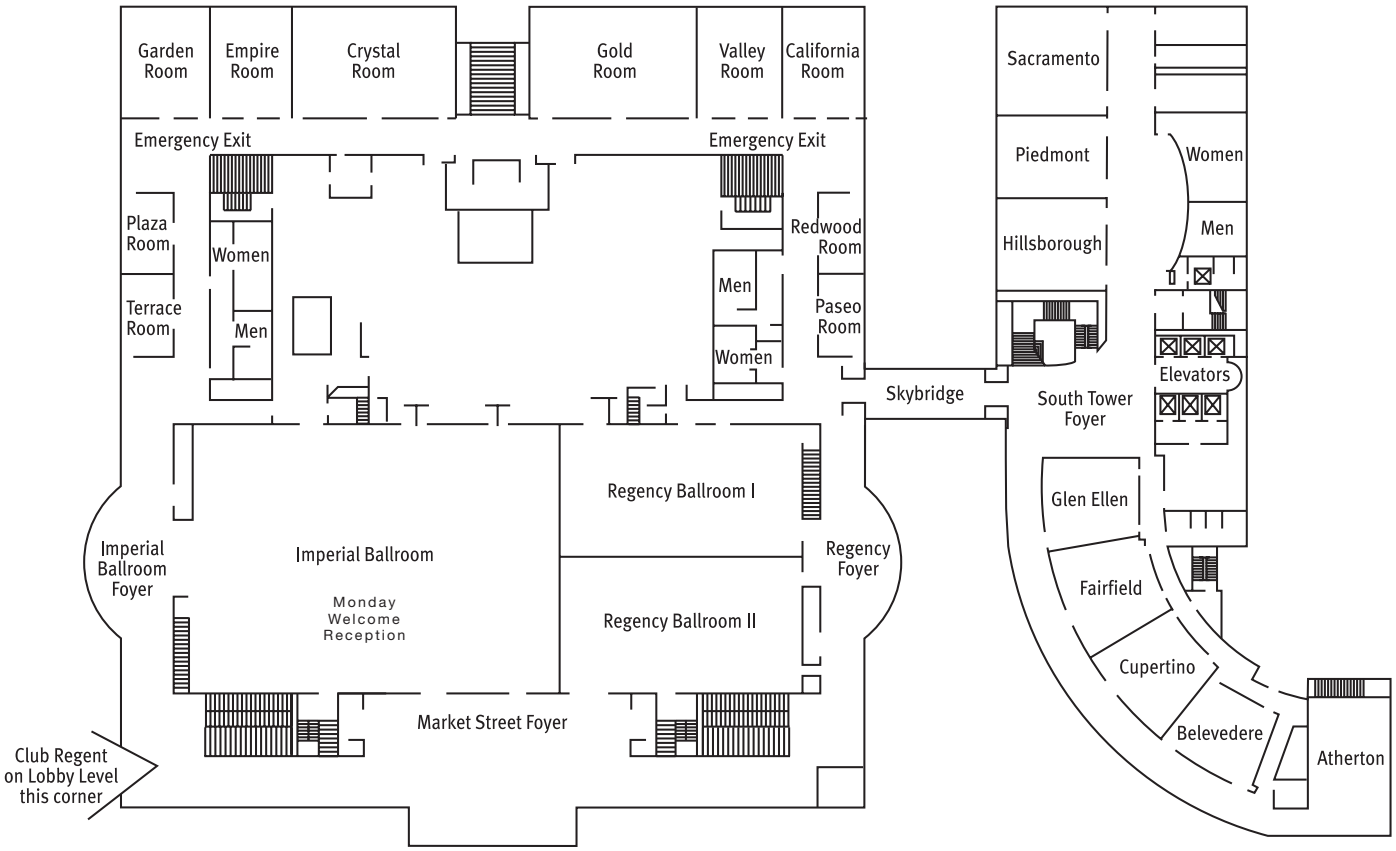
Meeting Facilities Map




Balbach St.
Viola Ave.
Photonics WEST An SPIE Event EXHIBITION
South Hall
Viola Ave.
SAN JOSE CONVENTION CENTER
EXHIBIT AND MEETING ROOM LEVEL
Biomedical Optics Exhibition (Sat. - Sun.)
Photonics WEST An SPIE Event
EXHIBITION
Exhibition
Almaden Foyer
Exhibitor Lounge
Down to Rooms K, L, M, N
Audio Visual Desk
SPIE Marketplace
MARKET ST.
SOUTH ALMADEN AVE.
Silicon Valley Board Room
Down to San Carlos Street Level
Down to Almaden Ballrooms (Lobby Level)
Exec. Board Room
Santa Clara I
Santa Clara II
Pacific Room
San Carlos I
San Carlos II
University Room
Plaza Room
HILTON HOTEL
SECOND FLOOR
THIRD FLOOR
SAN JOSE MARRIOTT
SECOND FLOOR
Almaden
Blossom Hill III
Blossom Hill II
Blossom Hill I
Guadalupe
San Carlos
Willow Glen III
Willow Glen II
Willow Glen I
Salon I
Salon II
San Jose Ballroom
Salon III
Salon IV
Salon V
Salon VI
CONVENTION CENTER ACCESS
WEST SAN CARLOS ST.
Key: M = Men's Restroom
W = Women's Restroom

Fairmont Hotel

Ballroom Level (2nd Floor)



Technical Conference Room Lists

BiOS

Biomedical Optics

2006 Symposium Chairs

James Fujimoto, Massachusetts Institute of Technology

R. Rox Anderson, M.D., Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine

Photonic Therapeutics and Diagnostics

Program Chair: **Reza Malek, M.D.,** Mayo Clinic; **Achilles Demetriou, M.D.,** Cedars-Sinai Medical Ctr.

6078A **Photonics in Dermatology and Plastic Surgery** *(Kollias, Choi, Zeng)* . . . . CC, Rm A8 . 44

6078B **Urology: Diagnostics and Therapeutics** *(Malek)* . . . CC, Rm B5 . 46

6078C **Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology** *(Wong, Ilgner)* . . . . . CC, Rm C1 . 47

6078D **Innovations in Clinical Applications of Minimally Invasive Devices and Techniques** *(Trowers, de Riese)* . . . . . CC, Rm D . . 48

6078E **Diagnostic and Therapeutic Applications of Light in Cardiology** *(Gregory, Tearney)* . CC, Rm C2 . 49

6078F **Optical Techniques in Neurosurgery and Brain Imaging** *(Hirschberg, Madsen)* . . CC, Rm A4 . 50

6078G **Biophotonics in Veterinary Medicine** *(Tate, Lucroy)* . . . . . CC, Rm C1 . 51

6137 **Lasers in Dentistry XII** *(Fried, Rechmann)* . . CC, Rm C4 . 52

6138 **Ophthalmic Technologies XVI** *(Manns, Söderberg, Ho)* . . . . . CC, Rm A1/A2 54

6139 **Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy** *(Kessel)* . . . . CC, Rm A3 . 58

6140 **Mechanisms for Low-Light Therapy** *(Hamblin, Anders, Waynant)* . . . . . CC, Rm C1 . 61

Clinical Technologies and Systems

Program Chair: **Tuan Vo-Dinh,** Oak Ridge National Lab.

6079 **Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine X** (Tuchin, Izatt, Fujimoto) . . . . . CC, Rm A7/A8 63

6080 **Advanced Biomedical and Clinical Diagnostic Systems IV** *(Cohn, Benaron, Grundfest, Vo-Dinh)* . . . . . CC, Rm B2 . 67

6081 **Multimodal Biomedical Imaging** *(Azar)* . . . . CC, Rm B1 . 69

6082 **Endoscopic Microscopy** *(Wang, Tearney)* . . CC, B1 71

6083 **Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VI** *(Gannot)* . . . CC, Rm A5 . 72

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chair: **Steven Jacques,** Oregon Health and Science Univ.

6084 **Optical Interactions with Tissue and Cells XVII** *(Jacques, Roach)* . . . . . CC, R1 74

6085 **Complex Dynamics and Fluctuations in Biomedical Photonics III** *(Tuchin)* . . CC, Rm C4 . 77

6086 **Photons plus Ultrasound: Imaging and Sensing** *(Oraevsky, Wang)* . . . CC, Rm A-6 79

6087 **Biophotonics and Immune Responses** *(Chen)* . . . CC, Rm A5 . 82

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chair: **Ammasi Periasamy,** Univ. of Virginia

6088 **Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues III** *(Nicolau, Leif, Farkas)* . . . . . CC, Rm C4 . 84

6089 **Multiphoton Microscopy in the Biomedical Sciences VI** *(Periasamy, So)* CC, Rm A4 . 87

6090 **Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIII** *(Conchello, Cogswell, Wilson)* . CC, Rm A5 . 90

6091 **Optical Biopsy VI** *(Alfano, Katz)* . . . . . CC, Rm C1 . 92

6092 **Ultrasensitive and Single-Molecule Detection Technologies** *(Enderlein, Gryczynski)* . . . . . CC, Rm A7 . 93

6093 **Biomedical Vibrational Spectroscopy III: Advances in Research and Industry** *(Mahadevan-Jansen, Petrich)* . . CC, Rm C3 . 95

6094 **Optical Diagnostics and Sensing VI** *(Coté, Priezzhev)* . . . . . CC, Rm C1 . 97

Nano/Biophotonics

Program Chair: **Paras Prasad,** SUNY/Buffalo

6095 **Nano/Biophotonics and Biomedical Applications III** *(Cartwright, Nicolau)* . . . . . CC, Rm A1 . 99

6096 **Colloidal Quantum Dots for Biomedical Applications** *(Osiński, Jovin, Yamamoto)* . . CC, Rm C2 101

6097 **Optical Molecular Probes for Biomedical Applications** *(Bornhop, Achilefu, Raghavachari)* . CC, Rm K . 104

6098 **Genetically Engineered Probes for Biomedical Applications** *(Savitsky)* . . . . . CC, Rm C3 105

6099 **Plasmonics in Biology and Medicine III** *(Vo-Dinh, Lakowicz, Gryczynski)* . . . CC, Rm A2 107

LASE

Lasers and Applications in Science and Engineering

2006 Symposium Chairs

L. N. Durvasula
DARPA

Jan J. Dubowski
Université de Sherbrooke (Canada)

2006 Symposium Cochairs

Friedrich G. Bachmann
ROFIN-SINAR Laser GmbH (Germany)

Henry Helvajian
The Aerospace Corp.

Laser Source Engineering

Program Chair: **Gregory Quarles,** VLOC

6100 **Solid State Lasers XV: Technology and Devices** *(Hoffman, Shori)* . . . CC, Rm J1 114

6101A **Laser Resonators and Beam Control IX** *(Kudryashov, Ilchenko, Paxton)* . . CC, Rm J3 118

6101B **8th International Workshop on Laser Beam and Optics Characterization** *(Giesen, Nickel)* CC, Rm F1 120

6101C **High Energy/Average Power Lasers and Intense Beam Applications** *(Davis, Heaven, Schriempf)* . . . . . CC, Rm F1 121

6102 **Fiber Lasers III: Technology, Systems, and Applications** *(Brown, Nilsson)* . . . . CC, Rm J2 122

Nonlinear Optics

Program Chair: **Peter Powers,** Univ. of Dayton

6103 **Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications V** *(Powers)* . . . . CC, Rm F2 127

CC = Convention Center
H = Hilton Hotel
M, SJ = Marriott Hotel, San Jose Ballroom

Semiconductor Lasers and LEDs

Program Chair: **Daniel Johnstone,** Virginia Commonwealth Univ.

6104 **High-Power Diode Laser Technology and Applications IV** *(Zediker)* . CC, Rm J3 130

6132 **Vertical-Cavity Surface-Emitting Lasers X** *(Lei, Choquette)* CC, Rm C2 200

6133 **Novel In-Plane Semiconductor Lasers V** *(Mermelstein, Bour)* . . CC, Rm N . 202

6134 **Light-Emitting Diodes: Research, Manufacturing, and Applications X** *(Streubel, Yao, Schubert)* . . . . . CC, Rm A4 205

Laser Communication and Propagation

Program Chair: **G. Stephen Mecherle,** Innocept Inc.

6105 **Free-Space Laser Communication Technologies XVIII** *(Mecherle)* . . . . . CC, Rm F1 132

Laser Micro-/Nanoengineering and Applications

Program Chairs: **Henry Helvajian,** The Aerospace Corp.; **James S. Horwitz,** U.S. Department of Energy

6106A **Laser Applications in Microelectronic Optoelectronic Manufacturing XI** *(Arnold, Holmes, Meunier, Okada)* . . . . CC, Rm J4 Joint Session Tues CC, Rm A3 134

6106B **Synthesis and Photonics of Nanoscale Materials IV** *(Dubowski, Geohegan, Träger)* . . . CC, Rm J4 137

6107 **Laser-Based Micro-Packaging** *(Bachmann, Hoving, Lu, Washio)* . . . . . H, Santa Clara II . 138

6108 **Commercial and Biomedical Applications of Ultrafast Lasers VI** *(Heisterkamp, Neev, Nolte, Schaffer)* . CC, Rm A3 140

MOEMS-MEMS

Micro & Nanofabrication

2006 Symposium Chair

Rajeshuni Ramesham, Jet Propulsion Lab.

2006 Symposium Cochair

Albert K. Henning, Redwood Microsystems, Inc.

Founding Chair

M. Edward Motamedi, Revoltech Microsystems

Micro/Nanofabrication

6109 **Micromachining and Microfabrication Process Technology XI** *(Maher/Stewart/Chiao)* . . . . H, University 146

6110 **Micromachining Technology for Micro-Optics and Nano-Optics IV** *(Johnson/Nordin/Suleski)* . . . . . H, Santa Clara I/II 148

Devices/Applications/Reliability

6111 **Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS V** *(Tanner/Ramesham)* . . . H, Santa Clara I 150

6112 **Microfluidics, BioMEMS, and Medical Microsystems IV** *(Papautsky/Wang/Vauchier)* . H, Almaden I . . 152

6113 **MEMS/MOEMS Components and Their Applications III** *(Olivier/Tadigadapa/Henning)* . . . . H, San Carlos I/II 154

6114 **MOEMS, Display, Imaging, and Miniaturized Microsystems IV** *(Ürey/Dickensheets/Gogoi)* . . . . . H, San Carlos I/II 156

CC = Convention Center
H = Hilton Hotel
M, SJ = Marriott Hotel, San Jose Ballroom

OPTO

Integrated Optoelectronic Devices

2006 Symposium Chair

Seppo Honkanen,
Optical Sciences Ctr./Univ. of Arizona

2006 Symposium Cochair

Yakov Sidorin,
Photineer Technology Group

Optoelectronic Materials and Devices

Program Chair: **James G. Grote,** Air Force Research Lab.

6115 **Physics and Simulation of Optoelectronic Devices XIV** *(Osiński, Arakawa, Henneberger)* . CC, Rm B3 162

6116 **Optical Components and Materials III** *(Digonnet, Jiang)* . . . . . M, SJ Blrm, Salon V 166

6117 **Organic Photonic Materials and Devices VIII** *(Grote, Kajzar, Kim)* . . . . M, SJ Blrm. Salon I 168

6118 **Ultrafast Phenomena in Semiconductors and Nanostructure Materials X** *(Tsen, Song, Jiang)* . CC, Rm D . 171

6119 **Semiconductor Photodetectors III** . . . . . CC, Rm B4 173
(Cohen, Dereniak)

6120 **Terahertz and Gigahertz Electronics and Photonics V** *(Hwu, Linden)* . . . CC, Rm A1/A2 174

6121 **Gallium Nitride Materials and Devices** . . . . CC, Rm E . 176
(Litton)

6122 **Zinc Oxide Materials and Devices** . . M, SJ Blrm. Salon I 178
(Hosseini Teherani, Litton)

Photonic Integration

Program Chair: **Yakov Sidorin,** Photineer Technology Group

6123 **Integrated Optics: Devices, Materials, and Technologies X** *(Sidorin, Waechter)* . . . . . M, SJ Blrm. Salon II 180

6124 **Optoelectronic Integrated Circuits VIII** . . . CC, Rm K . 183
(Eldada)

6125 **Silicon Photonics** *(Kubby, Reed)* . . . . . CC, Rm C3 186

6126 **Photonics Packaging and Integration VIII** . CC, Rm M 188
(Heyler, Chen, Earman)

Nanotechnologies in Photonics

Program Chair: **Ali Adibi,** Georgia Institute of Technology

6127 **Quantum Sensing and Nanophotonic Devices III** *(Razeghi, Brown)* . . . . CC, Rm L . 189

6128 **Photonic Crystal Materials and Devices IV** *(Adibi, Lin, Scherer)* . . . . M, SJ Blrm. Salon III 192

6129 **Quantum Dots, Particles, and Nanoclusters III** *(Eyink)* . . . . . M, SJ Blrm. Salon VI 195

Advanced Optoelectronic Applications

Program Chair: **Zameer U. Hasan,** Temple Univ.

6130 **Advanced Optical and Quantum Memories and Computing III** *(Coufal, Hasan, Craig)* . . . . . CC, Rm B2 197

6131 **Nanomanipulation with Light II** *(Andrews)* . CC, Rm B4 199

Semiconductor Lasers and LEDs

Program Chair: **Daniel K. Johnstone,** Virginia Commonwealth Univ.

6132 **Vertical-Cavity Surface-Emitting Lasers X** *(Lei, Choquette)* . . . . . CC, Rm C2 200

6133 **Novel In-Plane Semiconductor Lasers V** . . CC, Rm N . 202
(Mermelstein, Bour)

6134 **Light-Emitting Diodes: Research, Manufacturing, and Applications X** *(Streubel, Yao, Schubert)* . . . . . CC, Rm A4 205

6104 **High-Power Diode Laser Technology and Applications IV** *(Zediker)* . . . . CC, Rm J3 130

Displays and Holography

Program Chairs: **Liang-Chy. Chien,** Kent State Univ.; **Ming H. Wu,** Hamamatsu Corp.

6135 **Liquid Crystal Materials, Devices, and Applications XI** *(Chien)* . . . . CC, Rm N . 207

6136 **Practical Holography XIX: Materials and Applications** *(Bjelkhagen, Lessard)* . . CC, Rm M 210

Special Events Daily Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	**22 January**	**23 January**	**24 January**	**25 January**	**26 January**
Biomedical Optics Exhibition *San Jose Convention Center, Exhibition Hall 1* Saturday 21 January 1:00 to 5:00 pm Sunday 22 January 10:00 am to 4:00 pm		**MOEMS-MEMS Plenary Session,** 9:00 am to Noon, p. 18	**OPTO Plenary Session,** 8:30 to 10:00 am, p. 20	**LASE Plenary Session,** 10:30 am to 12:30 pm, p. 14	**LASE Best Student Presentation Award,** 5:50 pm, p. 16
BiOS Hot Topics 7:00 to 9:30 pm, p. 12	*NIST Workshop:* **Biophotonic Tools for Cell and Tissue Diagnostics** 6:00 to 8:30 pm, p. 12	*STUDENT EVENT:* **High Technology Entrepreneurship: From Conception to Venture,** 1:30 to 3:30 pm, p. 10	**WS412: Intellectual Property Issues in High-Tech Business,** 8:30 am to 12:30 pm, p. 22	**WS487: Pulling Property Out of Thin Air: The Optical Patent,** 8:30 to 11:00 am, p. 23	
		WS609: Basic Optics for Non-Optics Personnel, 1:30 to 5:30 pm, p. 22	**WS758: Intellectual Property: Prior Art Searching,** 1:30 to 5:30 pm, p. 22	*STUDENT EVENT:* **WS667: The Craft of Scientific Presentations: A Workshop on Technical Presentations,** 8:30 am to 12:30 pm, p. 24	
		Welcome Reception, 6:00 to 7:30 pm, p. 10	**BiOS Conference Poster Session,** 6:00 to 7:30 pm, p. 10	*STUDENT EVENT:* **Lunch with the Experts- A Networking Event,** 12:30 to 1:30 pm, p. 11	
		Panel Discussion: **Progress and Prospects in Microfluidics,** 7:30 to 9:30 pm, p. 19	**LASE Panel Discussion,** 6:00 to 7:30 pm, p. 16	*STUDENT EVENT:* **WS668: The Craft of Scientific Writing: A Workshop on Technical Writing,** 1:30 to 5:30 pm, p. 24	
			IBOS—International Biomedical Optics Society, 7:30 to 9:00 pm, p. 13	*STUDENT EVENT:* **WS777: Optimizing Your Resume,** 1:30 to 5:30 pm, p. 11	
			Technical Group Meeting: **Holography,** 7:30 to 9:00 pm, p. 20	**WS756: How to Start a Small High Tech Business Almost Anywhere,** 1:30 to 5:30 pm, p. 23	
			Technical Group Meeting and Panel Discussion: **Adaptive Optics,** 7:30 to 9:00 pm, p. 19	**OPTO, LASE, MOEMS/MEMS Conference Poster Session,** 6:00 to 8:00 pm, p. 10	
			Technical Group Meeting: **Laser Communications,** 7:30 to 9:00 pm, p.15	*Women in Optics Sponsored:* **Presentation and Reception,** 7:00 to 8:30 pm, p. 10	
			Technical Group Meeting: **Global Homeland Security,** 7:30 to 9:00 pm, p. 13	*Round Table Discussion:* **MOEMS-MEMS,** 5:30 to 6:30 pm, p. 19	
			SPIEWorks Career Fair 10:00 am to 5:00 pm	10:00 am to 5:00 pm	
			Photonics West Exhibition *San Jose Convention Center, Exhibition Halls 1-3, Exhibit foyer, and South Hall* 10:00 am to 5:00 pm	10:00 am to 5:00 pm	10:00 am to 4:00 pm

Photonics West 2006

Exhibiting on the UK/US Partners Pavilion

Centre for Integrated Photonics (CIP)	Booth 2036
Davin Optronics Ltd	Booth 1945
East of England International	Booth 1941
FiberLogix Ltd	Booth 1941
LEW Techniques Ltd	Booth 2042
Mesophotonics Ltd	Booth 1939
Mindready Solutions	Booth 6319
Miniflex Ltd	Booth 1941
OpTek Systems	Booth 6321
Photonics Cluster (UK)	Booth 2044
Photonic Products Ltd	Booth 2040
SIFAM Fibre Optics Ltd	Booth 1937
Sira	Booth 2044
Specialised Imaging Ltd	Booth 2038
Spectronic Devices Ltd	Booth 1947
Tecan Ltd	Booth 2046

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Special Events

Welcome Reception

Fairmont Hotel, Imperial Ballroom

Monday 23 January . . . . . 6:00 to 7:30 pm

All attendees are invited to relax, socialize, and enjoy refreshments while establishing and renewing connections with colleagues. Please remember to wear your conference registration badges. Dress is casual.

Poster Sessions

Parkside Hall

For BiOS conferences

Tuesday 24 January . . . . . 6:00 to 7:30 pm

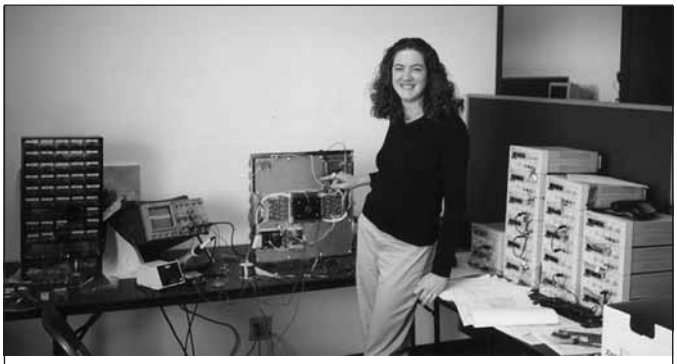
For OPTO, LASE, and MOEMS/MEMS conferences

Wednesday 25 January . . . . . 6:00 to 8:00 pm

All registered symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors.

Poster Setup

Poster presenters: see p. 250 for instructions on setting up your posters.



WiO Presentation and Reception

Wednesday 25 January · 7:00 to 8:30 pm
Fairmont Hotel: Atherton

Digital Image Sensors: A brief history of an amazing technology

Gloria Putnam
Worldwide Field Applications Engineering
Manager, Image Sensor Solutions, Eastman Kodak Company

In the 36 years since the invention of the CCD, Electronic imaging has grown from an esoteric art serving the scientific community to a mainstream technology enabling the $385B Infoimaging industry. In her talk Gloria will discuss the past, present, and future of imager technologies and the applications they make possible.

Open to all conference attendees

Sponsored by SPIE Women in Optics

Student Events

Focus on Industry

High Technology Entrepreneurship: From Conception to Venture

Monday 23 January · 1:30 to 3:30 pm · Hilton Hotel: Almaden II

Prof. Greg Crawford, Brown University, Providence, RI

NOTE: *This workshop is* ***free to ALL SPIE Members****.*

Students interested in starting hi-tech businesses and professors exploring a multidisciplinary approach to teaching business in engineering are especially encouraged to attend.

This seminar is divided into two parts: (1) the nuts-and-bolts of entrepreneurship to teach students the pathway from invention to venture and to have them think about alternative career options after graduation and (2) case studies from Brown University in Providence, Rhode Island and the Technical University of Eindhoven in the Netherlands. Part 1 will focus on the pathway that one needs to take in order to move an invention to the marketplace, including intellectual property, legal issues, company formation, importance of prototyping, investment, marketing, organizational strategy, and exit strategies. Part II will focus on my experience in teaching entrepreneurship in the university, both at Brown University and the Technical University of Eindhoven in the Netherlands, and several case studies will be presented along with the basic educational model.

The explosive worldwide growth, over the last decade, of university-based entrepreneurial education is attributable to many and varied factors. Among these can be cited strong support from alumni and external constituencies, the visibility and status of successful entrepreneurs in society, the increasing desire of universities to develop technologies derived from sponsored research programs for societal and institutional benefit, and an increasing recognition by governmental officials of the vital role played by small entrepreneurial companies in stimulating local economies.

Campus-based entrepreneurship programs have most often been based in business and engineering schools, but such programs continue to gain ever-wider acceptance within the university community. They are increasingly viewed as an authentic educational tool capable of not only training students, but also inspiring and reinforcing for them the traditional values associated with capstone projects. Teaching methods associated with entrepreneurship offerings often tend not to be characteristic of those used in traditional disciplines. Increasingly, the topic and methods associated with teaching it are diffusing into academic disciplines and departments outside of business and engineering.

Professor Greg Crawford and colleague **Professor Eric Suuberg** have developed an innovative Engineering Entrepreneurship course. Multidisciplinary teams of engineering students, and students from other technical and non-technical disciplines, form a core business unit to work on a problem seeded by local industry. The teams work on the product from conception, through engineering design, and next semester will take the design to a prototype stage, and, hopefully, to a level of commercialization. The teams are not only involved with engineering science and design issues, but are responsible for developing a full scale business plan to see the product through to commercialization, and embark on such issues as intellectual property, marketing and market analysis, human factors, safety, and environmental and legal concerns, which strongly affect engineering decision- making. The class is composed of 24 students, predominately seniors from many majors, including Applied Math, Mechanical, Materials, Electrical, and Chemical Engineering from the technical side, and Economics, Psychology, English, and Organizational Business and Management from the non-technical side.

Special 2-Day Event!

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SPIEWorks Career Fair

Convention Center Street Level near Hilton Hotel

Tuesday 24 January . . . . . 10:00 am to 5:00 pm
Wednesday 25 January . . . . . 10:00 am to 5:00 pm

Connect with companies involved in the commercial development of optical engineering, remote sensing, materials and devices, signal and image processing, and x-ray optical technologies. This event includes the entire spectrum of light - driven technologies and attracts employers representing a wide range of industries, production processes, and products. If you're a physicist, optical engineer, applied scientist, engineer or product developer this event should be of interest.

- Network with technical staff and human resource recruiters
- Post your resume to the online Career Fair
- Search job postings online (24 hours a day)
- Interview for positions
- Learn more about employment opportunities

Membership in SPIE is not required.

Online Career Services

In addition to the onsite recruitment activities listed above, SPIEWorks offers you online services to help you with your search for employment before, during and after the conference. Visit the online Career Fair being held in conjunction with Photonics West; post your resume, view jobs, or sign-up for "Job Alerts" and receive opportunities by email long after this event is over.

spieworks.com

Free Services for Employers

- Stop by the SPIEWorks booth in the Career Fair and gain access to our proprietary resume database at no charge.
- Post jobs for free. That's right, there's no charge to post jobs to the Photonics West Career Fair. Go to spieworks.com, create an account and sign-in to post jobs online. Your free job(s) will be live 23 – 29 January.

For information on future recruiting events contact Robert Dentel or Dave Baggenstos at +1 360 715 3705 or email sales@spieworks.com

Lunch with the Experts - A Networking Event

Wednesday 25 January · 12:30 to 1:30 pm
Marriott Hotel: San Jose Ballroom, Salon IV

Note: Only the first 100 students to sign up can be admitted.

Combine fun, food and networking at this engaging event. Hosted by SPIE Student Services, this event will feature experts willing to share their accumulated wisdom on career paths within the optics and photonics industry. Lunch is complimentary to all students. Please sign-up at the SPIE Marketplace by Monday at 5:00 pm to reserve a spot.

Newport & Spectra-Physics Student Researcher Night

Wednesday 25 January · 7:00 pm
South First Billiards, 420 S 1st Street

Join the Newport & Spectra-Physics for a night of eating free food, shooting pool, and of course, ice-cold beer. There will be a cool raffle prizes and a chance to hang out with Newport team. This is a special invitation to STUDENTS ONLY. You must wear your Photonics West badge and be 21+ for entry.

Stop by the Newport booth #1307 to register and get directions to the venue.

The Craft of Scientific Presentations: A Workshop on Technical Presentations

Wednesday 25 January · 8:30 am to 12:30 pm

WS667 · Course level: Introductory · CEU .35

***NOTE:** This workshop is **free to SPIE Student Members**, but you must register to attend.*

$100 USD SPIE Members / $150 USD Nonmembers

See p. 24 for full course description.

The Craft of Scientific Writing: A Workshop on Technical Writing

Wednesday 25 January · 1:30 to 5:30 pm

WS668 · Course level: Introductory · CEU .35

***NOTE:** This workshop is **free to SPIE Student Members**, but you must register to attend.*

$100 USD SPIE Members / $150 USD Nonmembers

See p. 24 for full course description.

Optimizing Your Resume

Wednesday 25 January · 1:30 to 5:30 pm

WS777 · Course level: Introductory · CEU .35

***NOTE:** This student-only workshop is **free to SPIE Student Members**, but you must register to attend. See SPIE Cashier to register.*

Today's job market pits you against hundreds, if not thousands, of candidates who have approximately the same credentials as you do. How do you stand out in the crowd? This workshop, which concentrates on students and recent graduates, will review a number of strategies, tips, and tools that you can use to increase the impact of your resume and cover letter. We'll examine ways to translate your educational experience into a format that is attractive to potential employers, and how to create tailored versions of your job search materials for multiple targets. The process of creating your resume will be discussed, with a focus on both layout/formatting and writing style. We'll also look at cover letters, lists of references, and other materials used in your job search.

LEARNING OUTCOMES
This course will enable you to:
- translate your educational and work experience into a focused and effective resume
- avoid common mistakes and misconceptions
- understand how HR and hiring managers typically review resumes
- tailor your resume and cover letter for multiple job targets
- use an effective layout and format to ensure maximum impact
- write a cover letter that helps you stand out from the crowd

INTENDED AUDIENCE
This material is intended primarily for students, recent graduates, and early-career professionals who want to improve the quality and effectiveness of their job search materials.

INSTRUCTOR
John Cain is a former professional resume writer, and has written more than 500 resumes and cover letters for multiple industries and professions, focusing primarily on technical fields. He currently develops technical education programs for SPIE.

BiOS
Special Events

BiOS Hot Topics

Saturday 21 January · 7:00 to 9:30 pm · Convention Center, J2-J3

Welcome and Introduction:

James Fujimoto,
Massachusetts Institute of Technology, BiOS 2006 Symposium Chair

Presentation of Lifetime Achievement Award to

Michael W. Berns,
Univ. of California/Irvine

Presented by: **R. Rox Anderson**,
Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine,
BiOS 2006 Symposium Chair

Hot Topics Moderator

Sergio Fantini,
Tufts Univ.

Laser Microbeams in Space and Time

Michael Berns,
Univ. of California/Irvine

Lasers and Spectroscopy in Medical Applications

Katarina Svanberg,
Lund Univ. Medical Center/Sweden

Transitional Microscopy

Daniel Farkas,
Cedars Sinai Medical Ctr.

Recent Trends in Ultrahigh Resolution OCT

Wolfgang Drexler,
Univ. Vienna

Optical Harmonic Generation Microscopy

Chi Kuang Sun,
National Taiwan Univ.

Endoscopic Microscopy: Bridging the Radiology-Pathology Divide

Guillermo Tearney,
Harvard Medical School

A New Light in Brain Research

Martin Wolf,
Univ. Hospital Zurich

Low-Level Light Therapy: Progress and Possibilities

Michael R. Hamblin,
Harvard Medical School

NIST Workshop

Biophotonic Tools for Cell and Tissue Diagnostics

The roadmap of measurements critical to biophotonic applications

Sunday 22 January · 6:00 to 8:30 pm
Marriott Hotel: San Jose Ballroom IV

Free to all attendees. Light refreshments will be served.

Through this workshop, we will identify the critical measurement needs for biophotonic tools used in tissue and cell diagnostics. A statement of these needs will become part of the biophotonics segment of a national assessment of the U.S. Measurement System infrastructure. This roadmap will enable proactive development of measurement infrastructure to enhance the manufacturing efficiency and quality, improve interoperability, and accelerate the acceptance of biophotonics-related instruments and technologies.

In order to maintain the current rapid advance of biophotonics in the U.S. and to enhance our competitiveness worldwide, key measurement tools must be in place. The right measurement capabilities will improve both manufacturing efficiency and quality, and promote acceptance of biophotonics-based instruments and technologies through improved interoperability. This workshop is a part of a wide-reaching effort by the National Institute of Standards and Technology to improve the U.S. technology base.

It will focus on diagnostic techniques involving the interaction between biological systems and photons. Through invited presentations by industry representatives and panel discussion, the near- and far-term measurement needs will be evaluated. As a result of this workshop, a road-mapping document will be prepared on the measurement tools needed for biophotonic cell and tissue diagnostics. This will become a part of the larger road-mapping effort to be presented to the Nation as an assessment of the U.S. Measurement System. The information will be used to highlight measurement needs to the community and to facilitate solutions among key stakeholders in industry, government, and academia.

The session will comprise of four invited talks followed by a moderated panel discussion. It will include an interactive question and answer segment with the audience and panelists. Panelists include:

Michael Brownstein, The J. Craig Venter Institute

Robert Hoffman, BD Biosciences

Richard Levenson, Cambridge Research and Instrumentation, Inc. (CRi)

Thomas Milner, University of Texas at Austin

This workshop is open to all who are concerned about metrology issues in the area of biophotonics.

Don't miss the

BiOS Weekend Exhibition

San Jose Convention Center, Exhibition Hall 1

A unique exhibition focused on lasers, fibers, and optics in medicine

Saturday 21 January
1:00 to 5:00 pm

Sunday 22 January
10:00 am to 4:00 pm

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 24 January · 7:30 to 9:00 pm
Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona;
Lihong Wang, Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Biomedical optics is a major growth area in modern medicine. The International Biomedical Optics Society is a nonprofit interdisciplinary group that provides a unique channel for communications among physicians and clinicians employing optics in medicine and the scientists and engineers who provide foundations for advancements in this field. The BiOS symposium, where IBOS meets, is the premier annual international forum for discussions and announcements of technical/clinical and educational/pedagogical developments in the use of lasers, optical fibers, spectroscopic diagnostic techniques, and related areas of optical medicine.

The International Biomedical Optics Society of SPIE is pleased to announce a student paper competition. Undergraduate and graduate students who are primary authors and presenters of a paper at BiOS 2006 are encouraged to submit their manuscripts by 6 January 2006 for consideration in the competition. Four finalists will be selected to present their paper during the IBOS meeting Tuesday 24 January at 7:30 pm, in addition to their regularly scheduled presentation time. One winner will be selected during the meeting from the finalist pool. Entries will be judged on technical merit and writing/presentation skill. A $50 cash award will be presented to finalists and $200 to the overall winner. Finalists must present their paper at the IBOS meeting to be eligible for their award.

Technical Group Meeting

Global Homeland Security

Tuesday 24 January · 7:30 to 9:00 pm
Fairmont Hotel: Hillsborough

Chair: **Theodore T. Saito**, Lawrence Livermore National Lab.

You are invited to the SPIE Global Homeland Security Technical Group (GHSTG) meeting. GHSTG's mission is "to stimulate and focus the optics and photonics community's contribution to enhance safety, improve the sense of well being, and to counter terrorist threats."

This meeting will emphasize our Safe Drinking Water Initiative. Curtiss Stahl, VP of Frontier Technology (Santa Barbara, CA) will overview his project in the presentation "Water Quality Contamination Monitoring – a Potential tool for Water Security" and will discuss challenges and requirements for future needs. Dr. Ted Saito will also preview our planned visit (Wed Jan 25) to a local water district and a tour of facilities at the Lawrence Livermore National Laboratory. In addition we will have an update on the Port and Harbor Security initiative and a preview of the two conferences to be held at the Defense and Security Symposium in Orlando, April 2006 (Photonics for Port and Harbor Security and Optics & Photonics in Global Homeland Security).

GHSTG meetings are open to all, but you are encouraged to join the Technical Group to stay connected to the inside track of SPIE's homeland security efforts, and to maximize your participation opportunities to help us secure our homelands.

Visit HYPERLINK "http://spie.org/homelandsecurity" http://spie.org/homelandsecurity to learn more.

LASE
Special Events

Plenary Session

Wednesday 25 January · 10:30 am to 12:30 pm
Convention Center, Room J3

10:30 to 10:40 am

Welcome and Introductions

L. N. Durvasula, DARPA; **Jan J. Dubowski,** Université de Sherbrooke (Canada)

SPIE and LASE Organizers Congratulate Recipients of Physics Nobel Prize Awarded for Optics Work

The Royal Swedish Academy of Sciences awarded the Nobel Prize in Physics for 2005, to Roy J. Glauber, Harvard Univ., "for his contribution to the quantum theory of optical coherence"; and jointly to John L. Hall, Univ. of Colorado and National Institute of Standards and Technology and Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik, Garching and Ludwig-Maximilians-Universität (Germany), "for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique."

10:40 to 11:20 am

Laser Frequency Combs

Theodor W. Hänsch, Max-Planck-Insitut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

Nonlinear optical fibers play a key role in the realization of octave-spanning laser frequency combs. These tools have revolutionized the art of measuring and comparing optical frequencies. Fiber laser based frequency combs provide a long-missing reliable clockwork for otpical atomic clocks. High harmonic generation can extend frequency comb techniques into the extreme ultraviolet. Femtosecond laser frequency combs are, moreover, providing a key to attosecond science by enabling control of the electric field of ultrashort light pulses.

Theodor W. Hänsch was born on October 30, 1941, and raised in Heidelberg, Germany. After graduating from Helmholtz Gymnasium in 1961 he studied physics at the University of Heidelberg, where he obtained his Diploma degree in 1966 and his Doctor degree (Dr. rer. nat., "summa cum laude"), in 1969.

In 1970, he joined Arthur L. Schawlow at Stanford University as a NATO postdoctoral fellow, and he was appointed as Associate Professor of Physics at Stanford in 1972. From 1975 to 1986 he held a tenured appointment as a Full Professor in the Department of Physics at Stanford University. In 1986, he returned to his native Germany to become Director at the Max-Planck-Institut für Quantenoptik in Garching and Professor at the Ludwig-Maximilians-Universität in Munich.

Prof. Hänsch has authored and co-authored more than 400 papers, focusing on coherent nonlinear interactions between light and matter. He is widely known for his seminal contributions in the field of laser spectroscopy. His early work includes the first narrowband tunable dye laser, the invention of commonly used techniques of Doppler-free laser spectroscopy, and the first proposal for laser cooling of atomic gases. Since the early 1970's, Hänsch has pursued precision spectroscopy of the simple hydrogen atom, which permits unique confrontations between experiment and fundamental theory. This work has yielded accurate values of the Rydberg constant, the Lamb shift of the hydrogen ground state, and the charge radii of proton and deuteron. More recently, he has pioneered a revolutionary simple technique for measuring the frequency of light with ultrashort pulses. Exploring the quantum physics of cold neutral atoms, Hänsch and his coworkers have realized the first two- and three-dimensional atomic lattices bound by light, they have demonstrated the first atom laser that emits a continuous beam of coherent matter waves, and they have shown how to integrate a quantum laboratory for ultracold atoms on a microfabricated "atom chip". With a Bose-Einstein condensate in an optical lattice potential, they have been the first to observe a quantum phase transition between a wave-like superfluid state and a particle-like Mott insulator crystal.

Professor Hänsch has been a member of the German Physical Society since 1963. He is a Fellow of the American Physical Society (1973-), the Optical Society of America (1973-), the Franklin Institute (1986-), and the Laser Institute of America (2000-). He is also a member of the American Academy of Arts and Sciences (1983-), the Bavarian Academy of Sciences (1991-), the U.S. National Academy of Science (2001-), and the Accademia Nazionale dei Lincei (2002-).

In 1973, Hänsch was named California Scientist of the Year by the California Museum of Science and Industry. His later awards include the Alexander von Humboldt U.S. Scientist Award (A.v.H. Foundation, 1977), the Otto Klung Prize (Freie Universität zu Berlin, 1980), the Cyrus B. Comstock Prize (U.S. National Academy of Science, 1983), the Herbert P. Broida Prize (American Physical Society, 1983), the William F. Meggers Award (Optical Society of America, 1985), the Michelson Medal (Franklin Institute, Philadelphia, 1986), the Italgas Prize (Italgas, Torino, 1987), the Leibniz Prize (German Research Foundation, 1988), the King Faisal International Prize (King Faisal Foundation, Saudia Arabia, 1989), the Einstein Medal for Laser Science (Society for Quantum Optics and Quantum Electronics, 1995), the Arthur L. Schawlow Prize (American Physical Society, 1996), two Philip Morris Research Prizes (Philip Morris Foundation, 1998 and 2000), the Stern-Gerlach Medal (German Physical Society, 2000), the Arthur L. Schawlow Medal (Laser Institute of America, 2000), the Quantum Electronics and Optics Prize (European Physical Society, 2001), the SUNAMCO Medal (International Union of Pure and Applied Physics, 2001), the Matteucci Medal (Italian National Academy of Science 2002), and the Alfried Krupp Prize for Science (Alfried Krupp Foundation, 2002). In 2003, he has been awarded the "Bundesverdienstkreuz 1. Klasse", and the Bavarian "Maximiliansorden für Wissenschaft und Kunst." In 2005 he received the I. I. Rabi Award and the IEEE Frederic Ives Medal, Optical Society of America (highest award of OSA). He will soon receive the Otto-Hahn-Prize by the Society for Chemistry and Physics, GDCh, and the City of Frankfurt/M. He will be awarded the Nobel Price in Physics, jointly with Professor John L. Hall and Professor Roy Glauber in December 2005.

11:20 to 11:50 am

Ways to a Brighter Future, with Lasers

David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Centre (UK)

Brightness is a key figure of merit for laser performance and suitability for applications. Scaling up the brightness of lasers continues, even after 45 years, to be a major preoccupation of laser development. Here the recent advent of the high power fibre lasers has given a major boost. But this is not the only player. Thin disc lasers, cryogenically-cooled bulk lasers, hybrids combining fibre lasers and bulk lasers, and even parametric amplifiers are all serious contenders. This talk will survey the relative merits of these available options, with the conclusion that significant further increases in laser brightness can be expected in the near future.

David Hanna was born in Nottingham, England on April 10, 1941. His first degree, in Mathematics, awarded in 1962, was from Cambridge University, followed by a PhD in 1967 from Southampton University, for experimental laser research. His academic career began with appointment to a lectureship at Southampton University in 1967, where he has remained, apart from periods of sabbatical leave at the Politecnico di Milano (1971), at the University of Munich (1978-9) and at the Max Born Institute, Berlin 2001 and 2003 as the holder of a Humboldt Research Award. He was promoted to a Chair in Physics in 1988 and in 1989 was appointed to his current position as Deputy Director of the Optoelectronics Research Centre.

His research has covered extensive areas of nonlinear optics and laser physics. These include pioneering studies of nonlinear optical processes in atomic vapours and gases, optical parametric oscillators, and quasi-phase-matched nonlinear materials, while in laser physics he has made innovative contributions to the physics of resonators and mode control, and to the development of solid-state lasers, including fibre lasers and

waveguide lasers. He demonstrated the first Ytterbium-doped and Thulium-doped fibre lasers. He has published over 300 scientific papers, and has presented numerous invited/plenary papers at international conferences. He co-authored the book 'Nonlinear Optics of Free Atoms and Molecules' (Springer 1979).

In 1993 he was awarded the Max Born Medal and Prize by the German Physical Society. In 2000 he was awarded the Quantum Electronics Prize of the European Physical Society and a Research Award by the Alexander von Humboldt Foundation. In 2003 he was awarded the Charles Hard Townes Award of the Optical Society of America.

11:50 am to 12:20 pm

Taking Technology to the Marketplace

Aram Mooradian, Novalux, Inc.

The history of Novalux is presented as an example of the pathway to commercialization of technology into one or more large dollar volume markets. Included is the progression of funding, investor interactions, identification of markets, technology required to meet the market demands and liquidity strategies. Specific Novalux technology is based on high-power frequency doubled surface emitting semiconductor laser arrays that operate in the visible wavelength range for use in projection display. These devices can meet the price and performance goals for displays from small format to home theater to signage, a total annual market that will exceed $25B. The revenue for the laser light sources can exceed $2B/year with licensing franchising fees exceeding this amount. Good technology with a strong patent base needs a large market with little major competition to be teamed with smart, patient investors and one or more large corporate partners in order to succeed. Lasers have been known for some time to provide outstanding picture color gamut and light intensity but have been limited by their cost and complexity. A description of how the Novalux laser technology was developed and now can meet the needs of display and specialty lighting markets will be discussed.

Aram Mooradian is the founder and Chief Technology Officer of Novalux, Inc., a company located in Sunnyvale, CA that manufactures high power surface emitting semiconductor lasers and laser arrays for projection display. He received the PhD degree in physics at Purdue University where he studied semiconductors and lasers. He then joined the MIT Lincoln Laboratory as a staff member and later became the Leader of the Quantum Electronics Group. He founded Micracor, Inc., in 1992, an MIT spin-off company that developed technology such as optically pumped and tunable semiconductor lasers. Dr. Mooradian has been involved in the transfer of Department of Defense technology into the commercial marketplace.

12:20 to 12:30 pm

Closing Remarks

L. N. Durvasula, DARPA; **Jan J. Dubowski,** Université de Sherbrooke (Canada)

Technical Group Meeting

Laser Communications

Tuesday 25 January · 7:30 to 9:00 pm
Fairmont Hotel: Belvedere Room

Chair: **Steve Mecherle,** Innocept Inc.

Sponsored by **Fiber Guide**

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XVIII conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

LASE Seminar and Panel Discussion

Quantifying high-power diode laser lifetime: a seminar and discussion

Tuesday 24 January · 6:00 to 7:30 pm · Convention Center: Room J3

For anyone manufacturing or using high power laser diodes for solid state laser pumping or for direct processing applications achieving very long lifetimes of these devices is essential. Currently different statistical terms (MTTF, MTBF, t50 etc) are used for defining lifetime. This has led to a great deal of confusion in the marketplace. It is felt that the widely varying lifetimes quoted are due not only to technological differences between products but also due to different measurement techniques and even different mathematical methodologies being applied to these measurements. In addition, even existing standards are eventually not taken seriously enough. This panel discussion will therefore be focused on the methodology and standards for the determination of lifetime of high power laser diodes and diode laser bars, rather than the technology and the reasons for failures. Our goal for this discussion is to come to a common understanding for the determination of lifetime, to implement the knowledge about the standards and, if those are not sufficient, to generate working groups to improve the situation.

Agenda

Seminar

Welcome and Opening Remarks,
Friedrich Bachmann, Rofin-Sinar Laser GmbH (Germany)

Theory: Statistical basics, definitions and standards for lifetime determination
Detlev Wolff, Jenoptik Laserdiode GmbH (Germany)

Application: Determination of single emitter diode laser lifetime using a multicell life test approach
Toby Strite, JDSU (USA)

Application: Determination of laser diode bar and array lifetime based on degradation mode physics
Norbert Lichtenstein, Bookham AG (Switzerland)

Panel Discussion

Organizer: **Friedrich Bachmann,** ROFIN-SINAR Laser (Germany)

Moderator: **Tony Hoult,** Applications Manager, SPI Lasers (USA)

Panelists: **Friedhelm Dorsch,** Director Diode Laser Systems, TRUMPF Photonics (USA); **Adolf Giesen,** Senior Scientist, CHOCLAB Coordinator, University Stuttgart (Germany); **Norbert Lichtenstein,** Director R&D, Bookham AG (Switzerland); **Steve Norman,** Vice President Engineering, SPI Lasers (United Kingdom); **Alan Paxton,** Senior Scientist, Air Force Research Laboratory (USA); **Nissim Pilossof,** Principal Engineer, Kodak Graphic Comm. Comp. (Canada); **Toby Strite,** Marketing Manager, High Power Lasers, JDSU (USA); **Detlev Wolff,** Manager Marketing and Sales, Jenoptik Laserdiode (Germany)

Best Student Presentation Award

Fiber Lasers III: Technology, Systems, and Applications

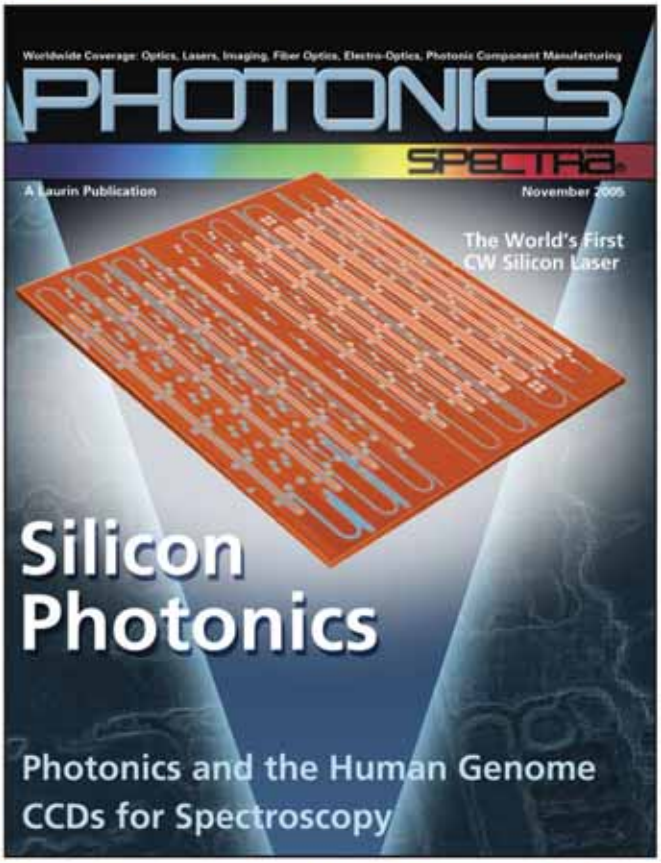
Thursday 26 January · 5:50 pm · Convention Center, Room J2

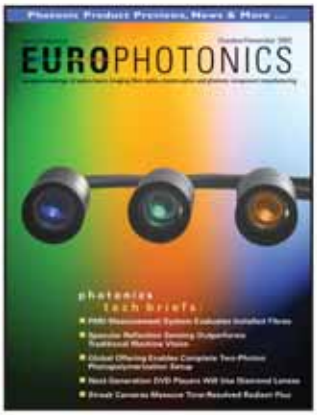
Prize donated by:

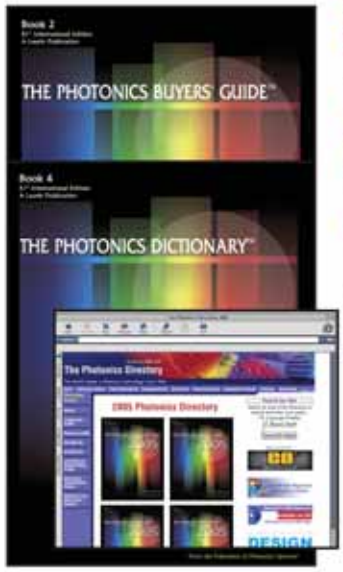
Best Student Presentation Award

We are pleased to announce that a prize in the amount of $1,000 US will be awarded to the best student oral presentation in the conference on Fiber Lasers III: Technology, Systems, and Applications at SPIE's Photonics West Symposium taking place next January in San Jose, California. This year's prize money has been donated by Aculight Corporation (**www.Aculight.com**) and the award will be presented by Dr. Andrew Brown, Director of Business Development at Aculight and Co-Chair of the Fiber Lasers III conference.

The Most Powerful Sources for Photonics Information







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EUROPHOTONICS

EuroPhotonics is a product-oriented publication dedicated to covering the growing market for photonics with a European focus. It is published bimonthly with a guaranteed distribution of 30,000 to important buyers and users of photonic products and services in Europe. Featured sections include European Show Spotlights, Product Previews and News.

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MOEMS-MEMS
Special Events

Plenary Session
Monday 23 January · 9:00 am to Noon
Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am

Opening Remarks and Introduction of Speakers

9:10 to 10:00 am

Fluidic Optics

George M. Whitesides, Harvard Univ.

The combination of "light" and "microsystems" and "fluidics" provides many opportunities for new types of devices and capabilities. This talk will focus on three subjects in fluidic optical devices: i) fabrication (using soft lithography) of new types of micro- and nanosystems relevant to optics; ii) liquid core/liquid cladding optical systems; and iii) spectrally dispersed optical detectors for microfluidic systems.

George M. Whitesides was born August 3, 1939 in Louisville, KY. He received an A.B. degree from Harvard University in 1960 and a Ph.D. from the California Institute of Technology (with J.D. Roberts) in 1964. He was a member of the faculty of the Massachusetts Institute of Technology from 1963 to 1982. He joined the Department of Chemistry of Harvard University in 1982, and was Department Chairman 1986-1989, and Mallinckrodt Professor of Chemistry from 1982-2004. He is now the Woodford L. and Ann A. Flowers University Professor.

Recent Awards: Von Hippel Award (Materials Research Society) (2000). World Technology Award for Materials from the World Technology Network (2001). Doctorate Honoris Causa, University of Twente (The Netherlands) (2001). Small Times Magazine's Researcher of the Year award (2002). Pittsburgh Analytical Chemistry Award (Society for Analytical Chemists of Pittsburgh) (2003). Kyoto Prize for Advanced Technology (Inamori Foundation) (2003). Paracelsus Prize (Swiss Chemical Society) (2004). Ralph and Helen Oesper Award (Cincinnati Section of ACS) (2004). Jacob Heskel Gabbay Award in Biotechnology and Medicine (Jacob and Louise Gabbay Foundation) (2004). 2004 Dickson Prize in Science (Carnegie Mellon University) (2005). Dan David Prize (Dan David Foundation) (2005). Emanuel Merck Lecture Prize, (Technische Universität Darmstadt/Merck) (2005).

Recent advisory:
- *National Research Council:* Board on Chemical Sciences and Technology (1984-89; Chairman, 1986-99); Naval Studies Board (1989-97; Vice Chairman, 1992-97); Committee on Bioprocess Engineering (1991-92); Board on Science, Technology and Economic Policy (1991-97); Visiting Committee on Advanced Technology (1994-97); Board on Physics and Astronomy (1997-2001) Committee on Science and Technology for Countering Terrorism (2002); Committee on Nanotechnology for the Intelligence Community (2003).
- *National Science Foundation:* Chemistry Advisory Committee (1984-86; Chairman, 1986), Materials Research Advisory Committee (1991-93; Chairman, 1993), Review Panel for the Materials Research Laboratories (1993, co-Chairman); Advisory Committee for Mathematics and Physical Sciences (1993-96); NSF Senior Assessment Panel: International Assessment of U. S. Mathematical Sciences (1997); Workshop on Chemical Bonding Centers, (2003).
- *Department of Defense:* Defense Advanced Research Projects Agency Defense Science Research Council (1984-); Defense Science Board (1993-2003); Threat Reduction Advisory Committee to the Defense Threat Reduction Agency (1998-).
- *National Aeronautics and Space Administration (NASA)*: Biological and Physical Research Maximization and Prioritization (REMAP) Task Force (2002)
- *Other*: M.I.T. Advisory Committee for Lincoln Laboratory (1985-2004); Scientific Advisory Committee for the Scripps Research Institute (1993-); Sandia Science and Technology Advisory Board (2002-); Intelligence Science Board (2003); International Committee to Assess the Status of Chemistry in the UK (EPSRC, 2003; chairman); Committee to Survey the Sciences at Brandeis (2005, Chairman)

10:00 to 10:20 am

Coffee Break

Convention Center, Ballroom Concourse

10:20 to 11:10 am

Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms — Icarus Revisited?

Marc Madou, *Chancellor Professor*
Univ. of California/Irvine

Prediction is extremely difficult.

Especially about the future.
—Niels Bohr

In bottom-up manufacturing, small molecular building blocks such as nucleic and amino acids are strung together, to make a plethora of mostly soft, low Young's modulus biological structures, ranging from DNA and proteins to artificial biological cells and artificial tissues. It is important to note that most biomolecular manufacturing occurs in an aqueous solution, not in the dry vacuum of an evaporation or sputtering station and that a biological cell, a fine-tuned protein factory, has a water balancing system to keep its manufacturing lines working.

It is likely that new biomimetic manufacturing methodologies will have a major impact on nanotechnology. Through genetic engineering the same molecule, perhaps a protein such as calmodulin, may be optimized to exhibit improved sensing by optimal placement of a fluorescent label within the molecular structure. Further generalizing, the combination of genetically engineered natural polymers such as proteins and nucleic acids with top-down machined structures (e.g., the nano channel we mentioned) promises the advent of a totally new class of sensors and actuators. Proteins and nucleic acid are information rich molecules with structural properties making their incorporation in the human sensor and actuator manufacturing arsenal an attractive proposition. To increase the operational window of such genetically engineered biosensor molecules in terms of temperature, pH, pressure, etc., a cue might be taken from the design of natural occurring extremophiles.

The outlined strategy will be illustrated with four ongoing projects:
1. Diagnostics on a Compact Disc
2. The Smart Pill: Responsive Drug Delivery
3. Electronic DNA Detection
4. An Adaptive Hydrogel Lens

Marc Madou, before joining UCI as the Chancellor's Professor in Mechanical and Aerospace Engineering (MEA), Dr. Madou was Vice President of Advanced Technology at Nanogen in San Diego, California. He specializes in the application of miniaturization technology to chemical and biological problems (BIO-MEMS). He is the author of several books in this burgeoning field he helped pioneer both in Academia and in Industry. He founded several micromachining companies and has been on the board of many more.

Madou was the founder of the SRI International's Microsensor Department, founder and President of Teknekron Sensor Development Corporation (TSDC), Visiting Miller Professor at UC Berkeley and Endowed Chair at the Ohio State University (Professor in Chemistry and Materials Science and Engineering). He has just started the third edition of'"Fundamentals of Microfabrication," an introduction to MEMS which has become known as the "bible" of micromachining. "

11:10 to Noon

Tunable Micro-optics

Hans Zappe, IMTEK-Dept. of Microsystems Technology, Univ. of Freiberg (Germany)

Micro-optical components have become important elements in complex microsystems, requiring interdisciplinary engineering to fully realize their potential. Key to many new applications will be tunability: a controlled change in the optical properties of lenses, mirrors or filters can result in a significant increase in functionality and open new application areas for optical microsystems.

We will present some of the technologies and devices being employed for the fabrication of tunable micro-optics. Liquid lenses and lens arrays, polymer membrane-based micro-lenses and mirrors as well as tunable optical filters are examples of micro-optical components whose characteristics may be tuned: focal length, position, lens curvature or transmission wavelength are examples of tunable parameters. The industrial potential for some of these devices is considerable, and a number of applications ranging from consumer items to specialized medical instrumentation will be discussed.

Hans Zappe, born in Paris and raised in New York, studied Electrical Engineering at the Massachusetts Institute of Technology (BSc & MSc, 1983) and at the University of California, Berkeley (PhD, 1989). He has worked at the IBM General Technology Division (Burlington, VT, USA) on silicon VLSI, at the Fraunhofer Institute for Applied Solid State Physics (Freiburg, Germany) on GaAs electronics and high-speed lasers and at the Centre Suisse d'Electronique et de Microtechnique (CSEM, Zurich, Switzerland) on integrated optical microsystems and surface-emitting lasers. Since 2000, Prof. Zappe has been Professor of Micro-optics in the Department of Microsystems Technology at the University of Freiburg, Germany, where he is also Dean of Studies. His current research specialties are in the areas of optical microsystems for medicine, tunable micro-optics and the use of novel optical materials.

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm
Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ.of California/Irvine; **Eric Mounier,** Yole Développment (France); **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George Whitesides,** Harvard Univ.

In the past decade, microfluidics has rapidly emerged and become main stream. Microfabrication techniques related to microfluidics have matured and are commercially available. Most microfluidic devices today are made of glass and polymer materials. In large measure, this rapid emergence of microfluidics has been driven by compelling applications in analytical chemistry and biomedical sciences, with enormous potential in developing new technologies and reducing costs. Recent years have seen a number of microfluidic chips brought to market, including those by Agilent and Fluidigm. One little-addressed aspect of microfluidics, however, is on-chip synthesis of microfluidics with optical detection techniques. This panel discussion will provide an overview of microfluidics over the past decade, with particular emphasis on progress related to the integration of optical detection in microfluidic systems.

Technical Group Meeting

Adaptive Optics

Panel Discussion

Professional Training in Adaptive Optics

Tuesday 24 January · 7:30 to 9:00 pm · Fairmont Hotel: Piedmont

Chair: **Scot S. Olivier**, Lawrence Livermore National Lab.

The SPIE International Technical Group on Adaptive Optics will hold a panel discussion on Professional Training in Adaptive Optics. Leading experts from around the world will discuss the needs for professionals trained in the concepts and practice of active and adaptive optics, and strategies for providing the necessary training to students at the Bachelor to Doctorate level. All those interested are welcome to attend and participate in the discussion - students and post-doctoral researchers working or interested in adaptive optics are particularly encouraged to participate.

Adaptive optics is established as a requirement for large, ground-based telescopes and high-energy laser systems. This technology is rapidly finding uses in fields such as optical communications, medical imaging, and remote sensing. An international community of researchers from around the world is advancing the state-of-the-art in adaptive optics methods, components and systems.

The SPIE International Technical Group on Adaptive Optics provides a forum for communication within the specialized fields of active and adaptive optics. The group is intended for scientists and engineers who are working or interested in these and related disciplines, including sensor technologies, control systems, real-time computing, optical and mechanical engineering.

Round Table Discussion

MOEMS-MEMS

Wednesday 25 January · 5:30 to 6:30 pm
Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier**, Lawrence Livermore National Lab.; **Albert K. Henning,** Redwood Microsystems, Inc.

A Center for Optical MEMS

Senior researchers, academic faculty, industry executives and staff are invited to join a round table discussion about a potential future center for optical MEMS. Topics to be addressed include possibilities for (1) center structure, (2) R&D thrust areas, (3) industry, academic and government participants, (4) funding models, (5) added value of a new center in optical MEMS.

Optoelectronics
Special Events

Plenary Session on Silicon Photonics
Tuesday 24 January 2006 · 8:30 to 10:00 am
Marriott Hotel: San Jose Ballroom, Salon IV

8:30 am
Introduction and Opening Remarks

8:40 am
Light Emission in Silicon: Recent Advances and Future Directions

Bahram Jalali, Univ. of California/ Los Angeles

This talk will review recent progress in the field of silicon photonics with focus on active devices including lasers, modulators and photodetectors. Optically pumped silicon lasers have already been demonstrated using the Raman approach. The alternative approach based of SiO2 films doped with silicon nanocrystals and Erbium is also showing promise. Using the III-V quantum dot laser as a benchmark, the talk will establish the prospects for optical and electrically pumped lasers based on the silicon nanocrystals approach. Through extensive device optimization, the traditional approach of free carrier plasma effect has been extended to 10Gbit/s electrooptic modulation in ultra compact device structures. Advances in epitaxial growth of Germanium on Silicon have produced photodetectors with responsivities, at communication wavelengths, approaching those of III-V devices.

Bahram Jalali is a Professor of Electrical Engineering at UCLA. He has published over 200 scientific papers in peer-reviewed journals and conferences and holds 6 US patents. He is a Fellow if IEEE, a Fellow of the Optical Society of America, and the Chair of the Los Angeles Chapter of the IEEE Lasers and Electro Optics Society (LEOS). His research interests include silicon photonics and optical signal processing. While on leave from UCLA from 1999-2001, Dr. Jalali founded Cognet Microsystems, a Los Angeles based fiber optic component company. He served as the company's CEO, President and Chairman, from its inception through acquisition by Intel Corporation in 2001. From 2001-2004, he was a consultant for Intel Corporation. Dr. Jalali serves on the Board of Trustees of the California Science Center.

9:20 am
Silicon Optoelectronics: Opportunities, Applications, and Recent Results

Mario Paniccia, Photonics Technology Lab., Intel Corp.

The silicon chip has been the mainstay of the electronics industry for the last 40 years and has revolutionized the way the world operates. Today a silicon chip the size of a fingernail contains nearly 1 Billion transistors and has the computing power that a decade ago would take up an entire room full of servers.

Silicon photonics that mainly based upon silicon on insulator (SOI) has recently attracted a great deal of attention since it offers an opportunity for low cost opto-electronic solutions for applications ranging from telecommunications down to chip-to-chip interconnects as well as possible applications in new emerging areas such as optical sensing and or bio-medical applications.

Recent advances and breakthroughs in performance of silicon based photonic devices is demonstrating that silicon can be considered as a practical material onto which one can build optical devices. If successful, silicon photonics may similarly come to dominate optical communications arena.

In this session, Dr. Paniccia will provide an overview of device performance improvements in silicon photonics as well as a discussion on the applications and future opportunities for these devices. In addition he will discuss some of the challenges for producing silicon photonic devices in a high volume manufacturing facility.

Dr. Mario Paniccia is currently the Director of Photonic Technology Lab at Intel Corporation. Mario currently directs a research group with activities in the area of Silicon Photonics. His team is focused on developing silicon-based photonic building blocks and technologies using standard CMOS processing for future use in enterprise and data center communications. Mario has worked in many areas of optical technologies during his career at Intel including optical testing for leading edge microprocessors, optical communications and optical interconnects. Mario earned a B.S. degree in Physics in 1988 from the State University of New York at Binghamton and a Ph.D. degree in Solid State Physics from Purdue University in 1994. Mario has published numerous papers and book chapters (including 3 Nature papers) has over 65 patents issued or pending. He has received numerous awards including in November 2004 being awarded by Scientific American to be one of the top 50 researchers for his teams pioneering work in the area of silicon photonics.

Technical Group Meeting

Holography
Tuesday 24 January 2006 · 7:30 to 9:00 pm
Fairmont Hotel: Cupertino

Chairs: **Hans I. Bjelkhagen,** De Montfort Univ. (United Kingdom); **Raymond K. Kostuk,** The Univ. of Arizona

In 1948 Dennis Gabor realized that the wavefront emanating from each point of a scene could be recorded by causing it to interfere with a background wave, converting phase difference into an intensity difference. The wavefront could be reconstructed by illuminating the recorded information with coherent light. Gabor termed this process holography, or whole record.

The Holography Technical Group is involved with the whole record of research, engineering, and applications in holographic optical elements, nondestructive testing, computer-generated holography, materials and processing, commercial and artistic applications of holography, and standardization issues.

Professor Gabor's career was an eclectic and highly nonlinear one. The nonlinearity seemed to worry even him, slightly, for a while, but it should give some reassurance to all of us who have sailed the erratic winds of holography!

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Basic Optics for Non-Optics Personnel

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic understanding of the terms, specifications, and measurements used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasising working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification and depth-of-field, understanding MTF curves and interferograms, and interpreting radiometric terms.

LEARNING OUTCOMES

This course will enable you to:

- Read and understand optical system descriptions and papers
- Ask the right questions about optical component performance
- Understand basic optical specifications for lenses, filters, and other components
- Select the right off-the-shelf lenses, filters, and beam directing optics
- Interpret optical data such as interferogram, MTF and aberration reports

INTENDED AUDIENCE

This course is intended for the non-optical professional who needs to understand basic optics and interface with optics professionals.

INSTRUCTOR

Kevin Harding has been active in the optics industry for over 25 years, and has taught machine vision and optical inspection methods for over 20 years in over 70 workshops and tutorials, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers. He has been recognized for his leadership in machine vision by the Society of Manufacturing Engineers, Automated Imaging Association, and Engineering Society of Detroit.

Course level: Introductory

WS609 CEU .20 $100 / $150 USD

Monday 1:30 to 3:30 pm

Intellectual Property Issues in High-Tech Business

Intellectual property (IP), in the form of copyrights, trademarks, trade secrets, ideas and patents, is of critical importance in high-tech business. In today's economy, IP is an asset that high-tech companies seek to leverage to add to their bottom line, whether through licensing or lawsuits. For many high-tech companies, IP represents their most valuable asset. Not surprisingly, the typical high-tech company's level of technical sophistication far outweighs its level of IP sophistication; yet both are needed to ultimately be successful in the high-tech marketplace. It is therefore imperative that employees of a high-tech company know the fundamentals of IP and understand their role in the IP-related aspects of a high-tech business. The aim of this course is to provide the audience with an overview of the numerous IP issues related to high-tech business. Topics covered include: the basic forms of IP, developing an IP strategy, IP licensing, litigation issues, IP insurance, IP management, directed development and generation of IP, and patent mapping.

LEARNING OUTCOMES

This course will enable you to:

- understand the basic forms of IP
- understand the role of IP in a company
- intelligently manage IP in a company
- develop an IP strategy that suits your business
- work intelligently with attorneys
- optimize the value of your company's IP
- properly generate, develop and leverage IP
- properly identify and document existing and future IP
- understand your role in your company's IP process.

INTENDED AUDIENCE

This course is designed for technicians, engineers, scientists, managers and executives involved in high-tech business.

INSTRUCTOR

Joseph Gortych is a registered patent attorney and is president of his own IP law and consulting firm based in Sarasota, Florida. He specializes in the strategic development, management and protection of intellectual property for optics, photonics and semiconductor technologies. His technical experience includes working at IBM Corporation as an optical engineer in the areas of photolithography, lens design, optical system evaluation, and semiconductor processing. He holds several patents and has authored a dozen technical papers. He has also written two books on intellectual property. He is on the Editorial Advisory Board of *Optics and Photonics News*, the news magazine of the Optical Society of America (OSA). He received his BS in Physics from Rutgers University, an MS in Optics from the University of Rochester's Institute of Optics, and his JD from Vermont Law School. He is a member of OSA and SPIE.

Course level: Introductory

WS412 CEU .35 $270 / $310 USD

Tuesday 8:30 am to 12:30 pm

Intellectual Property: Prior Art Searching

This course provides attendees with the basic skills needed to search for prior art when developing a patent application and/or taking your technology from R&D to production stage. The course includes a detailed presentation of the methods and tools for information retrieval, current sources of information, and modern trends in intellectual property search and analysis. The scope of this course encompasses searches of U.S. patents and published applications, foreign patents and published applications and non-patent literature. Case studies will be presented showing detailed examples of each type of search.

LEARNING OUTCOMES

This course will enable you to:

- protect your innovations by focusing on features uncovered in the prior art
- accelerate prosecution of your patent applications
- determine who your competitors are
- avoid patent infringement lawsuits
- identify material for licensing/cross-licensing
- use reliable and systematic methods to identify the building blocks of your invention, determine scope of the prior art search, and perform the search

INTENDED AUDIENCE

This material is intended for anyone who needs to learn how to perform a prior art search. Inventors who want to protect their innovations will find this course valuable, because it teaches how to avoid infringements and to accelerate prosecution of your patent. Business development managers will learn how to uncover trends in product development based on patent analysis. Scientists, engineers, and technicians may learn how to quickly access existing solutions for their tasks.

INSTRUCTOR

Nadya Reingand is a Senior Patent Analyst, a Head of Electrical Engineering and Photonics Group at Landon IP, Inc.; has Ph.D. in Photonics; the author of more than 70 scientific papers; and has been involved in patent search and analysis for over 10 years. She is a co-chair of "Practical Holography" conference within the framework of Photonics West since 1996.

Course level: Intermediate

WS758 CEU .35 $270 / $310 USD

Tuesday 1:30 to 5:30 pm

Pulling Property Out of Thin Air: The Optical Patent

What is a patent? What kinds of things are patentable? How do I use a patent as a business tool? What sorts of inventions should be patented, and what sorts should not? How do I make my patent dollars count? How do I make sure my attorney is patenting the inventions that give me or my company a competitive advantage? Anyone interested in finding out the answers to these questions will benefit from attending this presentation.

This will not be a legal lecture or overly technical pregram, but rather an informal nuts-and-bolts session giving "how to" answers. Examples of optical inventions will be used to show how common sense patenting techniques can be applied in real-world situations to maximize individual and/or corporate advantage.

INSTRUCTOR

Marshall Honeyman is a patent attorney in Kansas City, Missouri where he is Of Counsel to the law firm of Shook, Hardy, and Bacon, L.L.P. Prior to joining SHB, he worked in the U.S. Patent and Trademark Office (USPTO) as an Associate Solicitor, handling law suits brought against the USPTO as well as ex parte appeals to the Court of Appeals to the Court of Appeals for the Federal Court. Before that, Marshall served as a USPTO Patent Examiner, specializing in the examination of inventions relating to illumination technologies.

Course level: Introductory

WS487 CEU .00 $100 / $150 USD

Wednesday 8:30 to 11:00 am

Sign up for these workshops at the SPIE Cashier.

How to Start a Small High Tech Business Almost Anywhere

How to start and successfully operate a small high tech organization, either with a large organization or as a stand-alone entity, is an important question to many engineers, scientists and managers. This course focuses on the elements that can help minimize investment capital and the time needed to set up a viable and vibrant organization capable of functioning on its own - and growing.

It is possible to set up this type of organization within a large company; one or a handful of individuals can grow new ideas and technology into viable high tech products that can have a significant impact on the performance and ability of the company to offer a state-of-the-art edge necessary for competitiveness. These same individuals can in turn learn skills that can be used to set up small high tech businesses as spin-offs or standalone entities in such unlikely places as Troutdale, Oregon. Running a small, high tech business independently also involves sets of skills that are quite likely to be supported indirectly by the large business and these have to be developed and honed.

This course will overview the skills necessary to operate a successful high tech business within a large organization and point out how these skills can form the basis for developing a standalone business. The course will then continue by addressing the steps needed to start a small high tech business, even under less than ideal conditions. Elements that will be considered include motivation; start up planning, the types of organizations that can be operated, and the set up of structures that will greatly aid success. We'll review crucial topics such as consulting, small business contracts and subcontracts, intellectual property, licensing, product development, long term planning, and mergers/acquisitions. These topics are woven into the course structure and are intended to help attendees understand how to smooth out some of the rocky bumps associated with traversing a difficult but often wonderful road to a viable small high tech business.

LEARNING OUTCOMES

Topics include:

- Certain skills are common to individuals establishing high tech operations within a large as well as a small high tech organization, this course will outline skills that can have high payoff for both and point out ways to hone these skills
- Understand many of the advantages and pitfalls associated with operating a small high tech business in Troutdale, Oregon or virtually anywhere in the United States...many of these topics apply to businesses worldwide while some aspects are particular to the US
- Starting up a small high tech business involves a series of steps, the decision to leave a job, a vision for the new company, funding, the type of organization to be formed, a strategic and tactical plan, an operational plan, marketing...this course will lead you through a successful framework
- Intellectual property is a key area and indeed product of a small high tech business, this course will discuss how to minimize the cost of acquiring and developing an effective patent base and offsetting some of the costs by licensing/joint ventures
- Small organizations can establish leverage to developing relationships with other companies both large and small, examples of how this can be done are part of the course
- Eventually a small high tech business may decide to merge or be acquired as a means to grow, there are many pitfalls here that need to be fully understood, this course will outline a few of them in the hopes of bettering the prospects for a successful transition

INTENDED AUDIENCE

Engineers, scientists, technicians and managers in both large and small organizations can benefit strongly from this course. People operating out of large organizations can benefit from a better understanding of the advantages and disadvantages associated with small businesses that may be important partners as well as developing skills that can make their own organizations more cost effective and efficient. For individuals contemplating and engaged in starting a small business understanding the processes involved can literally be the difference between success and failure, as small differences in operation and execution can be crucial.

INSTRUCTOR

Eric Udd is President of Columbia Gorge Research, LLC. He worked at McDonnell Douglas from 1977 to 1993 as an Engineer/Scientist, Unit Chief, Manager and McDonnell Douglas Fellow, building a fiber optic sensor program that grew to a large organization-wide effort. In 1993 he left McDonnell Douglas to found Blue Road Research in Troutdale, Oregon, where he now serves as Vice President of Technology. He founded Columbia Gorge Research, LLC in 2004 as his second company and plans to "retire into it". Eric Udd has taught many courses for SPIE, UCLA Extension, OSA, Sensors Expo and other organizations. He has chaired approximately 30 international conferences, holds over 40 issued patents, has written approximately 150 papers, edited two books on fiber sensors, and is a Fellow of the SPIE. Mr. Udd is currently working on a book titled "How to Start a Small High Tech Business in Troutdale, Oregon!?!"

Course level: Introductory

WS756 CEU .35 $270 / $310 USD

Wednesday 1:30 to 5:30 pm

The Craft of Scientific Presentations: A Workshop on Technical Presentations

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

LEARNING OUTCOMES
This course will enable you to:
- account for the audience, purpose, and occasion in a presentation,
- logically structure the introduction, middle, and ending of a scientific presentation,
- create a memorable and persuasive set of presentation slides, and
- deliver a presentation with more confidence.

INTENDED AUDIENCE
This material is intended for anyone who needs to present scientific research. Those who either have not yet presented or have made several presentations will find this course valuable.

INSTRUCTOR
Michael Alley teaches writing and speaking to engineering and science students at Virginia Tech. Alley has taught this workshop at Sandia National Labs, Los Alamos National Laboratory, and United Technologies.

COURSE PRICE INCLUDES the text *The Craft of Scientific Presentations* by the instructor.

Course level: Introductory

WS667 CEU .35 $100 / $150 USD

Wednesday 8:30 am to 12:30 pm

NOTE: *This workshop is* ***free to SPIE Student Members****, but you must register to attend.*

The Craft of Scientific Writing: A Workshop on Technical Writing

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

LEARNING OUTCOMES
This course will enable you to:
- account for the audience, purpose, and occasion in a scientific paper,
- logically structure the introduction, middle, and ending of a scientific paper,
- understand how to make your language clear, energetic, and fluid, and
- avoid the most common mechanical errors in scientific writing.

INTENDED AUDIENCE
This material is intended for anyone who needs to write about scientific research. Those who either have not yet written a paper or have written several papers will find this course valuable.

INSTRUCTOR
Michael Alley teaches writing and speaking to engineering and science students at Virginia Tech. Alley has taught this workshop at Sandia, Lawrence Livermore, and Los Alamos National Laboratory.

COURSE PRICE INCLUDES the text *The Craft of Scientific Writing* by the instructor.

Course level: Introductory

WS668 CEU .35 $100 / $150 USD

Wednesday 1:30 to 5:30 pm

NOTE: *This workshop is* ***free to SPIE Student Members****, but you must register to attend.*

Market Seminars:
analysis, insight, and ideas for business

FREE to all technical attendees and exhibitors. Badge required

Hear industry leaders, analysts and forecasters share market research, strategic insight and ideas for business.

Tuesday 24 January · 8:30 to 9:45 am
Hilton Hotel: Almaden II

Nanotech Roadmap for Optics
Scott Mize, Executive Director, Foresight Nanotechnology Institute

Nanophotonics: Technology Assessment and Market Opportunities
Tom Hausken, Director, Optical Components, Strategies Unlimited

Tuesday 24 January · 2:00 to 3:30 pm
Marriott Hotel: San Jose Ballroom IV

Seeing New Light in the Display Industry
Dr. Kim Allen, Director, Display Technology and Strategy, iSuppli

Optoelectronics Industry Forecast: Opportunities for Business
Michael Lebby, Optoelectronics Industry Development Association (OIDA)

Wednesday 25 January · 8:30 to 9:45 am
Marriott Hotel: San Jose Ballroom IV

Executive Panel: Market Direction and Implications for the World of Photonics
BOOKHAM, **Giorgio Anania,** President and CEO

MELLES GRIOT, **Lynn Strickland,** VP Marketing and Strategic Development

EDMUND OPTICS, **John Stack,** President and COO

NEWPORT CORPORATION, **Gary Spiegel,** Vice President Sales and Service

HAMAMATSU, **Ken Kaufmann,** New Technology Development

COHERENT, **Paul Meissner,** Executive Vice President, Global Business Operations

Thursday 26 January · 9:15 to 9:45 am
Convention Center: Room A7-A8

Perspectives on Asia
Eugene Arthurs, Executive Director, SPIE

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Wednesday 25 January 2006 . . . . . 10:00 am to 5:00 pm
Thursday 26 January 2006 . . . . . 10:00 am to 4:00 pm

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The World's Largest Biomedical Symposium and Exhibition

BiOS Exhibition

Saturday 21 January 2006 . . . . . 1:00 to 5:00 pm
Sunday 22 January 2006 . . . . . 10:00 am to 4:00 pm

See the applications and technologies driving the diagnostic, treatment, and instrumentation of the future at the BiOS exhibition. Meet the vendors behind the leading-edge clinical diagnostics and therapeutics. Trade ideas with other medical and optical physicists, bioengineers, and pharmacologists, cancer therapists, cell physiologists, and others sharing your interests.

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*––**Kathy Kincade,***
Optoelectronics Report, February 15, 2005

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Please refer to the Exhibition Guide for a complete schedule of FREE product demonstrations.

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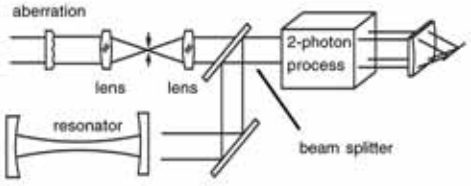

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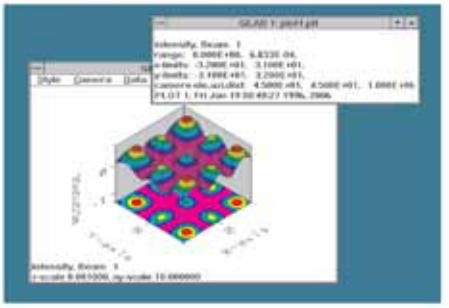
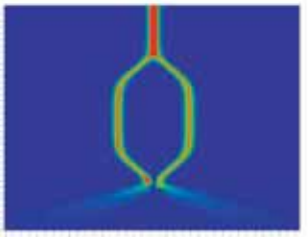


complex laser modes



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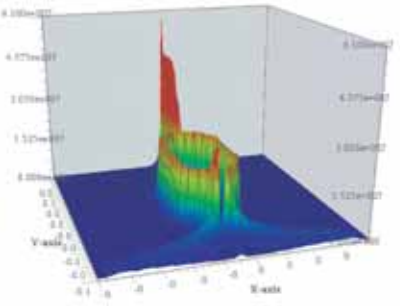
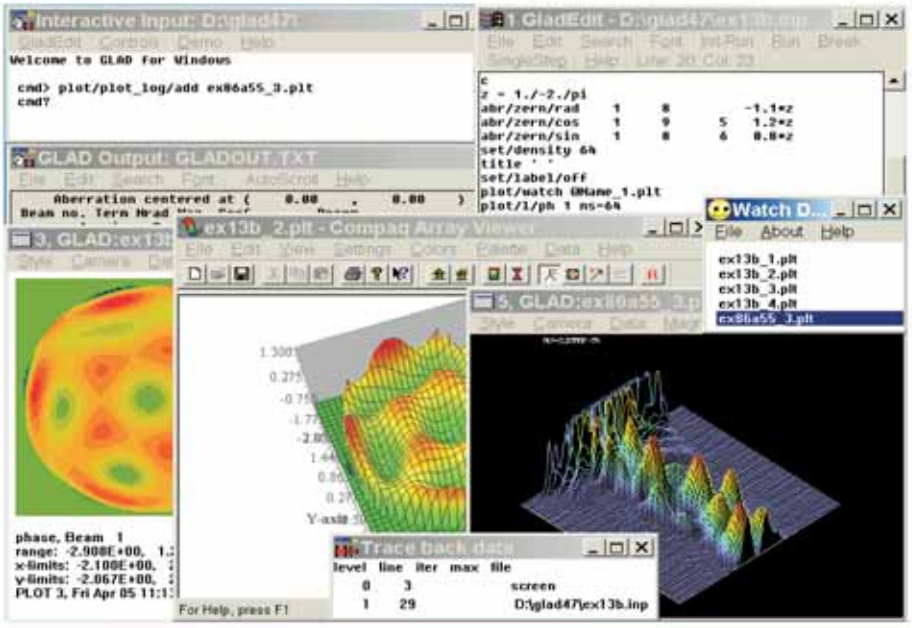


photonic switch in the *off* position



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Daily Course Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	22 January	23 January	24 January	25 January	26 January

Basic Optics and Photonics

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
SC156 **Basic Optics for Engineers** *(Ducharme)* 8:30 am to 5:30 pm, $475 / $555		SC017 **Principles of Fourier Optics and Diffraction** *(Gaskill)* 8:30 am to 5:30 pm, $560 / $640	SC747 NEW **Semiconductor Optoelectronic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $440 / $520	SC206 **Polarized Light: A Practical Hands-on Introduction** *(Fisher)* 8:30 am to 5:30 pm, $440 / $520	SC040 **Gratings, Monochromators, and Spectrometers** *(Fisher)* 8:30 am to 12:30 pm, $270 / $310
SC212 **Modern Optical Testing** *(Wyant)* 8:30 am to 12:30 pm, $270 / $310		SC402 **Understanding Lasers, Fiber Optics, and Photonics Components** *(Ezekiel)* 8:30 am to 5:30 pm, $440 / $520			
		SC745 **Basic Testing and Calibration of Digital Imagers** *(Burns, Williams)* 8:30 am to 12:30 pm, $270 / $310			

Laser Safety and Product Certification

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
			SC603 **Laser Product Certification to National and International Regulations** *(Stoev)* 8:30 am to 5:30 pm, $440 / $520	SC769 NEW **Laser Safety: Principles and Accident Prevention** *(Barat)* 8:30 am to 5:30 pm, $440 / $520	

Laser Sources and Nonlinear Optics

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
SC748 NEW **High-Power Fiber Sources** *(Nilsson)* 1:30 to 5:30 pm, $270 / $310		SC744 NEW **Ultrafast Fiber Lasers** *(Fermann)* 1:30 to 5:30 pm, $270 / $310	SC047 **Introduction to Nonlinear Optics** *(Fisher)* 8:30 am to 5:30 pm, $440 / $520	SC228 **Fiber Laser Sources and Amplifiers for Lightwave System Applications** *(Digonnet)* 8:30 am to 5:30 pm, $440 / $520	
SC752 NEW **Solid State Laser Technology** *(Hodgson)* 8:30 am to 5:30 pm, $560 / $640					

Ultrafast Optics

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
SC746 NEW **Introduction to Ultrafast Technology** *(Trebino)* 8:30 am to 12:30 pm, $270 / $310		SC743 NEW **Micromachining with Femtosecond Lasers** *(Nolte, Schaffer)* 1:30 to 5:30 pm, $270 / $310			
SC541 **An Introduction to Femtosecond Laser Techniques** *(Mazur)* 1:30 to 5:30 pm, $270 / $310		SC744 NEW **Ultrafast Fiber Lasers** *(Fermann)* 1:30 to 5:30 pm, $270 / $310			

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Semiconductor Lasers and LEDs

SC741 NEW **III-Nitride Deep UV Photonics** *(Jiang, Lin)* 1:30 to 5:30 pm, $270 / $310

SC698 **Quantum Dot Laser Diodes** *(Blood)* 8:30 am to 12:30 pm, $270 / $310

SC052 **Light-Emitting Diodes** *(Schubert)* 8:30 am to 12:30 pm, $320 / $360

SC053 **Testing and Reliability of Semiconductor Lasers** *(Wang)* 1:30 to 5:30 pm, $270 / $310

SC657 **Accurate Measurement of LED Optical Properties** *(Tirpak)* 1:30 to 5:30 pm, $270 / $310

SC747 NEW **Semiconductor Optoelectronic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $440 / $520

Photonic and Laser Applications

SC547 **Terahertz Wave Technology and Applications** *(Zhang)* 8:30 am to 12:30 pm, $270 / $310

SC656 **Fundamentals of Free-Space Laser Communications** *(Majumdar)* 1:30 to 5:30 pm, $270 / $310

Holography

SC688 **Optical Scanning Holography** *(Poon)* 8:30 am to 5:30 pm, $440 / $520

See SPIE Cashier to Register.

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Illumination Engineering & Displays

SC011 **Design of Efficient Illumination Systems** *(Cassarly)* 8:30 am to 12:30 pm, $270 / $310

SC052 **Light-Emitting Diodes** *(Schubert)* 8:30 am to 12:30 pm, $320 / $360

SC657 **Accurate Measurement of LED Optical Properties** *(Tirpak)* 1:30 to 5:30 pm, $270 / $310

SC770 NEW **Solid State Lighting II** *(Ferguson)* 1:30 to 5:30 pm, $270 / $310

Micromachining and Microfabrication

SC437 **Microfabrication Techniques for MicroFluidics & BioMEMS** *(Madou)* 1:30 to 5:30 pm, $270 / $310

SC743 NEW **Micromachining with Femtosecond Lasers** *(Nolte, Schaffer)* 1:30 to 5:30 pm, $270 / $310

SC699 **Polymer Microfabrication** *(Becker)* 8:30 am to 5:30 pm, $440 / $520

SC689 **Introduction to MicroMachining Using Lasers** *(Schaeffer)* 1:30 to 5:30 pm, $270 / $310

Optical Components and Systems Design

SC552 **Aspheric Optics: Design, Fabrication, and Test** *(Fischer)* 8:30 am to 12:30 pm, $345 / $385

SC001 **Optical System Design: Layout Principles and Practice** *(Smith)* 8:30 am to 5:30 pm, $510 / $590

SC003 **Practical Optical System Design** *(Fischer)* 8:30 am to 5:30 pm, $515 / $595

SC700 **Understanding Scratch and Dig Specifications** *(Boultbee)* 8:30 am to 12:30 pm, $305 / $345

SC690 **Geometrical Optics** *(Greivenkamp)* 8:30 am to 5:30 pm, $470 / $550

SC157 **MTF in Optical and Electro-Optical Systems** *(Ducharme)* 8:30 am to 5:30 pm, $475 / $555

SC384 **The Design of Plastic Optical Systems** *(Schaub)* 1:30 to 5:30 pm, $270 / $310

SC321 **Thin Film Optical Coatings** *(Macleod)* 8:30 am to 5:30 pm, $440 / $520

SC720 **Cost-Conscious Tolerancing of Optical Systems** *(Youngworth)* 8:30 am to 12:30 pm, $270 / $310

SC010 **Introduction to Optical Alignment Techniques** *(Ruda)* 8:30 am to 5:30 pm, $845 / $990

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Optomechanics

SC220 **Optical Alignment Mechanisms** *(Guyer)* 8:30 am to 12:30 pm, $270 / $310

SC015 **Structural Adhesives for Optical Bonding** *(Daly)* 8:30 am to 12:30 pm, $270 / $310

SC386 **Advanced Thermal Management Materials for Optoelectronic and MEMS/MOEMS Packaging** *(Zweben)* 8:30 am to 5:30 pm, $440 / $520

Nanophotonics and Photonic Crystals

SC608 **Photonic Crystals: A Crash Course in Designer Electromagnetism** *(Johnson)* 1:30 to 5:30 pm, $270 / $310

SC742 NEW **Nano-Photonics: Physics and Techniques** *(Scherer)* 8:30 am to 12:30 pm, $270 / $310

SC727 **Nanoplasmonics** *(Stockman)* 8:30 am to 5:30 pm, $440 / $520

Ophthalmic Applications

SC702 **Optics and Optical Quality of the Human Eye** *(Roorda)* 1:30 to 5:30 pm, $270 / $310

Tissue Optics

SC029 **Tissue Optics** *(Jacques)* 1:30 to 5:30 pm, $270 / $310

SC749 NEW **Diffuse Optical Spectroscopy and Imaging of Tissues** *(Toronov)* 8:30 am to 5:30 pm, $440 / $520

SC750 NEW **Optical Clearing of Tissue and Blood** *(Tuchin)* 8:30 am to 12:30 pm, $270 / $310

SC768 NEW **Optoacoustic Systems for Medical Imaging: From Principles to Clinical Applications** *(Oraevsky)* 1:30 to 5:30 pm, $270 / $310

See SPIE Cashier to Register.

Daily Course Schedule

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Biomedical Spectroscopy and Imaging

SC312 Principles and Applications of Optical Coherence Tomography *(Fujimoto)* 8:30 am to 12:30 pm, $270 / $310

SC693 Spectral Imaging for Biology and Medicine *(Mansfield, Levenson)* 8:30 am to 12:30 pm, $270 / $310

SC749 NEW Diffuse Optical Spectroscopy and Imaging of Tissues *(Toronov)* 8:30 am to 5:30 pm, $440 / $520,

SC751 NEW Vibrational Spectroscopy: From Physics to Medicine *(Petrich)* 1:30 to 5:30 pm, $270 / $310

SC768 NEW Optoacoustic Systems for Medical Imaging: From Principles to Clinical Applica-tions *(Oraevsky)* 1:30 to 5:30 pm, $270 / $310

SC040 Gratings, Monochromators, and Spectrometers *(Fisher)* 8:30 am to 12:30 pm, $270 / $310

Fluorescent Sensing and Diagnostics

SC309 Fluorescent Markers: Usage and Optical System Optimization *(Levi)* 8:30 am to 12:30 pm, $270 / $310

SC461 Bio-Optical Detection Systems *(Levi)* 1:30 to 5:30 pm, $270 / $310

SC696 Bioluminescence for Food and Environmental Safety *(Brovko)* 8:30 am to 12:30 pm, $270 / $310

SC695 Noninvasive in vivo Biosensing Based on Color Fluorescent Proteins for Drug Design and Screening *(Savitsky)* 8:30 am to 5:30 pm, $440 / $520

Biophotonics and Microbiochips

SC259 Biochips: Fundamentals, Fabrication, and Applications *(Nicolau)* 1:30 to 5:30 pm, $270 / $310

SC437 Microfabrication Techniques for MicroFluidics & BioMEMS *(Madou)* 1:30 to 5:30 pm, $270 / $310

SC463 Biophotonics *(Prasad)* 8:30 am to 5:30 pm, $530 / $610

SC532 Microfluidics: Technology and Application *(Gaertner)* 8:30 am to 12:30 pm, $270 / $310

SC742 NEW Nano-Photonics: Physics and Techniques *(Scherer)* 8:30 am to 12:30 pm, $270 / $310

SC727 Nanoplasmonics *(Stockman)* 8:30 am to 5:30 pm, $440 / $520

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Workshops: Basic Optics

WS609 **Basic Optics for Non-Optics Personnel** *(Harding)* 1:30 to 3:30 pm, $100 / $150

Workshops: Business, Patents, and IP

WS412 NEW **Intellectual Property Issues in High-Tech Business** *(Gortych)* 8:30 am to 12:30 pm, $270 / $310

WS487 **Pulling Property Out of Thin Air: The Optical Patent** *(Honeyman)* 8:30 to 11:00 am, $100 / $150

WS758 NEW **Intellectual Property: Prior Art Searching** *(Reingand)* 1:30 to 5:30 pm, $270 / $310

WS756 NEW **How to Start a Small High Tech Business Almost Anywhere** *(Udd)* 1:30 to 5:30 pm, $270 / $310

Workshops: Professional Development

WS667 **The Craft of Scientific Presentations: A Workshop on Technical Presentations** *(Alley)* 8:30 am to 12:30 pm, $100 / $150

WS668 **The Craft of Scientific Writing: A Workshop on Technical Writing** *(Alley)* 1:30 to 5:30 pm, $100 / $150

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Program on
Photonic Therapeutics and Diagnostics

Program Track Chairs: **Reza Malek, M.D.,** Mayo Clinic; **Achilles Demetriou, M.D.,** Cedars-Sinai Medical Ctr.

6078A **Photonics in Dermatology and Plastic Surgery** *(Kollias, Zeng, Choi)* p. 44

6078B **Urology: Diagnostics and Therapeutics** *(Malek)* p. 46

6078C **Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology** *(Wong, Ilgner)* p. 47

6078D **Innovations in Clinical Applications of Minimally invasive Devices and Techniques** *(Trowers, de Riese)* p. 48

6137 **Lasers in Dentistry XII** *(Rechmann, Fried)* p. 52

6078E **Diagnostic and Therapeutic Applications of Light in Cardiology** *(Gregory, Tearney)* p. 49

6140 **Mechanisms for Low-Light Therapy** *(Hamblin, Waynant, Anders)* p. 61

6078F **Optical Techniques in Neurosurgery and Brain Imaging** *(Hirschberg, Madsen)* p. 50

6078G **Biophotonics in Veterinary Medicine** *(Tate, Lucroy)* p. 51

6138 **Ophthalmic Technologies XVI** *(Manns, Söderberg, Ho)* p. 54

6139 **Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy** *(Kessel)* p. 58

Program on
Clinical Technologies and Systems

Program Track Chair: **Tuan Vo-Dinh,** Oak Ridge National Lab.

6081 **Multimodal Biomedical Imaging** *(Azar)* p. 69

6082 **Endoscopic Microscopy** *(Tearney, Wang)* p. 71

6079 **Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine X** *(Tuchin, Izatt, Fujimoto)* p. 63

6083 **Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VI** *(Gannot)* p. 72

6080 **Advanced Biomedical and Clinical Diagnostic Systems** *(Cohn, Grundfest, Benaron, Vo-Dinh)* p. 67

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21 January	22 January	23 January	24 January	25 January	26 January

Program on
Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Track Chair: **Steven Jacques,** Oregon Health and Science Univ.

6085 **Complex Dynamics and Fluctuations in Biomedical Photonics III** *(Tuchin)* p. 77

6084 **Optical Interactions with Tissue and Cells XVII** *(Jacques, Roach)* p. 74

6086 **Photons plus Ultrasound: Imaging and Sensing** *(Oraevsky, Wang)* p. 79

6087 **Biophotonics and Immune Responses** *(Chen)* p. 82

Program on
Biomedical Spectroscopy, Microscopy, and Imaging

Program Track Chair: **Ammasi Periasamy,** Univ. of Virginia

6088 **Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues III** *(Farkas, Leif, Nicolau)* p. 84

6089 **Multiphoton Microscopy in the Biomedical Sciences VI** *(Periasamy, So)* p. 87

6090 **Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIII** *(Conchello, Cogswell, Wilson)* p. 90

6092 **Ultrasensitive and Single-Molecule Detection Technologies** *(Enderlein, Gryczynski)* p. 93

6091 **Optical Biopsy VI** *(Alfano, Katz)* p. 92

6093 **Biomedical Vibrational Spectroscopy IV: Advances in Research and Industry** *(Mahadevan-Jansen, Petrich)* p. 95

6094 **Optical Diagnostics and Sensing VI** *(Coté, Priezzhev)* p. 97

Program on
Nano/Biophotonics

Program Track Chair: **Paras Prasad,** SUNY/Buffalo

6095 **Nano/Biophotonics and Biomedical Applications** *(Cartwright, Nicolau)* p. 99

6096 **Colloidal Quantum Dots for Biomedical Applications** *(Osiński, Yamamoto, Jovin)* p. 101

6097 **Optical Molecular Probes for Biomedical Applications** *(Achilefu, Bornhop, Raghavachari)* p. 104

6098 **Genetically Engineered Probes for Biomedical Applications** *(Savitsky)* p. 105

6099 **Plasmonics in Biology and Medicine** *(Vo-Dinh, Lakowicz, Gryczynski)* p. 107

Biomedical Optics Special Events

Biomedical Optics Exhibition
San Jose Convention Center, Exhibition Hall 1
Saturday 21 January . . . . . 1:00 to 5:00 pm
Sunday 22 January . . . 10:00 am to 4:00 pm

BiOS Hot Topics
7:00 to 9:30 pm, p. 12

NIST Workshop:
Biophotonic Tools for Cell and Tissue Diagnostics
6:00 to 8:30 pm, p. 12

Welcome Reception,
6:00 to 7:30 pm, p. 10

BiOS Conference Poster Session,
6:00 to 7:30 pm, p. 10

IBOS—International Biomedical Optics Society, 7:30 to 9:00 pm, p. 13

Saturday-Sunday 21-22 January 2006 • Part of Proceedings of SPIE Vol. 6078

Photonics in Dermatology and Plastic Surgery

Conference Chairs: **Nikiforos Kollias**, Johnson & Johnson; **Haishan Zeng**, BC Cancer Agency (Canada); **Bernard Choi**, Univ. of California/Irvine

Saturday 21 January

SESSION 1

Conv. Ctr. A8 . . . . . Sat. 8:30 to 10:10 am

Skin Imaging I: Multi-Photon Excitation

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

8:30 am: **Spectroscopic analysis of skin intrinsic signals for multiphoton microscopy,** A. Pena, M. Strupler, T. Boulesteix, Ecole Polytechnique (France) and CNRS (France) and INSERM (France); G. Godeau, Paris V Univ. (France); E. Beaurepaire, M. Schanne-Klein, Ecole Polytechnique (France) and CNRS (France) and INSERM (France) . . . . . [6078A-01]

8:50 am: **In vivo multiphoton tomography of wound healing and scar forming,** I. Riemann, A. Ehlers, Fraunhofer Institut für Biomedizinische Technik (Germany); R. LeHarzic, S. Martin, JenLab GmbH (Germany); A. Reif, Friedrich-Schiller-Univ. Jena; K. König, Fraunhofer Institut für Biomedizinische Technik (Germany) . . . . . [6078A-02]

9:10 am: **Monitoring photoaging by use of multiphoton fluorescence and second harmonic generation microscopy,** S. Lin, National Taiwan Univ. Hospital (Taiwan) and National Taiwan Univ. (Taiwan); C. Hsu, National Taiwan Univ. Hospital (Taiwan); R. Wu, W. Lo, National Taiwan Univ. (Taiwan); J. Chan, Cathay General Hospital (Taiwan); H. Tan, National Taiwan Univ. (Taiwan) and Gung Memorial Hospital (Taiwan); W. Lin, National Taiwan Univ. (Taiwan); J. Chen, National Taiwan Univ. Hospital (Taiwan); T. Young, National Taiwan Univ. (Taiwan); S. Jee, National Taiwan Univ. Hospital (Taiwan) and National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . [6078A-03]

9:30 am: **Multiphoton investigation of charge-dependent iontophoresis,** J. Chen, W. Lo, National Taiwan Univ. (Taiwan); S. Lin, National Taiwan Univ. Hospital (Taiwan); S. Jee, C. Dong, National Taiwan Univ. (Taiwan) . . [6078A-04]

9:50 am: **Imaging of skin dermal thermal damage by multiphoton autofluroescence and second harmonic generation (SHG) microscopy,** T. Yang, C. Chiang, H. Kao, W. Lo, National Taiwan Univ. (Taiwan); S. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan); Y. Chen, C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6078A-05]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Conv. Ctr. A8 . . . . . Sat. 10:40 am to 12:20 pm

Skin Spectroscopy I: Reflectance & Fluorescence

Chair: **Haishan Zeng**, British Columbia Cancer Agency (Canada)

10:40 am: **Flap monitoring using infrared spectroscopy,** J. Mao, ViOptix, Inc. . . . . [6078A-06]

11:00 am: **Simultaneous spectrophotometric and mechanical property characterization of skin,** L. Bunegin, J. B. Moore, The Univ. of Texas Health Science Ctr. at San Antonio . . . . . [6078A-07]

11:20 am: **Subcutaneous transport of extravascular hemoglobin,** A. M. Winnem, L. L. Randeberg, B. Skallerud, Norwegian Univ. of Science and Technology (Norway); R. Haaverstad, Univ. Hospital of Trondheim (Norway); O. A. Haugen, Norwegian Univ. of Science and Technology (Norway) and Trondheim University Hospital (Norway); L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6078A-08]

11:40 am: **Multimode spectroscopy for the assessment of post-inflammatory pigmentation in vivo,** J. Zhao, BC Cancer Agency (Canada) and The Univ. of British Columbia (Canada); H. Alkhayat, The Univ. of British Columbia (Canada); H. Zeng, BC Cancer Agency (Canada) and The Univ. of British Columbia (Canada); A. Al Robaee, The Univ. of British Columbia (Canada); D. I. McLean, H. Lui, The Univ. of British Columbia (Canada) and BC Cancer Agency (Canada) . . . . . [6078A-09]

12:00 pm: **Changes in skin fluorescence spectra after UVA irradiation,** P. R. Bargo, L. Zhang, M. Eisinger, N. Kollias, Johnson & Johnson CPPW [6078A-10]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 3

Conv. Ctr. A8 . . . . . Sat. 1:20 to 3:00 pm

Skin Therapy I: Pulsed Laser

Chair: **Bernard Choi**, Univ. of California/Irvine

1:20 pm: **Morphological changes in skin melanomas,** K. G. Moskalik, L. N. Alexeeva, O. F. Chepic, R. I. Wagner, A. P. Kozlov, N. N. Petrov Research Institute of Oncology (Russia) . . . . . [6078A-11]

1:40 pm: **Trends in light-based aesthetic and dermatology applications,** C. Mehlmann, PerkinElmer Optoelectronics (Germany) . . . . . [6078A-12]

2:00 pm: **Irradiation planning for automated treatment of psoriasis with a high-power excimer laser,** F. Klämpfl, M. Schmidt, Bavarian Laser Ctr. (Germany); H. Hagenah, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [6078A-13]

2:20 pm: **Effectiveness and safety of endovenous laser treatment comparing various laser sources using thermal imaging in combined with temperature measurements,** A. I. Rem, S. van Thoor, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands); B. C. Disselhoff, D. J. der Kinderen, Mesos Medical Ctr. (Netherlands) . . . . . [6078A-15]

2:40 pm: **Fractional photothermolysis: effects of skin temperature on microscopic treatment zones,** H. Laubach, R. R. Anderson, D. Manstein, Wellman Ctr. for Photomedicine . . . . . [6078A-14]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. A8 . . . . . Sat. 3:30 to 5:10 pm

Skin Imaging II: Confocal, Laser Speckle, OCT

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

3:30 pm: **Confocal reflectance and fluorescence imaging for the detection of skin cancers,** I. Amat-Roldán, E. V. Salomatina, J. Novak, Wellman Ctr. for Photomedicine; V. Neel, Massachusetts General Hospital; R. R. Anderson, Wellman Ctr. for Photomedicine; A. N. Yaroslavsky, Massachusetts General Hospital . . . . . [6078A-16]

3:50 pm: **Monitoring free tissue transfer using laser speckle imaging,** L. W. Winchester, Jr., N. Chou, CW Optics . . . . . [6078A-17]

4:10 pm: **Three-dimensional evaluation of in vivo human skin by spectral domain and swept source optical coherence tomography,** S. Sakai, M. Matsumoto, Kanebo Cosmetics Inc. (Japan); Y. Yasuno, V. D. Madjarova, S. Makita, M. Yamanari, Y. Nakamura, G. Aoki, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6078A-18]

4:30 pm: **Ultrahigh resolution optical coherence tomography of human skin,** B. Pova_ay, A. Unterhuber, B. M. Hermann, H. Kittler, F. Róka, Medizinische Univ. Wien (Austria); C. Glittenberg, Ludwig Boltzmann Institut (Austria); H. Sattmann, R. Leitgeb, M. Binder, H. Pehamberger, W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6078A-19]

4:50 pm: **Development of fast optical Doppler tomography with user-friend software,** J. Kim, W. Verkruysse, J. S. Nelson, Univ. of California/Irvine . . . . . [6078A-20]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Sunday 22 January

SESSION 5

Conv. Ctr. A8 . . . . . Sun. 8:50 to 10:10 am

Skin Spectroscopy II: Raman, Photoacoustic, Time-Resolved

Chair: **Haishan Zeng**, British Columbia Cancer Agency (Canada)

8:50 am: **In vivo detection of basal cell carcinoma using Raman spectroscopy and pattern recognition techniques,** Z. Huang, National Univ. of Singapore (Singapore); A. Alajlan, The Univ. of British Columbia (Canada); W. Zheng, National Univ. of Singapore (Singapore); H. Zeng, British Columbia Cancer Agency (Canada); D. I. McLean, The Univ. of British Columbia; H. Lui, The Univ. of British Columbia (Canada) . . . . . [6078A-21]

9:10 am: **In-vivo time-resolved autofluorescence measurements on human skin,** K. Katika, L. Pilon, K. M. Dipple, Univ. of California/Los Angeles [6078A-23]

9:30 am: **Characterization and evaluation of a handheld AC-coupled pulsed photothermal radiometry system,** B. Jung, Yonsei Univ. (South Korea); C. Kim, Pusan National Univ. (South Korea); B. Choi, S. J. Nelson, Beckman Laser Institute . . . . . [6078A-24]

9:50 am: **Role of collagen dissociation in optical clearing of in vitro human skin,** J. Hirshburg, Texas A&M Univ.; J. Goodman, Univ. of California/Irvine/ Beckman Laser Institute; E. Chen, Univ. of California/Irvine; A. T. Yeh, Texas A&M Univ.; S. Nelson, B. Choi, Univ. of California/Irvine/Beckman Laser Institute . . . . . [6078A-25]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Conv. Ctr. A8 . . . . . Sun. 10:40 am to 12:20 pm

Skin Imaging III: Fluorescence & Multi-Spectral Reflectance

Chair: **Bernard Choi**, Univ. of California/Irvine

10:40 am: **Hyperspectral imaging of bruised skin,** L. L. Randeberg, Norwegian Univ. of Science and Technology (Norway); I. Baarstad, T. Løke, Norsk Elektro Optikk AS (Norway); A. M. Winnem, E. L. Larsen, Norwegian Univ. of Science and Technology (Norway); P. Kaspersen, Norsk Elektro Optikk AS (Norway); O. A. Haugen, L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6078A-26]

11:00 am: **Noninvasive quantitative documentation of cutaneous inflammation in vivo using spectral imaging,** G. N. Stamatas, N. Kollias, Johnson & Johnson CPPW . . . . . [6078A-27]

11:20 am: **Reproducible multispectral imaging in dermatology for diagnostics and treatment evaluation,** H. J. Noordmans, R. d. Roode, R. Verdaasdonk, L. d. Annamarijke, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [6078A-28]

11:40 am: **A novel hemispherical high-speed spectro-polarimetric scattering instrument for skin lesion imaging,** J. C. Ramella-Roman, Johns Hopkins Univ.; B. Boulbry, T. A. Germer, National Institute of Standards and Technology . . . . . [6078A-29]

12:00 pm: **Far-red and near-infrared fluorescence imaging system for noninvasive skin diagnosis and evaluation,** X. Han, British Columbia Cancer Agency (Canada); H. Lui, D. I. McLean, The Univ. of British Columbia (Canada) and Vancouver Coastal Health Research Institute (Canada); H. Zeng, British Columbia Cancer Agency (Canada) . . . . . [6078A-30]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 7

Conv. Ctr. A8 . . . . . Sun. 1:20 to 2:20 pm

Skin Therapy II and Optical Clearing

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

1:20 pm: **Targeted gene transfer of human hepatocyte growth factor into rat skin by the use of laser-induced stress waves,** M. Terakawa, Keio Univ. (Japan); S. Sato, D. Saitoh, H. Ashida, National Defense Medical College (Japan); H. Okano, Keio Univ. (Japan); M. Obara, Keio Univ. . . . . [6078A-31]

1:40 pm: **Photodynamic therapy, fluorescent diagnostics and laser hyperthermia in patients in primary and metastatic skin cancer,** E. G. Vakoulovskaya, V. P. Letyagin, N.N. Blokhin Russian Cancer Research Ctr. (Russia); L. Oumnova, G. N. Vorozhcsov, State Scientific Ctr. NIOPIC (Russia); S. G. Kuzmin, State Scientific Ctr. (Russia) . . . . . [6078A-32]

2:00 pm: **Enhanced optical clearing of human skin at topical application of immersion agents to stratum corneum pretreated by a lattice-like photothermal ablation,** V. V. Tuchin, Saratov State Univ. (Russia); G. B. Altshuler, Palomar Medical Technologies Inc.; A. A. Gavrilova, A. B. Pravdin, Saratov State Univ. (Russia); D. Tabatadze, J. Childs, I. V. Yaroslavsky, Palomar Medical Technologies Inc. . . . . [6078A-33]

SESSION 8

Conv. Ctr. A8 . . . . . Sun. 2:20 to 4:50 pm

Laser Welding and Soldering of Tissue

Chair: **Abraham Katzir**, Tel Aviv Univ. (Israel)

2:20 pm: **Numerical modeling of a CO2 laser soldering system with a radiometric temperature control,** A. Ravid, A. Katzir, Tel Aviv Univ. (Israel) . . . . . [6078A-34]

2:40 pm: **Laser-activated chitosan adhesive for tissue repair,** A. Lauto, M. Stoodley, A. Avolio, J. Foster, Univ. of New South Wales (Australia)[6078A-35]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Heat management prevents tissue buckling,** S. Vidyasagar, R. K. Halder, City College/CUNY; H. E. Savage, R. B. Rosen, New York Eye and Ear Infirmary; A. Katz, R. R. Alfano, City College/CUNY . . . . . [6078A-36]

3:50 pm: **Use of icg doped albumin and laser diode heating for the soldering of the trachea,** L. Shapira, Tel Aviv Univ. (Israel); Y. Rabi, I. Vasserman, Tel-Aviv Univ. (Israel); T. Vasilyev, Tel Aviv Univ. (Israel); D. Sharvit, Meir Hospital (Israel); A. Hardy, A. Katzir, Tel Aviv Univ. (Israel) . . . . . [6078A-37]

4:10 pm: **Laser reconstruction of the intervertebral discs,** E. N. Sobol, Institute of Laser and Information Technologies (Russia); A. V. Baskov, Burdenko Institute of Laser Surgery (Russia); I. Borshchenko, Consultant; A. B. Shekhter, Sechenov Medical Academy of Moscow (Russia); O. L. Zakharkina, Laser Research Ctr. (Russia) . . . . . [6078A-38]

4:30 pm: **Tissue welding with 980-nm diode laser system: preliminary study for determination of optimal parameters,** Z. Dereli Korkut, H. O. Tabakoglu, O. Bozkulak, A. Aksoy Aksel, M. Gülsoy, Bogaziçi Univ. (Turkey) . . . [6078A-39]

Roundtable Discussion . . . . . 4:50 pm

Evaluating the Clinical Applicability of Presented Technologies

Saturday 21 January 2006 • Part of Proceedings of SPIE Vol. 6078

Urology: Diagnostics and Therapeutics

Conference Chair: **Reza S. Malek**, Mayo Clinic

Program Committee: **Nathaniel M. Fried**, Johns Hopkins Univ.; **Rainer M. Kuntz**, Auguste-Victoria-Hospital (Germany); **Kester Nahen**, Laserscope; **Unyime O. Nseyo**, Univ. of Florida; **James C. Ulchaker**, Cleveland Clinic Foundation

Saturday 21 January

Welcome/Introductions

Conv. Ctr. B4 . . . . . Sat. 9:00 to 9:10 am

Chair: **Reza S. Malek**, Mayo Clinic

SESSION 10

Conv. Ctr. B4 . . . . . Sat. 9:10 to 10:10 am

Laser Fiber/Lithotripsy

Chair: **Nathaniel M. Fried**, Johns Hopkins Univ.

9:10 am: **Comparison of single use and reusable small core holmium:YAG laser fibers,** B. E. Knudsen, The Ohio State Univ.; B. H. Chew, The Univ. of Western Ontario (Canada); R. D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; J. D. Denstedt, The Univ. of Western Ontario (Canada); J. M. Teichman, The Univ. of British Columbia (Canada) . . . . . [6078B-40]

9:30 am: **Holmium:YAG laser fiber performance as a function of chemical environment,** K. J. Stallman, R. Marcovich, R. Glickman, The Univ. of Texas Health Science Ctr.; J. M. Teichman, The Univ. of British Columbia (Canada) . . . . . [6078B-41]

9:50 am: **Investigation of stone retropulsion as a function of Ho:YAG Laser pulse duration,** H. W. Kang, The Univ. of Texas at Austin; L. Ho, Wellman Ctr. for Photomedicine; J. Teichman, The Univ. of British Columbia (Canada) and Providence Health Care; A. Welch, The Univ. of Texas at Austin . . . . [6078B-42]

Coffee Break . . . . . 10:10 am

SESSION 11

Conv. Ctr. B4 . . . . . Sat. 10:40 am to 12:20 pm

Prostatectomy/Urethroplasty

Chairs: **Kester Nahen**, Laserscope;
James C. Ulchaker, The Cleveland Clinic Foundation

10:40 am: **Photoselective KTP laser vaporization of the prostate (PVP): an update,** R. S. Malek, Mayo Clinic . . . . . [6078B-43]

11:00 am: **Gyrus TURP the ins and outs: our first 50 cases at CCF,** J. C. Kefer, E. D. Kursh, J. C. Ulchaker, The Cleveland Clinic Foundation . . . . . [6078B-44]

11:20 am: **Transurethral holmium laser enucleation of the prostate compared with TURP: 3 yrs. follow-up results of a randomized clinical trial on 200 patients,** R. M. Kuntz, S. Ahyai, K. Lehrich, Auguste-Victoria-Hospital (Germany) . . . . . [6078B-45]

11:40 am: **Transurethral holmium laser enucleation of the prostate compared with transvesical open prostatectomy: 3 years follow-up of a randomized trial,** R. M. Kuntz, S. Ahyai, K. Lehrich, Auguste-Victoria-Hospital (Germany) . . . . . [6078B-46]

12:00 pm: **Endoscopic laser-urethroplasty,** P. T. O. Gilbert, Polyclinique du Maine (France) . . . . . [6078B-48]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 12

Conv. Ctr. B4 . . . . . Sat. 1:20 to 4:30 pm

Diagnostics/Therapeutics/Minimally Invasive Therapies

Chairs: **Rainer M. Kuntz**, Auguste-Victoria-Hospital (Germany);
James C. Ulchaker, The Cleveland Clinic Foundation

1:20 pm: **Laser welding of urinary tissues, ex vivo, using a tunable Thulium fiber laser,** N. M. Fried, A. K. Ngo, U. Sharma, J. U. Kang, Johns Hopkins Univ. . . . . [6078B-49]

1:40 pm: **Photodynamic diagnosis of bladder cancer in ex vivo urine cytology,** C. Y. Fu, Nanyang Technological Univ. (Singapore); O. Malini, National Cancer Ctr. of Singapore (Singapore); B. K. Ng, Nanyang Technological Univ. (Singapore); W. K. Lau, P. H. Tan, Singapore General Hospital (Singapore); W. Chin, National Cancer Ctr. of Singapore (Singapore); S. G. Razul, Nanyang Technological Univ. (Singapore) . . . . . [6078B-50]

2:00 pm: **Feasibility of Raman spectroscopy in vitro after 5-ALA based fluorescence diagnosis in the bladder,** M. C. Grimbergen, Univ. Medical Ctr. Utrecht (Netherlands); C. F. van Swol, St. Antonius Ziekenhuis (Netherlands); R. J. A. van Moorselaar, Univ. Medisch Ctr. Utrecht (Netherlands); N. Stone, Gloucestershire Royal Hospital (United Kingdom) . . . . . [6078B-51]

The following presentations will be given in this conference and in 6139 and 6078D respectively

2:20 pm: **In-vivo light dosimetry of interstitial PDT of human prostate,** T. C. Zhu, J. Li, J. C. Finlay, A. Dimofte, D. Stripp, S. M. Hahn, Univ. of Pennsylvania . . . . . [6139-21]

2:40 pm: **Laser therapy in the treatment of urological diseases,** T. Nelius, Otto-van-Guericke-Univ. Magdeburg (Germany); W. T. de Riese, Texas Tech Univ.; F. Reiher, Otto-van-Guericke-Univ. Magdeburg (Germany); S. Filleur, Northwestern Univ.; E. P. Allhoff, Otto-van-Guericke-Univ. Magdeburg (Germany) . . . . . [6078D-70]

Coffee Break . . . . . 3:00 to 3:30 pm

3:50 pm: **Er:YAG laser radiation for soft and hard urological tissue treatment,** P. Koranda, H. Jelinkova, M. Nemec, Czech Technical Univ. (Czech Republic); O. Kohler, P. Drlik, J. Pokorny, Central Military Hospital (Czech Republic); M. Miyagi, Sendai National College of Technology (Japan); Y. Shi, Y. Matsuura, Tohoku Univ. (Japan) . . . . . [6078B-52]

3:30 pm: **Combined optical coherence tomography and fluorescence cystoscopy: powerful tool for bladder carcinoma detection,** E. V. Zagaynova, Institute of Applied Physics (Russia); O. Streltsova, Nizhny Novgorod Regional Hospital (Russia); N. Gladkova, Nizhny Novgorod State Medical Academy (Russia); A. Orlova, Institute of Applied Physics (Russia); F. Feldchtein, Imalux Corp. . . . . [6078B-53]

4:10 pm: **Combined photovacuum therapy of copulative dysfunction,** Y. A. Menyaev, Bauman Moscow State Technical Univ. (Russia); V. P. Zharov, Univ. of Arkansas for Medical Sciences; E. A. Mishanin, A. P. Kuzmich, Russian Medical Ctr. "Yarovit" (Russia); S. E. Bessonov, Russian Medical Ctr. "Yarovit" . . . . . [6078B-54]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Saturday 21 January 2006 • Part of Proceedings of SPIE Vol. 6078

Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology

Conference Chairs: **Brian J. Wong**, Univ. of California/Irvine; **Justus F. R. Ilgner**, Univ. Hospital Aachen (Germany)

Program Committee: **Hans-Jochen Foth**, Univ. Kaiserslautern (Germany); **Arnold Gillner**, Fraunhofer-Institut für Lasertechnik (Germany); **David M. Kaylie**, Vanderbilt Univ.; **Vasant H. Oswal**, Captain James Cook Univ. Hospital (United Kingdom)

Saturday 21 January

SESSION 13

Room: Conv. Ctr. C1 . . . . . Sat. 8:30 am to 12:00 pm

Chairs: **Brian J. Wong**, Univ. of California/Irvine; **Justus F. R. Ilgner**, Univ. Hospital Aachen (Germany)

8:30 am: **Study of the thermal distribution in vocal cords irradiated by an optical source for the treatment of voice disabilities,** J. L. Arce-Diego, F. Fanjul Vélez, Univ. de Cantabria (Spain); A. Borragán Torre, Ctr. de Foniatría y Logopedia (Spain) . . . . . [6078C-55]

8:50 am: **Photodynamic therapy and fluorescent diagnostics of cancer and non-cancer diseases of oral cavity, pharynx and larynx,** E. G. Vakoulovskaya, N.N. Blokhin Russian Cancer Research Ctr. (Russia) . . . . . [6078C-56]

9:10 am: **OCT for acute and late mucosal radiation toxicity in patients with head and neck cancer: pilot study,** N. D. Gladkova, A. Maslennikova, Nizhny Novgorod Medical Academy (Russia); I. Balalaeva, Institute of Applied Physics (Russia); Y. Vyseltseva, Nizhny Novgorod Medical Academy (Russia); N. Kornoukhova, Nizhny Novgorod State Medical Academy (Russia); R. Larin, Nizhny Novgorod Medical Academy (Russia); A. Terentieva, N. Khomutinnikova, Y. Fomina, Nizhny Novgorod State Medical Academy (Russia); V. A. Kamensky, Institute of Applied Physics (Russia); A. Shakhov, Nizhny Novgorod State Medical Academy (Russia); N. M. Shakhova, G. V. Gelikonov, Institute of Applied Physics (Russia); F. I. Feldchtein, Imalux Corp. . . . . [6078C-57]

9:30 am: **Effect of Low Level Laser on cochlear and vestibular inner ear including tinnitus,** C. Rhee, J. Jung, Dankook Univ. (South Korea); M. Kim, E. Ihm, Dankook Univ. Hospital (South Korea) . . . . . [6078C-58]

9:50 am: **In vivo fluorescence microendoscopy of hair cells in the mammalian cochlea,** E. L. Cheung, A. Monfared, Stanford Univ.; J. C. Jung, Oxford Univ. and Stanford Univ.; R. P. Jackson, G. Popelka, N. H. Blevins, M. Schnitzer, Stanford Univ. . . . . [6078C-59]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Endoscopic imaging of the human vocal cords in vivo using polarization-sensitive optical coherence tomography,** M. C. Pierce, K. H. Kim, A. Klein, J. Burns, H. Park, Massachusetts General Hospital; M. S. Shishkov, Harvard Medical School; S. M. Zeitels, J. F. de Boer, Massachusetts General Hospital . . . . . [6078C-60]

11:00 am: **Non-invasive correction of septonasal deformities: Laser technology and feedback controlled equipment for safe and effective clinical application,** E. N. Sobol, Institute of Laser and Information Technologies (Russia); Y. M. Ovchinnikov, V. M. Svistushkin, Sechenov Medical Academy of Moscow (Russia); V. N. Bagratashvili, Institute of Laser and Information Technologies (Russia) . . . . . [6078C-61]

11:20 am: **Optical characterization of vocal folds with OCT,** K. Lueerssen, Hanover Medical School (Germany); N. Radicke, Laser Zentrum Hannover e.V. (Germany); M. Ptok, Hanover Medical School (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6078C-62]

11:40 am: **Selectivity of optical stimulation in the auditory system,** A. D. Izzo, J. Pathria, E. Suh, J. T. Walsh, Jr., Northwestern Univ.; E. D. Jansen, Vanderbilt Univ.; C. Richter, Northwestern Univ. . . . . [6078C-63]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 24

Conv. Ctr. C1 . . . . . Sat. 1:00 to 3:20 pm

Chair: **Brian J. Wong**, Univ. of California/Irvine

1:00 pm: **Laser-induced stimulation of the semicircular canals for caloric vestibular testing,** J. F. R. Ilgner, L. E. Walther, RWTH Aachen Univ. (Germany); D. Fassler, W. Schmidt, A. Scheibe, GMBU Jena (Germany); D. Roemhild, CIS-Institut für Mikrosensorik gGmbH (Germany); H. Gudziol, E. Beleites, Univ. of Jena (Germany); M. Westhofen, RWTH Aachen Univ. (Germany) . . . [6078C-112]

1:20 pm: **Optical coherence tomography of the vocal cords: a clinical review and overview of instrumentation,** D. Vokes, J. Perez, S. Guo, J. M. Ridgway, J. Su, W. B. Armstrong, R. Crumley, Z. Chen, B. J. Wong, Univ. of California/Irvine; N. D. Gladkova, Nizhny Novgorod State Medical Academy (Russia) . . . . . [6078C-118]

1:40 pm: **Radiometric measurements of threshold temperatures of chondrocytes survival and thermo-mechanical tissue transformation during cartilage heating with Nd:YAG Laser,** A. Zemek, D. E. Protsenko, C. Li, B. J. Wong, Univ. of California/Irvine . . . . . [6078C-119]

2:00 pm: **Numerical model of thermally induced stress relaxation in septal cartilage,** D. E. Protsenko, B. J. Wong, Univ. of California/Irvine . . [6078C-111]

2:20 pm: **Evaluation of extra-cellular matrix structure peripheral to thermal injury in laser-irradiated hyaline cartilage using multi-photon microscopy and histology,** C. Li, B. Dao, R. Wei, Z. Wang, L. L. Liaw, B. J. Wong, Univ. of California/Irvine . . . . . [6078C-120]

2:40 pm: **Multi-photon microscopy of tobacco-exposed organotypic skin models,** B. Dao, A. Yamazaki, C. Sun, Z. Wang, M. Oldham, B. J. Wong, Univ. of California/Irvine . . . . . [6078C-121]

3:00 pm: **Electromechanical reshaping of cartilage using graphite electrodes,** K. Amin, D. E. Protsenko, B. J. Wong, Univ. of California/Irvine . . . . . [6078C-122]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Saturday 21 January 2006 • Proceedings of SPIE Vol. 6078D

Innovations in Clinical Applications of Minimally Invasive Devices and Techniques

Conference Chairs: **Eugene A. Trowers**, Florida State Univ.; **Werner T. de Riese**, Texas Tech Univ.

Saturday 21 January

SESSION 14

Conv. Ctr. D . . . . . Sat. 8:30 to 10:10 am

8:30 am: **Comparison of TcPO2 and StO2,** L. P. Wright, M. Makhratchev, A. Yarbrough, M. Elmandjra, J. Mao, ViOptix, Inc. . . . . [6078D-64]

8:50 am: **Long wavelength fluorescence based biosensors for in vivo continuous monitoring of metabolites,** K. J. Thomas, A. Ambroise, K. Birchfield, W. Cai, C. Sandmann, S. Singh, K. Weidemaier, J. B. Pitner, BD Technologies . . . . . [6078D-65]

9:10 am: **Tissue identification using a miniature near-infrared spectrometer,** E. Botonjic, S. C. Fawcett, Axsun Technologies Inc. . . . . [6078D-66]

9:30 am: **Apparatus for endoscopical, laser-based determination of ciliary beat frequency in vivo,** N. S. Bogdanovic, M. Frenz, J. Ricka, Univ. Bern (Switzerland); B. Krattiger, Storz Endoscop GmbH (Switzerland) . . . . [6078D-67]

9:50 am: **Scalable plasma-mediated tractionless scalpel,** A. B. Vankov, Y. Freyvert, D. Palanker, Stanford Univ. . . . . [6078D-68]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 15

Conv. Ctr. D . . . . . Sat. 10:40 am to 12:20 pm

10:40 am: **Laser probes for noninvasive thermal coagulation of subsurface tissues,** N. M. Fried, C. C. Chung, I. M. Varkarakis, S. Permpongkosol, G. Lima, T. L. Nicol, Johns Hopkins Univ.; N. Franco, Tulane Univ.; M. H. Hayman, Louisiana State Univ. . . . . [6078D-69]

11:00 am: **Laser therapy in the treatment of urological diseases,** T. Nelius, Otto-von-Guericke-Univ. Magdeburg (Germany); W. T. de Riese, Texas Tech Univ.; F. Reiher, Otto-von-Guericke-Univ. Magdeburg (Germany); S. Filleur, Northwestern Univ.; E. P. Allhoff, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [6078D-70]

11:20 am: **Limitations of dual detector polarization sensitive optical coherence tomography (PS-OCT) for cardiovascular imaging,** S. D. Giattina, S. Raby, Brigham and Women's Hospital; M. Rupnick, Harvard Medical School; B. Liu, S. Shortkroff, M. E. Brezinski, Brigham and Women's Hospital [6078D-71]

11:40 am: **In search of the ideal bone strength study,** C. De Riese, Texas Tech Univ. . . . . [6078D-72]

12:00 pm: **Use of near infrared diffuse optical tomography in wound healing: an animal model,** E. Papazoglou, L. Zubkov, M. Weingarten, L. Zhu, K. Pourrezai, Drexel Univ. . . . . [6078D-73]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 16

Conv. Ctr. D . . . . . Sat. 1:20 to 2:20 pm

1:20 pm: **Medical modeling using rapid prototyping,** D. Jayakanth, R.M.K Engineering College (India) . . . . . [6078D-74]

1:40 pm: **Complex noninvasive spectrophotometry in examination of patients with vibration disease,** V. V. Tchernyi, General Physics Institute (Russia); D. A. Rogatkin, R. V. Gorenkov, V. N. Karpov, V. I. Shumskiy, Moscow Regional Research and Clinical Institute (Russia) . . . . . [6078D-75]

2:00 pm: **New light upon non-invasive blood glucose monitoring,** D. Davies-Shaw, Fibersense & Signals Inc. and Univ. of California at Davis; N. Davies, Fibersense & Signals Inc. and Univ. of Toronto . . . . . [6078D-117]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Saturday 21 January 2006 • Proceedings of SPIE Vol. 6078E

Diagnostic and Therapeutic Applications of Light in Cardiology

Conference Chairs: **Kenton W. Gregory**, Oregon Medical Laser Center; **Guillermo J. Tearney**, Harvard Medical School/Wellman Ctr./ Massachusetts General Hospital and Wellman Ctr. for Photomedicine and Massachusetts General Hospital

Cochair: **Laura Marcu**, Cedars-Sinai Medical Ctr.

Saturday 21 January

SESSION 17

Conv. Ctr. C2 . . . . . Sat. 8:30 to 10:10 am

Vulnerable Plaque: OCT

Chair: **Guillermo J. Tearney**, Harvard Medical School/Wellman Ctr./ Massachusetts General Hospital

8:30 am: **Temperature dependent optical properties of individual vascular wall components measured by OCT,** T. G. van Leeuwen, Academic Medical Ctr. (Netherlands) and Univ. Twente (Netherlands); F. J. van der Meer, D. J. Faber, Academic Medical Ctr./Univ. of Amsterdam (Netherlands); I. F. Cilesiz, Istanbul Teknik Üniv. (Turkey) . . . . . [6078E-76]

8:50 am: **Evaluating optical properties of an in vitro blood vessel model using optical coherence tomography,** D. Levitz, M. T. Hinds, K. Vartanian, S. R. Hanson, S. L. Jacques, Oregon Health and Science Univ. . . . . [6078E-77]

9:10 am: **Assessment of coronary plaque collagen with polarization sensitive optical coherence tomography (PS-OCT),** S. D. Giattina, Brigham and Women's Hospital; B. K. Courtney, Stanford Univ. Medical Ctr.; P. R. Herz, Massachusetts Institute of Technology; M. Harman, Brigham and Women's Hospital; S. Shortkroff, D. L. Stamper, B. Liu, Brigham and Women's Hospital/ Harvard Medical School; J. G. Fujimoto, Massachusetts Institute of Technology; M. E. Brezinski, Brigham and Women's Hospital/Harvard Medical School . . . . . [6078E-78]

9:30 am: **Estimation of collagen content in atherosclerotic plaques using polarization-sensitive optical coherence tomography,** S. K. Nadkarni, Harvard Medical School/ Massachusetts General Hospital; M. C. Pierce, B. H. Park, J. F. de Boer, B. E. Bouma, G. J. Tearney, Harvard Medical School/ Massachusetts General Hospital . . . . . [6078E-79]

9:50 am: **Atherosclerosis diagnostic imaging by optical spectroscopy and optical coherence tomography,** M. D. Hewko, L. Choo-Smith, A. C. Ko, M. S. D. Smith, E. R. Bock, L. Leonardi, M. G. Sowa, National Research Council Canada (Canada) . . . . . [6078E-80]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 18

Conv. Ctr. C2 . . . . . Sat. 10:40 am to 12:20 pm

Vulnerable Plaque: Spectroscopy

Chair: **Laura Marcu**, Cedars-Sinai Medical Ctr.

10:40 am: **Measurement of fibrous cap thickness in necrotic core fibroatheromas using laser speckle imaging,** S. K. Nadkarni, Harvard Medical School/Massachusetts General Hospital; B. E. Bouma, Harvard Medical School/ Massachusetts General Hospital; G. J. Tearney, Harvard Medical School/ Massachusetts General Hospital . . . . . [6078E-81]

11:00 am: **Real-time broad-band measurement of cholesterol, collagen and elastin,** R. Claps, R. Guynn, W. Serafin, J. Virojanapa, Neptec Optical Solutions, Inc.; A. Urbas, R. A. Lodder, Univ. of Kentucky . . . . . [6078E-82]

11:20 am: **Detection of high-risk atherosclerotic lesions by time-resolved fluorescence spectroscopy based on the Laguerre deconvolution technique,** J. A. Jo, Q. Fang, T. Papaioannou, L. Marcu, Cedars-Sinai Medical Ctr.; J. Qiao, M. C. Fishbein, J. D. Baker, T. Reil, J. A. Freischlag, UCLA School of Medicine . . . . . [6078E-83]

11:40 am: **Characterization of arterial fluorescent components by time-resolved laser-induced fluorescence spectroscopy,** Q. Fang, J. A. Jo, T. Papaioannou, R. M. Sierra-Honigmann, L. Marcu, Cedars-Sinai Medical Ctr. . . . . [6078E-84]

12:00 pm: **The effect of a thin blood layer on intravascular fluorescence spectroscopy,** M. B. Lilledahl, M. Barkost, M. W. Gran, Norwegian Univ. of Science and Technology (Norway); O. A. Haugen, St. Olavs Hospital (Norway); L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6078E-85]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 19

Conv. Ctr. C2 . . . . . Sat. 1:20 to 3:00 pm

Myocardium: Diagnosis and Therapy

Chair: **Kenton W. Gregory**, Oregon Medical Laser Center

1:20 pm: **Excimer laser catheters for thrombolysis: mechanism of action studied using high-speed imaging techniques,** A. I. Rem, S. C. E. van Thoor, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands); W. Bowe, K. D. Taylor, Spectranetics Corp. . . . . [6078E-86]

1:40 pm: **In vivo characterization of myocardial infarction using optical spectroscopy,** W. Lin, A. McGoron, Florida International Univ. . . . . [6078E-87]

2:00 pm: **Micron-scale imaging of the mouse cardiovascular system,** M. Rupnick, Children's Hospital Boston/Brigham and Women's Hospital/Harvard Medical School; S. D. Giattina, Brigham and Women's Hospital; S. Shortkroff, Brigham and Women's Hospital/Harvard Medical School; S. M. Dallabrida, Children's Hospital Boston/Harvard Medical School; B. Liu, Brigham and Women's Hospital/Harvard Medical School; A. N. Goodwin, Brigham and Women's Hospital; M. E. Brezinski, Brigham and Women's Hospital/Harvard Medical School . . . . . [6078E-88]

2:20 pm: **High-speed and high-resolution optical imaging of the developing Xenopus laevis myocardium,** R. Yelin, B. E. Bouma, D. Yelin, S. A. Yun, C. Boudoux, B. J. Vakoc, G. J. Tearney, Harvard Medical School/Wellman Ctr. for Photomedicine . . . . . [6078E-89]

2:40 pm: **Synchronization of ventricular fibrillation with electrical pacing guided by optical signals: comparison of pacing locations,** H. Hernandez, G. Hwang, S. Lin, Cedars-Sinai Medical Ctr. . . . . [6078E-90]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Saturday 21 January 2006 • Proceedings of SPIE Vol. 6078F

Optical Techniques in Neurosurgery and Brain Imaging

Conference Chairs: **Henry Hirschberg**, Rikshospitalet (Norway); **Steen J. Madsen**, Univ. of Nevada/Las Vegas

Saturday 21 January

SESSION 20

Conv. Ctr. A4 . . . . . Sat. 8:30 to 10:10 am

Functional Brain Imaging I

Chair: **Steen J. Madsen**, Univ. of Nevada/Las Vegas

8:30 am: **Characterization of spatial heterogeneity in the vascular bed,** R. B. Saager, Univ. of Rochester . . . . . [6078F-91]

8:50 am: **Spectral domain optical coherence tomography for measurement of transient structural changes during neural activity,** T. Akkin, Massachusetts General Hospital; C. Joo, Massachusetts Institute of Technology; J. F. de Boer, Massachusetts General Hospital . . . . . [6078F-92]

9:10 am: **Optical Imaging of fast light-evoked neural activation in amphibian retina,** X. Yao, B. Perry, J. George, Los Alamos National Lab. . . . . [6078F-93]

9:30 am: **Gaussian-based image processing approach improves blood flow velocity resolution in laser speckle neuroimaging,** B. Choi, Univ. of California/Irvine; J. C. Ramírez-San-Juan, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); C. C. Bee, B. S. Nadav, R. D. Frostig, Univ. of California/Irvine . . . . . [6078F-94]

9:50 am: **Single neuron dissection in C. elegans by femtosecond laser pulses,** S. H. Chung, D. A. Clark, C. V. Gabel, A. D. T. Samuel, E. Mazur, Harvard Univ. . . . . [6078F-95]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 21

Conv. Ctr. A4 . . . . . Sat. 10:40 am to 12:20 pm

Tumor Diagnosis and Treatment

Chair: **Henry Hirschberg**, Rikshospitalet (Norway)

10:40 am: **Optical characterization of pediatric brain tumors and epileptogenic lesions,** W. Lin, Florida International Univ.; P. Jayakar, D. Sandberg, Miami Children's Hospital . . . . . [6078F-96]

11:00 am: **Validation of IR-spectroscopic brain tumor classification,** C. Beleites, G. Steiner, S. B. Sobottka, G. Schackert, R. Salzer, Technische Univ. Dresden (Germany) . . . . . [6078F-97]

11:20 am: **Fluorescence guided resection for malignant glioma using 5-aminolevulinic acid** *(Invited Paper),* H. G. Stepp, Ludwig-Maximilians-Univ. München (Germany); T. J. Beck, J. Tonn, H. Reulen, Univ. Hospital Munich (Germany); W. Stummer, Univ. Hospital Duesseldorf (Germany) . . . . [6078F-98]

11:40 am: **Reduction of the invasiveness of human glioma cells by ALA-mediated photodynamic therapy,** H. Hirschberg, National Hospital (Norway); C. Sun, Univ. of California/Irvine; S. J. Madsen, Univ. of Nevada/Las Vegas [6078F-99]

12:00 pm: **ALA-PDT of glioma cell micro-clusters in BD-IX rat brain,** S. J. Madsen, Univ. of Nevada/Las Vegas; E. Angell-Petersen, The Norwegian Radium Hospital (Norway); S. Spetalen, Ullevaal Univ. Hospital (Norway); S. W. Carper, S. A. Ziegler, Univ. of Nevada/Las Vegas; H. Hirschberg, Rikshospitalet (Norway) . . . . . [6078F-100]

Lunch/Exhibition Break . . . . . 12:20 to 1:40 pm

SESSION 22

Conv. Ctr. A4 . . . . . Sat. 1:40 to 2:40 pm

Clinical

Chair: **Henry Hirschberg**, Rikshospitalet (Norway)

1:40 pm: **Non-invasive intraoperative optical coherence tomography of the resection cavity during surgery of intrinsic brain tumors,** A. Giese, H. Böhringer, J. Leppert, Univ. Hospital Schleswig-Holstein; E. Lankenoau, Univ. Lübeck, P. Koch, Thorlabs Lübeck AG; G. Hüttmann, Univ. Lübeck (Germany) . . . . . [6078F-123]

2:00 pm: **Investigating the effects of combined photodynamic and anti-angiogenic therapies using a three-dimensional in-vivo brain tumor system,** N. De Magalhaes, L. L. Liaw, A. Liogys, Univ. of California/Irvine; S. J. Madsen, Univ. of Nevada/Las Vegas; H. Hirschberg, Rikshospitalet (Norway); B. J. Tromberg, Univ. of California/Irvine . . . . . [6078F-116]

2:20 pm: **Changes in diffuse reflectance intensity and autofluorescence for brain tissue in rats during loss of tissue viability,** S. Kawauchi, S. Sato, H. Ooigawa, H. Nawashiro, K. Shima, M. Kikuchi, National Defense Medical College (Japan) . . . . . [6078F-101]

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Study the prefrontal cortex activity of Chinese children with dyslexia in phonological processing by NIRS,** Z. Zhang, Q. Liu, Huazhong Univ. of Science and Technology (China); Y. Zheng, Huazhong Univ. of Science and Technology; Q. Luo, R. Song, H. Gong, Huazhong Univ. of Science and Technology (China) . . . . . [6078F-114]

✔ **Studies of neurovascular coupling in the visual cortex during visual stimulation at various frequencies using a two wavelength near infrared system and electroencephalography technique simultaneously,** S. Lebid, National Univ. of Ireland/Maynooth (Ireland); J. Condron, Dublin Institute of Technology (Ireland); C. Markham, S. Coyle, T. Ward, C. Soraghan, National Univ. of Ireland/Maynooth (Ireland) . . . . . [6078F-103]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Monday 23 January 2006 • Proceedings of SPIE Vol. 6078G

Biophotonics in Veterinary Medicine

Conference Chairs: **Michael D. Lucroy**, Purdue Univ.; **Lloyd P. Tate**, North Carolina State Univ.

Program Committee: **Larry G. Adams**, Purdue Univ.; **Russell G. Higbee**, VaxDesign Corp.

Monday 23 January

SESSION 23

Conv. Ctr. C1 . . . . . Mon. 9:00 to 11:50 am

Chair: **Michael D. Lucroy**, Purdue Univ.

9:00 am: **Squamous cell carcinoma of dogs and cats: an ideal test system for human head and neck PDT protocols,** M. D. Lucroy, Purdue Univ. . . . . [6078G-104]

9:20 am: **Quantitative detection of astaxanthin and cantaxanthin in Atlantic salmon by resonance Raman spectroscopy,** I. V. Ermakov, M. R. Ermakova, W. Gellermann, Univ. of Utah . . . . . [6078G-105]

9:40 am: **Laser lithotripsy for removal of uroliths in dogs,** L. G. Adams, Purdue Univ.; J. P. Lulich, Univ. of Minnesota . . . . . [6078G-106]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Functional and behavioral metrics for evaluating laser retinal damage,** C. D. DiCarlo, U.S. Army Institute of Surgical Research; G. L. Martinsen, Air Force Research Lab.; T. Garza, T.R.U.E Research Foundation; A. Grado, U.S. Army Medical Research Detachment; J. Morin, T.R.U.E Research Foundation; A. Brown, U.S. Army Medical Research Detachment; D. J. Stolarski, C. P. Cain, Northrop Grumman Corp. . [6078G-107]

10:50 am: **Near infrared imaging to identify sentinel lymph nodes in invasive urinary bladder cancer,** D. W. Knapp, L. Adams, J. Niles, M. Lucroy, J. Ramos-Vara, P. L. Bonney, A. E. deGortari, Purdue Univ.; J. V. Frangioni, Harvard Univ. . . . . [6078G-109]

11:10 am: **Transendoscopic application of CO2 laser irradiation using the OmniGuide fiber to treat dorsal displacement of the soft palate in the horse,** L. P. Tate, Jr., North Carolina State Univ. . . . . [6078G-110]

11:30 am: **Endometrial healing following laser ablation of equine uterine cysts,** G. R. Holyoak, Oklahoma State Univ.; R. G. Higbee, VaxDesign Corp.; K. E. Bartels, Oklahoma State Univ. . . . . [6078G-113]

Sunday 22 January 2006 • Proceedings of SPIE Vol. 6137

Lasers in Dentistry XII

Conference Chairs: **Peter Rechmann**, Univ. of California/San Francisco; **Daniel Fried**, Univ. of California/San Francisco

Program Committee: **Aldo Brugnera, Jr.**, Univ. do Vale do Paráiba (Brazil); **John D. B. Featherstone**, Univ. of California/San Francisco; **David M. Harris**, Bio-Medical Consultants, Inc.; **Boris B. Majaron**, Jozef Stefan Institut (Slovenia); **G. L. Powell**, Univ. of Utah; **George K. Stookey**, Indiana Univ.; **Joel M. White**, Univ. of California/San Francisco; **Harvey A. Wigdor**, Advocate Illinois Masonic Medical Center

Sunday 22 January

SESSION 1

Conv. Ctr. C4 . . . . . Sun. 8:30 am to 12:10 pm

Lasers in Optical Imaging, Dental Hard Tissues and Diagnosis

Chair: **Daniel Fried**, Univ. of California/San Francisco

8:30 am: **Diagnostics of human teeth using photoacoustic response,** Y. H. Elsharkawy, Cairo Univ. (Egypt) . . . . . [6137-01]

8:50 am: **Investigations on the dynamics of water in structural dentine,** A. Rafique, A. Kishen, National Univ. of Singapore (Singapore) . . . . . [6137-02]

9:10 am: **Assessment of dental-caries using optical coherence tomography,** J. Na, E. S. Choi, S. Y. Ryu, B. H. Lee, Gwangju Institute of Science and Technology (South Korea); J. H. Back, Ulsan Univ. Hospital (South Korea); J. Chang, C. Lee, Univ. of Suwon (South Korea) . . . . . [6137-03]

9:30 am: **Carious growth monitoring with optical coherence tomography,** A. Z. Freitas, D. M. Zezell, Instituto de Pesquisas Energéticas e Nucleares (Brazil); A. S. L. Gomes, Univ. Federal de Pernambuco (Brazil); A. C. Ribeiro, M. P. A. Mayer, Univ. de São Paulo (Brazil); N. D. Vieira, Jr., Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [6137-04]

9:50 am: **Detection of intaoral lesions using a fluorescence camera,** M. Thoms, Duerr Dental GmbH and Co. KG (Germany) . . . . . [6137-05]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Characterization of early dental caries by polarized Raman spectroscopy** *(Invited Paper),* L. Choo-Smith, A. C. Ko, National Research Council Canada (Canada); R. Zhu, Univ. of Manitoba (Canada); N. Ghatak, Univ. of Toronto (Canada); M. D. Hewko, National Research Council Canada (Canada); C. C. Dong, Univ. of Manitoba (Canada); B. Cleghorn, Dalhousie Univ. (Canada); M. G. Sowa, National Research Council Canada (Canada) . . . . . [6137-06]

11:10 am: **Characterization of the dental pulp using optical coherence tomography,** C. F. Kauffman, M. T. Carvalho, R. E. Araújo, A. S. L. Gomes, Univ. Federal de Pernambuco (Brazil) . . . . . [6137-07]

11:30 am: **Quantifying the remineralization of artificial caries lesions using PS-OCT,** R. S. Jones, D. Fried, Univ. of California/San Francisco . . . . [6137-08]

11:50 am: **Using of autofluorescence and ALA-induced PP IX fluorescence diagnostics method for inflammatory periodontium deceases premorbid conditions clarification,** M. L. Sinyaeva, A. A. Mamedov, N. A. Dmitrieva, S. Y. Vasilchenko, A. I. Volkova, Sechenova Moscow Medical Academy (Russia); V. B. Loschenov, General Physics Institute (Russia); S. G. Kuzmin, G. N. Vorozhtsov, Sechenova Moscow Medical Academy (Russia) . . . . . [6137-09]

Poster Pops I-Sunday

Authors of the following posters will give a 3-minute overview of their posters using up to 3 vu-graphs. Posters will be on display in the hallway near the meeting room. Posters in this session will be viewed following this overview session.

✔ **Micro-Raman spectroscopy and ESEM analysis of hybrid layer at the dentine/resin interface of three different composite restorative resins,** C. Camerlingo, Consiglio Nazionale delle Ricerche (Italy); G. M. Gaeta, R. Riccio, F. Rosso, L. Muscariello, M. Lepore, Seconda Univ. degli Studi di Napoli (Italy) . . . . . [6137-19]

✔ **Tooth structural health monitoring with a fiber optic microbend sensor,** A. Kishen, A. Rafique, National Univ. of Singapore (Singapore) . . . [6137-20]

✔ **Phase-shifting real-time holographic interferometry applied load transmission evaluation in dried human skull,** M. R. Gesualdi, M. Mori, M. Muramatsu, E. A. Liberti, Univ. de São Paulo (Brazil) . . . . . [6137-21]

✔ **Imaging dental caries from occlusal surfaces with PS-OCT,** P. Ngaotheppitak, C. L. Darling, D. Fried, Univ. of California/San Francisco; S. Bell, J. Bush, Optiphase Inc. . . . . [6137-22]

✔ **Polarized light propagation through sound and carious enamel at 1310-nm,** C. L. Darling, D. Fried, Univ. of California/San Francisco [6137-23]

✔ **Influence of stains, plaque and developmental defects on the NIR imaging of dental caries,** C. M. Buehler, D. Fried, Univ. of California/San Francisco . . . . . [6137-24]

Discussion Time with Poster Authors

Poster authors will be available to answer questions.

Lunch/Exhibition Break . . . . . 12:45 to 2:00 pm

SESSION 2

Conv. Ctr. C4 . . . . . Sun. 2:00 to 3:00 pm

Lasers in Oral Surgery, Light Curing, Bleaching, Endodontology, Caries Resistance Improvement and Hard Tissue Ablation

Chair: **Peter Rechmann**, Univ. of California/San Francisco

2:00 pm: **Application of CO_2 laser for removal of oral mucocle,** J. Kato, Tokyo Dental College (Japan); K. Moriya, Tokyo Medical and Dental Univ. (Japan); Y. Hirai, Tokyo Dental College (Japan) . . . . . [6137-10]

2:20 pm: **The influence of the different light intensities and exposure times in the degree of conversion of the new generation of LEDs used in the light-curing process,** A. N. S. Rastelli, D. P. Jacomassi, V. S. Bagnato, Univ. de São Paolo (Brazil) . . . . . [6137-11]

2:40 pm: **The bleaching quantify with blue LED system on cellulose's matrix by reflective spectroscopy,** F. L. Florez, E. C. Lins, R. F. Lizarelli, V. S. Bagnato, Univ. de São Paulo (Brazil) . . . . . [6137-12]

Poster Pops II-Sunday

Authors of the following posters will give a 3-minute overview of their posters using up to 3 vu-graphs. Posters will be on display in the hallway near the meeting room. Posters in this session will be viewed following this overview session.

✔ **Effects on soft tissue produced by a visible violet diode laser,** G. Akashi, J. Kato, Y. Hirai, Tokyo Dental College (Japan); H. Hatayama, A. Inoue, Sumitomo Electric Industries, Ltd. (Japan) . . . . . [6137-25]

✔ **Micro-Raman spectroscopy on oral tissues,** M. Lepore, Seconda Univ. degli Studi di Napoli (Italy); F. Zenone, Univ. degli Studi di Napoli Federico II (Italy); G. Perna, P. Carmone, Univ. di Foggia (Italy); R. Riccio, G. M. Gaeta, Seconda Univ. degli Studi di Napoli (Italy); V. Capozzi, Univ. di Foggia (Italy) . . . . . [6137-26]

✔ **Effects of the CO2 laser combined with fluoridated toothpaste on human dental enamel demineralization,** L. K. A. Rodrigues, Univ. Federal do Cear (Brazil); M. Nobre dos Santos, Univ. Estadual de Campinas (Brazil); A. Brugnera, Jr., A. A. Martin, L. E. S. Soares, Univ. do Vale do Paráiba (Brazil); F. A. A. Zanin, Camilo Castelo Branco Univ. (Brazil) . . . . . [6137-27]

✔ **Selective removal of composite using 355-nm laser pulses: influence of fluoride and aged-composite on adhesion,** M. Larson, A. K. Gardner, M. Stainec, D. Fried, Univ. of California/San Francisco . . . . . [6137-28]

✔ **Selective ablation of pit and fissure caries from occlusal surfaces using 355-nm laser pulses and air-abrasion demonstrated using OCT and NIR imaging,** S. Ross, D. Fried, K. Fan, Univ. of California/San Francisco . . . . . [6137-29]

Coffee Break . . . . . 3:35 to 4:10 pm

Discussion Time with Poster Authors

Poster authors will be available to answer questions.

SESSION 3

Conv. Ctr. C4 . . . . . Sun. 4:10 to 5:50 pm

Lasers in Oral Surgery, Light Curing, Bleaching, Endodontology, Caries Resistance Improvement and Hard Tissue Ablation

Chair: **Peter Rechmann**, Univ. of California/San Francisco

4:10 pm: **Ablation of dentin by irradiation of violet diode laser,** H. Hatayama, A. Inoue, Sumitomo Electric Industries, Ltd. (Japan); J. Kato, G. Akashi, Y. Hirai, Tokyo Dental College (Japan) . . . . . [6137-14]

4:30 pm: **Selective preparation of hard dental tissue: classical and laser treatments comparisson,** T. Dostalova, Charles Univ. in Prague (Czech Republic); H. Jelínkova, M. Nemec, P. Koranda, Czech Technical Univ. in Prague (Czech Republic); P. Simunek, Charles Univ. in Prague (Czech Republic) . . . . . [6137-15]

4:50 pm: **Use of a compact fiber optic spectrometer for spectral feedback during the laser ablation of dental hard tissues and restorative materials,** J. Chang, D. Fried, K. Fan, Univ. of California/San Francisco . . . . . [6137-16]

5:10 pm: **Analysis of peripheral thermal damage produced during the rapid ablation of dentin and bone using a high pepetition rate, long-pulse TEA laser operating at 9.3-μm using polarized light microscopy and synchrotron radiation spectro-microsscopy,** P. Bell, K. Han, R. Jones, D. Fried, Univ. of California/San Francisco . . . . . [6137-17]

5:30 pm: **A high repetition rate, long-pulse TEA laser operating at 9.3-μm for the rapid and conservative ablation and modification of dental hard tissues,** K. Fan, D. Fried, Univ. of California/San Francisco . . . . . [6137-18]

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Ophthalmic Technologies XVI

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Saturday 21 January

SESSION 1

Conv. Ctr. A1/A2 . . . . . Sat. 8:30 to 10:15 am

Retinal imaging I: 3D Optical Coherence Tomography

Chairs: **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Michael Belkin**, Tel Aviv Univ. (Israel)

8:30 am: **Volumetric rendering of intraretinal features and macular pathology with high-speed ultrahigh resolution optical coherence tomography,** M. Wojtkowski, V. J. Srinivasan, J. Liu, Massachusetts Institute of Technology; A. Witkin, B. Monson, J. S. Duker, New England Eye Ctr.; J. Schuman, Univ. of Pittsburgh School of Medicine; J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6138-01]

8:45 am: **Volumetric retinal imaging with ultra-fast spectral-domain optical coherence tomography,** Y. Zhang, R. Jungtae, R. S. Jonnal, W. Gao, Indiana Univ.; R. J. Zawadzki, J. S. Werner, Univ. of California/Davis; D. T. Miller, Indiana Univ. . . . . [6138-02]

9:00 am: **3D OCT imaging in clinical settings: toward quantitative measurements of retinal structures,** R. J. Zawadzki, A. R. Fuller, Univ. of California/Davis; M. Zhao, Duke Univ.; D. F. Wiley, S. S. Choi, Univ. of California/Davis; B. A. Bower, Duke Univ.; B. Hamann, Univ. of California/Davis; J. A. Izatt, Duke Univ.; J. S. Werner, Univ. of California/Davis . . . . . [6138-03]

9:15 am: **Quantitative analysis of photoreceptor layer in macular pathologies with three-dimensional spectral optical coherence tomography,** A. Szkulmowska, T. Bajraszewski, M. Szkulmowski, I. Gorczyńska, P. Targowski, Univ. Mikolaja Kopernika (Poland); J. J. Kałżny, The Ludwik Rydygier Medical Univ. in Bydgoszcz (Poland); A. Kowalczyk, M. Wojtkowski, Univ. Mikolaja Kopernika (Poland) . . . . . [6138-04]

9:30 am: **Three-dimensional ultrahigh resolution OCT,** B. M. Hermann, B. Povazay, S. Michels, S. Sacu, Medizinische Univ. Wien (Austria); C. Glittenberg, Ludwig Boltzmann Institut (Austria); C. Ahlers, H. Sattmann, C. Scholda, R. A. Leitgeb, U. Schmidt-Erfurth, W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6138-05]

9:45 am: **Clinical application of high contrast three-dimensional imaging of the retina, choroid and optic nerve with three-dimensional Fourier domain optical coherence tomography,** M. Hangai, N. Yoshimura, Kyoto Univ. (Japan); Y. Yasuno, S. Makita, G. Aoki, Y. Nakamura, M. Yamanari, Univ. of Tsukuba (Japan); H. Ohtsuka, Y. Fukuma, Topcon Corp. (Japan); M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6138-06]

10:00 am: **Three-dimensional ultrahigh resolution OCT in glaucoma,** B. Povazay, B. Hermann, B. Kiss, S. Sacu, Medizinische Univ. Wien (Austria); C. Glittenberg, Ludwig Boltzmann Institut (Austria); C. Köppl, H. Sattmann, C. Vass, R. A. Leitgeb, U. Schmidt-Erfurt, W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6138-07]

Coffee Break . . . . . 10:15 to 10:30 am

SESSION 2

Conv. Ctr. A1/A2 . . . . . Sat. 10:30 am to 12:15 pm

Ophthalmic Diagnostics I

Chairs: **Luigi L. Rovati**, Univ. of Modena (Italy); **Per G. Soederberg**, St Erik's Eye Hospital (Sweden)

10:30 am: **In vivo autofluorescence lifetime imaging at the fundus of the human eye,** D. Schweitzer, Friedrich-Schiller-Univ. Jena (Germany); W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany); M. Hammer, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6138-08]

10:45 am: **Early detection of crystalline aggregation with dynamic light scattering and comparison with HPLC in an in-vivo hyperbaric oxygen/ guinea pig model,** K. I. Suh, R. R. Ansari, NASA Glenn Research Ctr.; F. J. Giblin, F. Simpanya, Oakland Univ. . . . . [6138-09]

11:00 am: **Evaluation of pre-senile cataract with non-invasive dynamic light scattering and comparison with optical lens grading system,** R. R. Ansari, K. I. Suh, NASA Glenn Research Ctr.; M. B. Datiles III, National Institutes of Health . . . . . [6138-10]

11:15 am: **Studies using dynamic light scattering as an outcome measure of pharmacologic vitreolysis with microplasmin,** J. Sebag, Univ. of Southern California; R. R. Ansari, K. I. Suh, NASA Glenn Research Ctr. . . . . [6138-11]

Keynote Presentation

11:30 am: **Technology needs for tomorrow's treatment and diagnosis of corneal disease,** H. D. Cavanagh, The Univ. of Texas Southwestern Medical Ctr. at Dallas . . . . . [6138-12]

Lunch/Exhibition . . . . . 12:15 to 1:15 pm

SESSION 3

Conv. Ctr. A1/A2 . . . . . Sat. 1:15 to 3:15 pm

Retinal Imaging II: Animal Models, Functional Imaging, Polarization Techniques

Chairs: **Peter Soliz**, ORION International Technologies, Inc.; **Karen M. Joos**, Vanderbilt Univ.

1:15 pm: **In vivo anterior segment imaging in rats using rapid acquisition full-field optical coherence tomography,** K. Grieve, P. Kuchynka, École Supérieure de Physique et de Chimie Industrielles (France); M. Simonutti, INSERM (France); A. Dubois, École Supérieure de Physique et de Chimie Industrielles (France); J. Le Gargasson, INSERM (France); A. C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6138-13]

1:30 pm: **Slit-lamp based fundus imaging and optical coherence tomography of the mouse retina in vivo,** O. P. Kocaoglu, S. R. Uhlhorn, E. Hernandez, R. Will, J. A. Parel, F. Manns, Bascom Palmer Eye Institute . . . . . [6138-14]

1:45 pm: **Detection of low-amplitude, in-vivo intrinsic signals from an optical imager of retinal function,** E. S. Barriga, ORION International Technologies, Inc.; D. Ts'o, Upstate Medical Univ./SUNY; M. S. Pattichis, The Univ. of New Mexico; M. Abramoff, R. H. Kardon, Y. H. Kwon, The Univ. of Iowa; P. Soliz, ORION International Technologies, Inc. . . . . [6138-15]

2:00 pm: **Optophysiology using functional ultrahigh-resolution OCT: from in vitro animal to in vivo human measurements,** A. Unterhuber, K. K. Bizheva, B. Hermann, B. Povazay, R. Pflug, H. Sattmann, E. Anger, H. Reitsamer, Medizinische Univ. Wien (Austria); S. Popov, R. Taylor, Imperial College (United Kingdom); P. Ahnelt, W. Drexler, Medizinische Univ. Wien (Austria) . . . [6138-16]

2:15 pm: **Noninvasive in vivo measurement of retinal physiology with high-speed ultrahigh resolution OCT,** V. J. Srinivasan, Massachusetts Institute of Technology; M. D. Wojtkowski, Massachusetts Institute of Technology and Tufts Univ./School of Medicine; T. H. Ko, Massachusetts Institute of Technology; J. S. Duker, Tufts Univ./School of Medicine; A. Clermont, S. Bursell, Harvard Medical School; J. Fujimoto, Massachusetts Institute of Technology . [6138-17]

2:30 pm: **Retinal pigment epithelium pathologies investigated with phase resolved polarization sensitive optical coherence tomography,** M. Pircher, E. Goetzinger, O. Findl, S. Michels, W. Geitzenauer, U. Schmidt-Erfurth, C. K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [6138-18]

2:45 pm: **Retinal nerve fiber layer thickness map,** M. Mujat, R. Chan, B. Cense, H. Park, C. Joo, Harvard Medical School and Massachusetts General Hospital; T. Chen, Harvard Medical School; J. de Boer, Harvard Medical School and Massachusetts General Hospital . . . . . [6138-19]

3:00 pm: **Spectral-domain polarization-sensitive ophthalmic imaging,** B. Cense, M. Mujat, C. Joo, B. H. Park, Harvard Medical School and Massachusetts General Hospital; T. C. Chen, Harvard Medical School; M. C. Pierce, J. F. de Boer, Harvard Medical School and Massachusetts General Hospital . . . . . [6138-20]

Coffee Break . . . . . 3:15 to 3:30 pm

SESSION 4

Conv. Ctr. A1/A2 . . . . . Sat. 3:30 to 4:45 pm

Ophthalmic Diagnostics II

Chairs: **Jean-Marie A. Parel**, Univ. of Miami; **H. D. Cavanagh**, The Univ. of Texas Southwestern Medical Ctr. at Dallas

3:30 pm: **Evaluation of the effective corneal ablation in refractive surgery by two 3-D topographic surface matching methods,** M. Bueeler, C. Donitsky, Univ. of Zürich (Switzerland); M. C. Mrochen, ETH Zürich (Switzerland) [6138-68]

3:45 pm: **The combination of mutiphoton and reflected confocal microscopy for cornea imaging,** W. Chen, W. Lo, Y. Sun, National Taiwan Univ. (Taiwan); H. Tan, National Taiwan Univ. (Taiwan) and Chang Gung Memorial Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6138-21]

4:00 pm: **Multiphoton fluorescence and second harmonic generation microscopy for imaging keratoconus cornea,** H. Tan, National Taiwan Univ. (Taiwan) and Chang Gung Memorial Hospital (Taiwan); W. Lo, National Taiwan Univ. (Taiwan); S. Lin, W. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6138-22]

4:15 pm: **A model for corneal endothelial morphometry by diffraction.,** C. P. Bucht, P. Söderberg, St. Erik's Eye Hospital, Secion for Eye and Vision, Dept. of Clinical Neuroscience (Sweden); G. Manneberg, Stockholm's Royal Institute of Technology (Sweden) . . . . . [6138-24]

4:30 pm: **OCT corneal strain mapping by pressure-induced optical feature flow,** M. Ford, Case Western Reserve Univ.; W. J. Dupps, The Cleveland Clinic Foundation; N. Huprikar, R. Lin, A. M. Rollins, Case Western Reserve Univ. . . . . [6138-25]

SESSION 5

Conv. Ctr. A1/A2 . . . . . Sat. 4:45 to 6:15 pm

Ocular Implants and Drug Delivery

Chairs: **Ezra I. Maguen**, Cedars-Sinai Medical Ctr.; **Arthur Ho**, Univ. of New South Wales (Australia)

4:45 pm: **Dynamic range of safe electrical stimulation of the retina,** A. F. A. Butterwick, A. B. Vankov, P. Huie, Y. Freyvert, D. V. Palanker, Stanford Univ. . . . . [6138-29]

5:00 pm: **A flexible and extensible retinal prosthesis device based on multi-chip architecture,** A. Uehara, Y. Terasawa, NIDEK Co., Ltd. (Japan); T. Tokuda, K. Kagawa, M. Nunoshita, J. Ohta, Nara Institute of Science and Technology (Japan) . . . . . [6138-30]

5:15 pm: **Two-photon triggered drug delivery system: a new way to prevent posterior capsule opacification,** N. A. Hampp, H. Kim, S. Härtner, Philipps-Univ. Marburg (Germany) . . . . . [6138-28]

5:30 pm: **A novel orbital tissue expander (OTE): design, in-vitro and in-vivo studies,** E. Lee, D. Tse, Univ. of Miami School of Medicine; L. Pinchuk, Innovia LLC; A. Acosta, Univ. of Miami School of Medicine; J. Martin, S. Davis, Innovia LLC; E. Hernandez, H. Yamamoto, D. B. Denham, S. Dubovy, J. A. Parel, Univ. of Miami School of Medicine . . . . . [6138-26]

5:45 pm: **New styrene-b-isobutylene-b-styrene (SIBS) glaucoma drainage implant,** M. A. Orozco, A. Acosta, E. M. Espana, Univ. of Miami; S. Davis, B. A. Weber, Innovia LLC; L. Pinchuk, Univ. of Miami and Innovia LLC; S. Dubovy, F. Fantes, Univ. of Miami; J. A. Parel, Univ. of Miami and Univ. de Liège (Belgium) . . . . . [6138-27]

6:00 pm: **Investigation of photoacoustic spectroscopy for biomolecular detection,** S. M. Maswadi, R. D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; N. Barsalou, W. R. Elliott III, Naval Health Research Ctr. . . . . [6138-69]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p.12 for more information.

Sunday 22 January

SESSION 6

Conv. Ctr. A1/A2 . . . . . Sun. 8:00 to 10:00 am

Retinal Imaging III: Adaptive Optics

Chairs: **Michael C. Mrochen**, ETH Zürich (Switzerland); **Katsuhiko Kobayashi**, Topcon Corp. (Japan)

8:00 am: **Study of the dynamic tear film aberrations using a curvature sensing setup,** S. Gruppetta, P. Puget, Observatoire de Paris (France); F. Lacombe, Mauna Kea Technologies (France) . . . . . [6138-31]

8:15 am: **Wavefront corrector requirements for compensation of ocular aberrations in two large populations of normal human eyes,** N. Doble, Iris AO, Inc.; D. T. Miller, Indiana Univ.; D. R. Williams, Univ. of Rochester; M. A. Helmbrecht, T. N. Juneau, Iris AO, Inc . . . . . [6138-32]

8:30 am: **Adaptive optics using a liquid crystal spatial light modulator for ultrahigh-resolution optical coherence tomography,** E. J. Fernández, B. Povazay, B. M. Hermann, A. Unterhuber, H. Sattmann, Medizinische Univ. Wien (Austria); P. M. Prieto, Univ. de Murcia (Spain); R. Leitgeb, P. K. Ahnelt, Medizinische Univ. Wien (Austria); P. Artal, Univ. de Murcia (Spain); W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6138-33]

8:45 am: **Adaptive-optics optical coherence tomography for in vivo retinal imaging: effects of spectral bandwidth on image quality,** R. J. Zawadzki, Univ. of California/Davis; S. M. Jones, Lawrence Livermore National Lab.; M. Zhao, Duke Univ.; S. S. Choi, S. P. Laut, Univ. of California/Davis; S. S. Olivier, Lawrence Livermore National Lab.; J. A. Izatt, Duke Univ.; J. S. Werner, Univ. of California/Davis . . . . . [6138-34]

9:00 am: **Adaptive optics scanning laser ophthalmoscope using a micro-electro-mechanical (MEMS) deformable mirror,** Y. Zhang, S. Poonja, A. Roorda, Univ. of California/Berkeley . . . . . [6138-35]

9:15 am: **Tracking adaptive optics scanning laser ophthalmoscope,** D. Ferguson, D. X. Hammer, N. V. Iftimia, C. E. Bigelow, T. Ustun, Physical Sciences Inc.; S. A. Burns, A. E. Elsner, Schepens Eye Research Institute/ Harvard Medical School; D. R. Williams, Univ. of Rochester . . . . . [6138-36]

9:30 am: **Precision targeting with a tracking adaptive optics scanning laser ophthalmoscope,** D. X. Hammer, R. D. Ferguson, N. V. Iftimia, C. E. Bigelow, T. E. Ustun, Physical Sciences Inc.; B. A. Rockwell, Air Force Research Lab.; C. A. Toth, Duke Univ. . . . . [6138-37]

9:45 am: **SuperRez-II adaptive multispectral fundus imager,** A. V. Larichev, M.V. Lomonosov Moscow State Univ. (Russia); J. J. Otten, Photon Research Associates; N. G. Irochnikov, M.V. Lomonosov Moscow State Univ. (Russia); P. Soliz, G. R. G. Erry, Kestrel Corp.; V. Y. Panchenko, M.V. Lomonosov Moscow State Univ. (Russia) and Institute on Laser and Information Technologies (Russia) . . . . . [6138-38]

Coffee Break . . . . . 10:00 to 10:15 am

SESSION 7

Conv. Ctr. A1/A2 . . . . . Sun. 10:15 am to 12:15 pm

Eye Models and Ocular Biometry

Chairs: **William B. Telfair**, IRIDEX Corp.;
Ezra I. Maguen, Cedars-Sinai Medical Ctr.

10:15 am: **Human eye anisoplanatism: eye as a lamellar structure,** A. Dubinin, A. I. Belyakov, M.V. Lomonosov Moscow State Univ. (Russia); T. Y. Cherezova, M.V. Lomonosov Moscow State Univ.; A. V. Kudryashov, Active Optics Ltd. (Russia) . . . . . [6138-39]

10:30 am: **Closed-loop adaptive eye,** A. V. Dubinin, A. I. Belyakov, S. Galetskiy, R. R. Letfullin, T. Y. Cherezova, M.V. Lomonosov Moscow State Univ. (Russia); A. V. Kudryashov, Active Optics Ltd. (Russia) . . . . . [6138-40]

10:45 am: **Optical properties of human ocular tissues in the near infrared region,** D. K. Sardar, R. M. Yow, G. Swanland, A. T. Tsin, The Univ. of Texas at San Antonio; R. J. Thomas, Air Force Research Lab. . . . . [6138-41]

11:00 am: **Comparison of the optomechanical reponse of normal and refilled lenses in a lens stretcher,** F. Manns, Univ. of Miami . . . . . [6138-42]

11:15 am: **Optical coherence tomography of the crystalline lens during simulated accommodation,** S. R. Uhlhorn, Bascom Palmer Eye Institute; F. Manns, Univ. of Miami; J. A. Parel, Univ. of Miami Medical School . [6138-43]

11:30 am: **Modelling the influence on accommodation of the gradient mechanical properties of the crystalline lens,** A. Ho, Univ. of New South Wales (Australia) . . . . . [6138-44]

11:45 am: **FEM simulation of the human lens compared to ex-vivo porcine lens cutting pattern: a possible treatment of presbyopia,** P. Breitenfeld, T. Ripken, Laser Zentrum Hannover e.V. (Germany); U. Oberheide, G. Gerten, Laserforum Koln e.V. (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6138-45]

12:00 pm: **Modelling of conductive and convective heat transfers in retinal laser treatments,** J. Sandeau, Air Liquide; G. Caillibotte, Air Liquide (France); J. Kandulla, Univ. zu Lübeck (Germany); R. Birngruber, Medizinisches Laserzentrum Lübeck GmbH (Germany); G. Apiou-Sbirlea, Air Liquide (France) . . . . . [6138-67]

Lunch/Exhibition Break . . . . . 12:15 to 1:15 pm

SESSION 8

Conv. Ctr. A1/A2 . . . . . Sun. 1:15 to 3:45 pm

Ocular surgery: Models, Experimental, Clinical

Chairs: **Jean-Marie A. Parel**, Univ. of Miami;
Michael Belkin, Tel Aviv Univ. (Israel)

1:15 pm: **Evaluation of response variables in computer-simulated virtual cataract surgery,** P. G. Soederberg, St Erik's Eye Hospital (Sweden) . [6138-46]

1:30 pm: **Preliminary study on the closure of the lens capsule by laser welding,** R. Pini, F. Rossi, Istituto di Fisica Applicata - CNR (Italy); L. Menabuoni, I. Lenzetti, Unità Operativa Oculistica, Azienda USL 4 (Italy); J. Parel, Univ. Miami . . . . . [6138-47]

1:45 pm: **Polymers for refractive index change in intraocular lenses: a novel approach for photoinduced tuning of focal length,** N. A. Hampp, J. Träger, H. Kim, Philipps-Univ. Marburg (Germany) . . . . . [6138-48]

2:00 pm: **Electron avalanche-mediated transfection of RPE,** D. V. Palanker, T. Chalberg, A. B. Vankov, P. Huie, F. E. Molnar, A. Butterwick, M. Calos, M. S. Blumenkranz, M. F. Marmor, Stanford Univ. . . . . [6138-49]

2:15 pm: **Reflectometric detection of intracellular cavitation during selective laser targeting of the retinal pigment epithelium: dependence of cell death mechanism on pulse duration,** H. Lee, C. Alt, C. M. Pitsillides, C. P. Lin, Harvard Medical School . . . . . [6138-50]

2:30 pm: **Noninvasive dosimetry and monitoring of TTT using spectral imaging,** G. Schuele, F. E. Molnar, D. Yellachich, Stanford Univ.; E. Vitkin, L. T. Perelman, Harvard Medical School; D. V. Palanker, Stanford Univ. Medical Ctr. . . . . [6138-51]

2:45 pm: **Non-invasive optoacoustic temperature determination during retinal cw-laser treatments,** J. Kandulla, H. Elsner, Univ. zu Lübeck (Germany); J. Sandeau, Air Liquide; R. Birngruber, Medizinisches Laserzentrum Lübeck GmbH (Germany); R. Brinkmann, Univ. zu Lübeck (Germany) . . . . . [6138-70]

3:00 pm: **Investigation of possible fs-LASIK induced retinal damage,** M. Sander, A. Stolte, S. Schumacher, Laser Zentrum Hannover e.V. (Germany); C. Doepke, W. Baumgaertner, Tierarztliche Hochschule Hannover (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6138-52]

3:15 pm: **New developments in corneal refractive surgery with femtosecond laser pulses,** R. Le Harzic, Fraunhofer-Institut für Biomedizinische Technik (Germany) and JenLab GmbH (Germany); S. Martin, R. Bückle, JenLab GmbH (Germany); C. Wüllner, C. Donitzky, Wavelight Laser Technologie AG (Germany); I. Riemann, K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6138-53]

3:30 pm: **Accuracy of LASIK corneal flap thickness with the femtosecond laser,** E. I. Maguen, Cedars-Sinai Medical Ctr. . . . . [6138-54]

Coffee Break . . . . . 3:45 to 4:00 pm

SESSION 9

Conv. Ctr. A1/A2 . . . . . Sun. 4:00 to 5:15 pm

Ophthalmic Diagnostics III

Chairs: **Rafat R. Ansari**, NASA Glenn Research Ctr.;
Jerry Sebag, Univ. of Southern California

4:00 pm: **Retinal tissue oxygen imaging by near infrared light and wide field OCT,** R. X. Xu, B. Qiang, C. J. Roberts, The Ohio State Univ. . . . . [6138-55]

4:15 pm: **Direct measurements of blood cells density and velocity in retinal micro vessels,** F. Lacombe, Mauna Kea Technologies (France); M. Glanc, Observatoire de Paris (France); J. Le Gargasson, C. Bellmann, M. Paques, J. Sahel, INSERM (France) . . . . . [6138-56]

4:30 pm: **Measurement of retinal blood velocity,** L. W. Winchester, Jr., N. Chou, CW Optics . . . . . [6138-57]

4:45 pm: **Retinal blood flow pulsation measured with SDODT,** M. Mujat, M. Pierce, B. Cense, H. Park, C. Joo, T. Chen, J. de Boer, Harvard Medical School and Massachusetts General Hospital . . . . . [6138-58]

5:00 pm: **PLS regression approach for oxygen saturation in spectroscopic fundus images,** H. Arimoto, H. Furukawa, National Institute of Advanced Industrial Science and Technology (Japan); M. Hangai, Kyoto Univ. (Japan) . . . . . [6138-59]

Ophthalmic Express

Chair: **Arthur Ho**, Univ. of New South Wales (Australia)

To facilitate exchange on timely and critical issues in ophthalmic technologies, in addition to our regular sessions, the "Ophthalmic Express" session will provide-researchers and developers a forum to discuss:

- issues critical to ophthalmic applications of optical technology
- preliminary data and work in progress
- controversial or unexplained results
- critical review of key areas of development

Presentations in Ophthalmic Express are strictly limited to 5 minutes, followed by ten minutes of extended discussion.

Pascal RoI Award

Outstanding summaries submitted to the Ophthalmic Technologies XVI conference will be nominated for the Pascal RoI Award for Best Paper in Ophthalmic Technologies. The award and prize will be presented after the last scientific session of the conference to recognize the best paper and presentation.

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Optical system for exposure of rabbit eyes to laser light and in-situ assessment of retinal damage,** D. Peri, J. Turetz, E. Fishbine, I. Egoz, T. Kadar, R. Brandeis, Israel Institute for Biological Research (Israel) [6138-61]

✔ **Healing process study of laser-welded corneal tissue by multispectral imaging autofluorescence microscopy (MIAM),** R. Pini, IFAC-CNR (Italy); V. Basile, S. Ambrosini, G. Vannelli, Univ. degli Studi di Firenze (Italy); F. Rossi, L. Menabuoni, IFAC-CNR (Italy); M. Monici, Ctr. di Eccellenza Optronica (Italy); R. Pratesi, Univ. degli Studi di Firenze (Italy) . . . . . [6138-62]

✔ **Treatment of Retinal Detachment with an Encircling Band and Buckle Implant: A Comparative Pilot Study between Poly (styrene-b-isobutylene-b-styrene) (SIBS) and Trimethyl terminated Polydimethylsiloxane (PDMS),** M. C. Aguilar, H. Yamamoto, E. Espana, A. C. Acosta, M. Orozco, M. Aly, E. Arrieta, E. Hernandez, Univ. of Miami; J. Martin, InnFocus LLC; S. Dubovy, W. Smiddy, Univ. of Miami; L. Pinchuk, InnFocus LLC; J. Parel, Univ. of Miami . . . . . [6138-63]

✔ **Automatic keratometry in slit lamps,** L. Ventura, C. Riul, J. De Groote, S. J. Faria e Sousa, G. C. Dablas de Oliveira, Univ. de São Paolo (Brazil) . . . . . [6138-64]

✔ **In vitro characterization of corneal wound healing using multiphoton autofluorescence and second harmonic heneration (SHG) microscopy,** Y. Sun, W. Lo, W. Chen, S. Teng, National Taiwan Univ. (Taiwan); H. Tan, Chang Gung Memorial Hospital (Taiwan) and National Taiwan Univ. (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6138-65]

✔ **Multiphoton microscopy for imaging infectious keratitis: demonstration of the pattern of microbial spread in experimental model,** H. Tan, National Taiwan Univ. (Taiwan) and Chang Gung Memorial Hospital (Taiwan); Y. Sun, W. Lo, National Taiwan Univ. (Taiwan); S. Lin, W. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . [6138-66]

✔ **Measurement of ocular parameters under various directions of gaze,** K. Ehrmann, F. Conrad, E. B. Papas, A. Ho, Univ. of New South Wales (Australia) . . . . . [6138-71]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Saturday-Sunday 21-22 January 2006 • Proceedings of SPIE Vol. 6139

Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XV

Conference Chair: **David Kessel**, Wayne State Univ.

Program Committee: **Thomas H. Foster**, Univ. of Rochester; **Charles J. Gomer**, Childrens Hospital Los Angeles; **Tayyaba Hasan**, Harvard Medical School; **Nancy L. Oleinick**, Case Western Reserve Univ.; **Brian W. Pogue**, Dartmouth College; **Kevin M. Smith**, Louisiana State Univ.; **Kenneth K. Wang**, Mayo Clinic

Saturday 21 January

✔ Posters-Saturday

Posters will be placed on display from 11:00 Saturday morning. Authors will be present to discuss their posters during the Saturday afternoon coffee break.

Poster authors: Please put up your posters before the conference or during the Saturday morning coffee break.

✔ **Analysis of the photodynamic therapy effects by using chloroaluminum phthalocyanine incorporated into liposomes and fractionation energy in colon tumors of rats,** J. Duarte, R. Hage, Univ. Federal de São Paolo (Brazil); A. C. Tedesco, Univ. de São Paolo (Brazil); M. Pazos, Univ. Federal de São Paolo (Brazil); A. A. Martin, Univ. do Vale do Paráiba (Brazil); H. Plapler, Univ. Federal de São Paolo (Brazil) . . . . . [6139-36]

✔ **Investigation of photodynamic activity of water-soluble porphyrins in vitro and in vivo,** G. Gyulkhandanyan, S. Ghambaryan, G. Amelyan, Institute of Biotechnology (Armenia); R. Ghazaryan, Yerevan State Medical Univ. (Armenia); F. Arsenyan, Institute of Fine Organic Chemistry (Armenia); A. Gyulkhandanyan, Pharmagene Co. Ltd. (Armenia) . . . . . [6139-37]

✔ **Design and evaluation of light source for photodynamic diagnosis of cancer,** H. S. Lim, S. C. Lee, Chungnam National Univ. (South Korea) . . . . . [6139-38]

✔ **A macro-Monte Carlo method for the simulation of diffuse light transport in tissue,** J. C. Finlay, T. C. Zhu, Univ. of Pennsylvania . [6139-39]

✔ **Phototriggered multifunctional drug delivery device,** S. Härtner, N. A. Hampp, H. Kim, Philipps-Univ. Marburg (Germany) . . . . . [6139-40]

✔ **Synthesis and photodynamic activities of modified corrole derivatives on nasopharyngeal carcinoma cells,** C. K. Chang, The Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6139-41]

✔ **Photodynamic effect and localization of the photosensitizer HMME on MCF-7 cells,** X. Li, Sun Yat-sen Univ. (China) . . . . . [6139-42]

✔ **Comparison between mALA- and ALA-PDT in the treatment of basal cell carcinomas,** P. Schleier, W. Zenk, S. Schultze-Mosgau, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6139-43]

✔ **System for providing simultaneous PDT delivery and dual spectroscopic monitoring in clinical basal cell carcinoma therapy,** T. H. Foster, W. J. Cottrell, Univ. of Rochester; A. R. Oseroff, Roswell Park Cancer Institute . . . . . [6139-44]

✔ **Research on Raman spectra of photodynamic effect on sarcoma S180 by chlorin F methyl ether,** C. Ping, J. Zhang, L. Lin, G. Tang, G. Zhang, Nankai Univ. (China) . . . . . [6139-45]

✔ **Waveform design for diffuse optical imaging,** A. Serdaroglu, B. Yazici, K. Kwon, Rensselaer Polytechnic Institute . . . . . [6139-46]

✔ **The effects of BPD-MA-based photodynamic therapy on proliferation and apoptosis of rabbit vascular smooth muscle cells,** X. Li, Y. Shao, J. Liu, H. Lin, Sun Yat-sen Univ. (China) . . . . . [6139-47]

✔ **Laparoscopic fluorescent diagnostics of early peritoneal dissemination of ovarian cancer with alasense,** E. G. Vakoulovskaya, N.N. Blokhin Russian Cancer Research Ctr. (Russia) . . . . . [6139-48]

✔ **Light dosimetry calculations for esophageal photodynamic therapy using porfimer sodium,** L. R. Jones, N. W. Preyer, Jr., M. A. Davis, C. Grimes, College of Charleston; M. B. Wallace, H. C. Wolfsen, Mayo Clinic . . . . . [6139-49]

✔ **Handheld dual fluorescence and reflection spectroscopy system for monitoring topical low dose ALA-PDT of actinic keratoses (AK),** I. Charamisinau, A. Paquette, K. Keymel, A. R. Oseroff, Roswell Park Cancer Institute . . . . . [6139-50]

✔ **Sub-surface fluorescence imaging of Protoporphyrin IX with B-Scan mode tomography,** D. Kepshire, S. L. Gibbs, S. C. Davis, H. Dehghani, B. W. Pogue, Dartmouth College . . . . . [6139-52]

✔ **Ru, Os, Rh mixed-metal complexes are a potential novel class of oxygen independent photosensitizers for PDT,** B. Storrie, Univ. of Arkansas for Medical Sciences; A. Holder, K. J. Brewer, Virginia Polytechnic Institute and State Univ. . . . . [6139-53]

✔ **Sustained fluorescence and white light induced apoptosis in normal rat urothelium after short intravesical instillation of Hypericum perforatum L methanolic polar fraction,** N. E. Stavropoulos, I. Tsimaris, Hatzikosta General Hospital (Greece); D. Stefanou, Univ. of Ioannina (Greece); U. O. Nseyo, Univ. of Florida; A. Evangelou, Virginia Commonwealth Univ.; D. Skalkos, Univ. of Ioannina (Greece) . . . . . [6139-54]

SESSION 1

Conv. Ctr. A3 . . . . . Sat. 9:00 am to 12:05 pm

PDT Mechanisms

Chairs: **Kevin M. Smith**, Louisiana State Univ.; **Charles J. Gomer**, Childrens Hospital Los Angeles

9:00 am: **Differential responses of anti-apoptotic Bcl-2 family proteins to PDT: Mcl-1 and the enhanced photosensitivity of lymphoid cells** *(Invited Paper),* N. L. Oleinick, L. Xue, S. Chiu, K. Azizuddin, A. Nieminen, M. Ke, E. D. Baron, K. D. Cooper, Case Western Reserve Univ. . . . . [6139-01]

9:25 am: **Cell death after PDT** *(Invited Paper),* D. Kessel, Wayne State Univ. . . . . [6139-02]

9:50 am: **PDT-induced changes in light scattering from cells using lysosomal- vs. mitochondrial-localizing photosensitizers** *(Invited Paper),* T. H. Foster, J. D. Wilson, Univ. of Rochester . . . . . [6139-03]

Coffee Break . . . . . 10:15 to 10:45 am

10:45 am: **Apoptotic inducing ability of a novel photosensitizing agent, GeSense on oesophageal and breast cancer cell lines,** H. Abrahamse, T. Kresfelder, Univ. of Johannesburg (South Africa) . . . . . [6139-04]

11:05 am: **Multimodality tumor imaging and/or phototherapy agents** *(Invited Paper),* R. K. Pandey, Roswell Park Cancer Institute . . . . . [6139-05]

11:25 am: **Photosensitizer decorated iron oxide nanoparticles: bimodal agent for combined hyperthermia and photodynamic therapy,** C. K. Chang, The Hong Kong Univ. of Science and Technology (Hong Kong China) [6139-06]

11:45 am: **The mono-aspartyl chlorin e6 regioisomers: unambiguous syntheses and characterization** *(Invited Paper),* K. M. Smith, J. A. Hargus, M. d. G. H. Vicente, Louisiana State Univ. . . . . [6139-07]

Lunch/Exhibition Break . . . . . 12:05 to 1:20 pm

SESSION 2

Conv. Ctr. A3 . . . . . Sat. 1:20 to 3:00 pm

ALA-sensitized PDT

Chairs: **Tayyaba Hasan**, Massachusetts General Hospital; **Nancy L. Oleinick**, Case Western Reserve Univ.

1:20 pm: **ALA-based fluorescent diagnosis of malignant oral lesions in the presence of bacterial porphyrin formation,** P. Schleier, W. Zenk, S. Schultze-Mosgau, W. Dietel, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6139-08]

1:40 pm: **Nuclear transcription factors: a new approach to enhancing cellular responses to ALA-mediated photodynamic therapy,** E. V. Maytin, S. Anand, N. Sato, J. Mack, C. Gasbarre, S. Keevey, The Cleveland Clinic Foundation; B. Ortel, A. Sinha, A. Khachemoune, Massachusetts General Hospital . . . . . [6139-09]

2:00 pm: **Cell line dependence in biochemical production of protoporphyrin IX,** S. L. Gibbs, B. W. Pogue, Dartmouth College; B. Chen, Dartmouth Hitchcock Medical Ctr.; M. D. Savellano, Dartmouth College; P. J. Hoopes, Dartmouth Hitchcock Medical Ctr.; N. J. Jacobs, P. R. Sinclair, J. A. O'Hara, Dartmouth College . . . . . [6139-10]

2:20 pm: **Effects of PpIX photobleaching for ALA-PpIX photodynamic therapy of esophagus,** C. Sheng, B. W. Pogue, Dartmouth College; P. J. Hoopes, Dartmouth Medical School; T. Hasan, Massachusetts General Hospital and Harvard Medical School . . . . . [6139-11]

2:40 pm: **Optical spectroscopy by 5-aminolevulinic acid hexylester induced photodynamic treatment in rat bladder cancer,** E. L. P. Larsen, L. L. Randeberg, O. A. Gederaas, Norwegian Univ. of Science and Technology (Norway); C. Arum, St. Olavs Hospital (Norway); H. E. Krokan, D. Chen, D. R. Hjelme, L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6139-12]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 3

Conv. Ctr. A3 . . . . . Sat. 3:30 to 5:10 pm

PDT Effects

Chairs: **Edward V. Maytin**, The Cleveland Clinic Foundation; **Michael R. Hamblin**, Harvard Medical School

3:30 pm: **Determination of optimal irradiation parameters for high dose ALA-PDT for human basal cell carcinomas,** A. R. Oseroff, Roswell Park Cancer Institute; W. J. Cottrell, Univ. of Rochester; A. Paquette, K. Keymel, Roswell Park Cancer Institute; T. H. Foster, Univ. of Rochester . . . . . [6139-51]

3:50 pm: **A role for manganese superoxide dismutase in ceramide accumulation and apoptosis after photosensitization,** D. Separovic, Case Western Reserve Univ. . . . . [6139-14]

4:10 pm: **The effect of PDT on chick's chorioallantoic membrane vasculature permeability: effects of an anti-aggregating agent,** H. van den Bergh, E. Debefve, B. Pegaz, J. Ballini, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6139-15]

4:30 pm: **Distribution studies of m-THPC after topical application of m-THPC thermogel in a murine non-melanoma skin cancer tumor model by fluorescence spectroscopic and imaging techniques,** E. Alexandratou, M. Kyriazi, D. M. Yova, National Technical Univ. of Athens (Greece); S. Gräfe, Biolitec AG (Germany); T. Trebst, CeramOptec Systems GmbH (Germany); A. Johansson, J. Svensson, K. Svanberg, N. Bendsøe, S. Anderson-Engels, Lunds Institute of Technology (Sweden) . . . . . [6139-16]

4:50 pm: **Design and verification of NIR DOT electro-optical measuring system,** M. Pan, C. Cheng, W. Huang, National Central Univ. (Taiwan); M. Pan, Tung Nan Institute of Technology (Taiwan) . . . . . [6139-17]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Sunday 22 January

SESSION 4

Conv. Ctr. A3 . . . . . Sun. 8:30 to 10:00 am

Clinical and Preclinical PDT

Chairs: **Merrill A. Biel**, Univ. of Minnesota; **Kenneth K. Wang**, Mayo Clinic

8:30 am: **Treatment of GI tumors with PDT** *(Invited Paper),* K. K. Wang, Mayo Clinic . . . . . [6139-18]

8:55 am: **Photodynamic therapy of head and neck tumors** *(Invited Paper),* M. A. Biel, Ear, Nose, and Throat Specialty Care of Minneapolis . . . . . [6139-19]

9:20 am: **Evaluation of Tookad photodynamic effect on peripheral nerve and pelvic nerve in canine model,** F. W. Hetzel, Q. Chen, HealthONE Alliance; D. Blanc, Negma-Lerads (France); L. Whalen, D. Gould, Colorado State Univ.; K. Dole, Z. Huang, HealthONE Alliance . . . . . [6139-20]

9:40 am: **In-vivo light dosimetry of interstitial PDT of human prostate,** T. C. Zhu, J. Li, J. C. Finlay, A. Dimofte, D. Stripp, S. M. Hahn, Univ. of Pennsylvania . . . . . [6139-21]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Conv. Ctr. A3 . . . . . Sun. 10:30 to 11:50 am

Instrumentation I

Chairs: **Jarod C. Finlay**, Univ. of Pennsylvania; **Duska Separovic**, Wayne State Univ. Health Sciences

10:30 am: **Study of light fluence rate distribution in photodynamic therapy using finite-element method,** J. Li, T. C. Zhu, J. C. Finlay, Univ. of Pennsylvania . . . . . [6139-22]

10:50 am: **Analysis of sampling volume and tissue heterogeneity upon the in vivo detection of fluorescence** *(Invited Paper),* B. W. Pogue, B. Chen, Dartmouth College; P. J. Hoopes, Dartmouth Medical School; X. Zhou, Dartmouth College . . . . . [6139-23]

11:10 am: **Diffuse reflectance spectra measured in vivo in human tissues during Photofrin-mediated pleural photodynamic therapy,** J. C. Finlay, T. C. Zhu, A. Dimofte, J. S. Friedberg, S. M. Hahn, Univ. of Pennsylvania . . . . . [6139-24]

11:30 am: **Photosensitizer dosimetry implementation reduces variation in treatment response,** X. Zhou, Dartmouth College; B. W. Pogue, Dartmouth College and Massachusetts General Hospital; B. Chen, Dartmouth College; E. Demidenko, Norris Cotton Cancer Ctr.; P. J. Hoopes, Dartmouth Medical School; T. Hasan, Massachusetts General Hospital . . . . . [6139-25]

Lunch/Exhibition Break . . . . . 11:50 am to 1:00 pm

SESSION 6

Conv. Ctr. A2 . . . . . Sun. 1:00 to 3:00 pm

Instrumentation II

Chairs: **Brian W. Pogue**, Dartmouth College;
Theresa M. Busch, Univ. of Pennsylvania

1:00 pm: **Detection of singlet oxygen production for PDT treatments both in vitro and in vivo studies using a diode laser-based singlet oxygen monitor,** S. Lee, D. H. Vu, M. F. Hinds, S. J. Davis, Physical Sciences Inc.; T. Hasan, A. Khachemoune, W. L. Rice, N. R. Sznycer-Taub, Massachusetts General Hospital . . . . . [6139-26]

1:20 pm: **NIR electro-optical measurement for pseudo-models of biological tissues,** M. Pan, Tung Nan Institute of Technology (Taiwan); W. Huang, C. Cheng, M. Pan, National Central Univ. (Taiwan) . . . . . [6139-27]

1:40 pm: **Measurement of fluorophore concentration in scattering media by a single optical fiber,** H. G. Stepp, T. J. Beck, W. Beyer, C. Pfaller, R. Sroka, R. Baumgartner, Ludwig-Maximilians-Univ. München (Germany) . . . . [6139-28]

2:00 pm: **Basic study on pulse-intensity-domain depth-controlled photodynamic therapy for transurethral prostate cancer,** S. Ohmori, K. Masuda, Y. Yamakawa, T. Arai, Keio Univ. (Japan) . . . . . [6139-29]

2:20 pm: **Mechanism of singlet oxygen chemiluminescence enhancement by human serum albumin,** Q. Chen, HealthONE Alliance . . . . . [6139-30]

2:40 pm: **Efficacy of photodynamic inactivation against pseudomonas aeruginosa with pulsed light and cw light excitation,** T. Yamaguchi, Keio Univ. (Japan); S. Sato, S. Kawauchi, National Defense Medical College (Japan); M. Terakawa, Keio Univ. (Japan); N. Shinomiya, D. Saitoh, H. Ashida, National Defense Medical College (Japan); M. Obara, Keio Univ. (Japan) . . . . . [6139-31]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 7

Conv. Ctr. A2 . . . . . Sun. 3:30 to 4:50 pm

New Directions

Chairs: **Brian W. Pogue**, Dartmouth College;
Thomas H. Foster, Univ. of Rochester

3:30 pm: **Photodynamic therapy for epilepsy,** E. E. Zusman, Sutter Neuroscience Institute; M. K. Sidhu, Univ. of California/Davis; V. C. Coon, Univ. of Utah; N. Scott, T. T. Tsukamoto, Univ. of California/Davis; S. K. Bisland, Univ. of Toronto (Canada) . . . . . [6139-32]

3:50 pm: **Synthesis, characterization and preclinical studies of two-photon-activated targeted PDT therapeutic triads,** C. W. Spangler, Rasiris, Inc.; J. R. Starkey, A. Rebane, F. Meng, A. Gong, M. A. Drobizhev, Montana State Univ./Bozeman . . . . . [6139-33]

4:10 pm: **Laser generation and detection of surface acoustic waves: used for breast cancer detection,** Y. H. Elsharkawy, Cairo Univ. (Egypt) . . [6139-34]

4:30 pm: **Methylene blue-mediated photodynamic therapy: a possible alternative treatment for oral lichen planus,** L. Ataie-Fashtami, Iranian Ctr. for Medical Laser (Iran) and Tehran Univ. (Iran) . . . . . [6139-35]

Sunday 22 January 2006 • Proceedings of SPIE Vol. 6140

Mechanisms for Low-Light Therapy

Conference Chairs: **Michael R. Hamblin**, Harvard Medical School; **Ronald W. Waynant**, U.S. Food and Drug Administration; **Juanita Anders**, USUHS

Program Committee: **Stuart K. Bisland**, Univ. of Toronto (Canada); **Mary Dyson**, King's College London (United Kingdom); **Chukuka S. Enwemeka**, New York Institute of Technology; **Josepa Rigau**, Univ. Rovira I Virgili (Spain)

Sunday 22 January

SESSION 1

Conv. Ctr. C1 . . . . . Sun. 8:30 to 10:10 am

Reviews and Dosimetry

Chair: **Ronald W. Waynant**, U.S. Food and Drug Administration

8:30 am: **Mechanisms of low-level-light therapy - an introduction,** M. R. Hamblin, Harvard Medical School; T. N. Demidova, Massachusetts General Hospital . . . . . [6140-01]

8:50 am: **To begin at the beginning: The science of bio-stimulation in cells and tissues,** S. K. Bisland, Princess Margaret Hospital (Canada); E. Pai, Univ. Health Network (Canada); B. Wilson, Princess Margaret Hospital (Canada)[6140-02]

9:10 am: **Some new aspects of the dose in laser therapy,** L. Hode, Swedish Laser-Medical Society (Sweden) . . . . . [6140-03]

9:30 am: **The characteristics of a LLLT / photobiomodulation light source defines the medicine, the exposure time defines the dose - A collapsed distinction,** J. D. Carroll, THOR International, Ltd. (United Kingdom) . [6140-04]

9:50 am: **Radiometer for electronic identity traceability and validation of optical radiation sources,** T. A. Burgmann, M. J. Richards, B. G. Yacobi, MedX Health Corp. (Canada) . . . . . [6140-05]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Conv. Ctr. C1 . . . . . Sun. 10:40 am to 12:20 pm

In Vitro Effects

Chair: **Michael R. Hamblin**, Harvard Medical School

10:40 am: **The primary, secondary and tertiary responses to phototherapy,** M. Dyson, King's College London (KCL) (United Kingdom) . . . . . [6140-06]

11:00 am: **Effect of wavelength and fluence on morphology, cellular and genetic integrity of diabetic wounded human skin fibroblasts,** H. Abrahamse, D. Hawkins, N. Houreld, Univ. of Johannesburg (South Africa) . . . . . [6140-07]

11:20 am: **Proliferation of human periodontal ligament fibroblast by laser biostimulation: an in vitro study,** S. Ahuja, K.L.E. Society's Institute of Dental Sciences (India); S. Kothiwale, K.L.E. Socitey's Institute of Dental Sciences (India); K. Bhatt, K.L.E. Society's Institute of Dental Sciences (India) . [6140-08]

11:40 am: **The electric field induced by light may explain cellular responses to electromagnetic energy,** R. W. Waynant, A. Amat, U.S. Food and Drug Administration . . . . . [6140-09]

12:00 pm: **Activation of VEGF and FGF induced angiogenesis under influence of low-level-laser radiation in vitro,** L. Gasparyan, EMRED Oy (Finland); G. E. Brill, Saratov Medical Univ. (Russia); A. Makela, Acupuncture and Bioenergy Research Institute (Finland) . . . . . [6140-10]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 3

Conv. Ctr. C1 . . . . . Sun. 1:20 to 3:00 pm

Animal Experiments

Chair: **Stuart K. Bisland**, Princess Margaret Hospital (Canada)

1:20 pm: **Delayed light therapy promotes axonal regeneration after acute spinal cord injury,** J. J. Anders, X. Wu, Uniformed Services Univ. of the Health Sciences; K. R. Byrnes, Georgetown Univ. . . . . [6140-11]

1:40 pm: **Laser acupuncture exerts an opioid-mediated analgesic effect,** P. Whittaker, Univ. of Massachusetts . . . . . [6140-12]

2:00 pm: **Effect of low-level-laser (LLL) on blood and lymphatic vessels,** C. Carati, B. J. Gannon, Flinders Univ. (Australia) . . . . . [6140-13]

2:20 pm: **Wound healing stimulation in mice by low-level- light,** M. R. Hamblin, Harvard Medical School; T. N. Demidova, Massachusetts General Hospital . . . . . [6140-14]

2:40 pm: **Steroids block the anti-inflammatory effect of low-level-laser therapy,** J. M. Bjordal, Univ. i Bergen (Norway); R. A. Lopes-Martins, Univ. of Sao Paulo (Brazil); V. V. Iversen, Univ. i Bergen (Norway); R. Albertini, Univ. do Vale do Paráiba (Brazil) . . . . . [6140-15]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Conv. Ctr. C1 . . . . . Sun. 3:30 to 5:30 pm

Clinical Studies

Chair: **Juanita Anders**, USUHS

3:30 pm: **Laser therapy in general dental practice,** A. A. Darbar, Smile Creations (United Kingdom) . . . . . [6140-17]

3:50 pm: **Low-intensity laser therapy,** F. Kahn, Meditech International Inc. (Canada) . . . . . [6140-18]

4:10 pm: **Low-level-laser therapy reduces inflammation in activated Achilles tendinitis,** J. M. Bjordal, Univ. i Bergen (Norway); R. A. Lopes-Martins, Univ. of Sao Paulo (Brazil); V. V. Iversen, Univ. i Bergen (Norway) . . . . . [6140-19]

4:30 pm: **Transmission of photon-therapy light through human skin: dosimetry adjustment for effects of skin color, body composition, wavelength and light coupling to skin,** E. L. Nussbaum, Mount Sinai Hospital (Canada) and Mount Sinai Hospital (Canada); J. Van Zuylen, PhotonX Health Corp. (Canada) . . . . . [6140-20]

4:50 pm: **Evaluation of low-level-laser irradiation in the healing of diabetic foot wounds: a randomized controlled trial,** G. E. Djavid, Iranian Ctr. for Medical Laser (Iran) and Tehran Univ. of Medical Sciences (Iran) . . . . [6140-21]

5:10 pm: **Aculaser therapy for the treatment of cerebral palsy,** S. Anwar, Anwar Shah's First C.P. and Paralysis Clinic and Research Ctr. (Pakistan); M. N. Malik, Children's Hospital & Institute of Child Health (Pakistan) . [6140-22]

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Role of agrin as a major mediator of effects of laser light on nervous tissue,** A. Makela, Acupuncture and Bioenergy Research Institute (Finland) . . . . . [6140-23]

✔ **Effects of low-intensity laser irradiation during healing of infected skin lesions in the rat,** E. L. Nussbaum, Mount Sinai Hospital (Canada) and Univ. of Toronto (Canada); L. D. Lilge, Univ. of Toronto (Canada) and Univ. of Toronto (Canada); T. Mazzulli, Mount Sinai Hospital (Canada) and Univ. of Toronto (Canada); K. P. Pritzker, Mount Sinai Hospital (Canada) and Univ, of Toronto (Canada) . . . . . [6140-24]

✔ **Can Cochrane reviews in controversial areas be biased? A sensitivity analysis based on the protocol of a systematic Cochrane review on low-level-laser therapy in osteoarthritis,** J. M. Bjordal, Univ. i Bergen (Norway); R. A. Lopes-Martins, Univ. of Sao Paulo (Brazil) . . . . . [6140-25]

✔ **Influence of laser light on AMPK as a factor in the laser therapy of diabetes,** A. Makela, Acupuncture and Bioenergy Research Institute (Finland) . . . . . [6140-26]

✔ **Theoretical and practical aspects of application of a low-energy electromagnetic radiation of the extremely high-frequency range in medicine,** E. P. Lyapina, Saratov State Medical Univ. (Russia); I. A. Chesnokov, N. A. Bushuev, Federal State Unitary Enterprise (Russia); S. E. Kuzyutkina, A. A. Shuldyakov, Saratov State Medical Univ. (Russia) . . . . . [6140-27]

✔ **Activation of migration of stem cells in vitro under influence of low-level-laser radiation,** L. Gasparyan, EMRED Oy (Finland); G. E. Brill, Saratov State Medical Univ. (Russia); A. Makela, Acupuncture and Bioenergy Research Institute (Finland) . . . . . [6140-28]

✔ **Biomodulative effects of polarized light on the healing of cutaneous wounds on nourished and undernourished Wistar rats,** A. L. B. Pinheiro, G. C. Silva Meireles, C. M. Carvalho, A. L. de Barros Vieira, J. N. dos Santos, L. M. P. Ramalho, Univ. Federal da Bahia (Brazil) . . . . . [6140-29]

✔ **Laser therapy improves healing of bone defects submitted to autologus bone graft,** A. L. B. Pinheiro, Univ. Federal da Bahia (Brazil); J. B. B. Weber, M. G. de Oliveira, Pontificia Univ. Catolica do Rio Grande do Sul (Brazil); L. M. Pedreira Ramalho, Univ. Federal da Bahia (Brazil) . . . . . [6140-30]

✔ **Dose Spectral Optimization in Low Light Therapy,** V. Grimblatov, A. Rubinstein, Laser Therapy Institute . . . . . [6140-31]

✔ **LLLT in treating dentinary hypersensitivity: new concepts,** A. Brugnera, Jr., Univ. do Vale do Paráiba (Brazil); F. A. A. Zanin, Univ. de Ribeirao Preto (Brazil); T. C. Ladalardo, Univ. Federal de São Paolo (Brazil); A. L. B. Pinheiro, Univ. Federal da Bahia (Brazil); J. D. Pecora, Univ. de São Paulo (Brazil) . . . . . [6140-32]

✔ **Managing tissue heating in laser therapy to enable double-blind clinical study,** B. Cantanzaro, L. De Taboada, PhotoTherma Inc.; J. Streeter, Acculaser . . . . . [6140-33]

Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6079

Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine X

Conference Chairs: **Valery V. Tuchin**, Saratov State Univ. (Russia); **Joseph A. Izatt**, Duke Univ.; **James G. Fujimoto**, Massachusetts Institute of Technology

Program Committee: **Peter E. Andersen**, Risø National Lab. (Denmark); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Zhongping Chen**, Univ. of California/Irvine; **Johannes F. de Boer**, Massachusetts General Hospital; **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Christoph K. Hitzenberger**, Medizinische Univ. Wien (Austria); **Adrian G. Podoleanu**, Univ. of Kent (United Kingdom); **Andrew M. Rollins**, Case Western Reserve Univ.; **Natalia M. Shakhova**, Institute of Applied Physics (Russia); **Guillermo J. Tearney**, Massachusetts General Hospital; **Lihong V. Wang**, Texas A&M Univ.; **Ruikang K. Wang**, Cranfield Univ. (United Kingdom)

Monday 23 January

SESSION 1

Conv. Ctr. A7/A8 . . . . . Mon. 8:30 to 10:10 am

Molecular/Functional Imaging

Chair: **Joseph A. Izatt**, Duke Univ.

8:30 am: **Frequency domain second harmonic optical coherence tomography,** J. Su, Univ. of Califonia/Irvine . . . . . [6079-01]

8:50 am: **Transient absorption and lifetime imaging with ground state recovery pump-probe optical coherence tomography,** B. E. Applegate, J. A. Izatt, Duke Univ. . . . . [6079-02]

9:10 am: **Imaging of functional activation in the rat somatosensory cortex with optical coherence tomography,** A. D. Aguirre, Y. Chen, Massachusetts Institute of Technology; L. Ruvinskaya, Harvard Medical School; A. Devor, D. A. Boas, Massachusetts General Hospital; J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6079-03]

9:30 am: **Pump-probe optical coherence tomography using indocyanine green as a contrast agent,** Z. Yaqoob, J. Wu, C. Yang, California Institute of Technology . . . . . [6079-04]

9:50 am: **Using nanoshells to achieve molecular contrast in optical coherence tomography images: a pilot study,** D. J. Faber, M. E. van Velthoven, M. C. Aalders, T. G. van Leeuwen, Academic Medical Ctr./Univ. of Amsterdam (Netherlands) . . . . . [6079-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Conv. Ctr. A7/A8 . . . . . Mon. 10:30 am to 12:10 pm

Retinal Imaging Applications I

Chair: **Adrian G. Podoleanu**, Univ. of Kent (United Kingdom)

10:30 am: **Three-dimensional adaptive optics ultrahigh-resolution optical coherence tomography,** E. J. Fernández, B. Povazay, B. M. Hermann, A. Unterhuber, H. Sattmann, Medizinische Univ. Wien (Austria); P. M. Prieto, Univ. de Murcia (Spain); R. Leitgeb, P. K. Ahnelt, Medizinische Univ. Wien (Austria); P. Artal, Univ. de Murcia (Spain); W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6079-06]

10:50 am: **Ultrahigh resolution spectral/Fourier domain OCT systems for retinal imaging applications,** V. J. Srinivasan, Massachusetts Institute of Technology; M. Wojtkowski, Massachusetts Institute of Technology and Tufts Univ. School of Medicine; A. Witkin, B. Monson, J. S. Duker, Tufts Univ. School of Medicine; J. Schuman, Univ. of Pittsburgh; V. Shidlovski, S. Yakubovich, Superlum Diodes Ltd.; J. Fujimoto, Massachusetts Institute of Technology . . . . . [6079-07]

11:10 am: **Adaptive-optics optical coherence tomography for in vivo retinal imaging: comparative analysis of two wavefront correctors,** R. J. Zawadzki, Univ. of California/Davis; S. M. Jones, Lawrence Livermore National Lab.; M. Zhao, Duke Univ.; S. S. Choi, S. P. Laut, Univ. of California/Davis; S. S. Olivier, Lawrence Livermore National Lab.; J. A. Izatt, Duke Univ.; J. S. Werner, Univ. of California/Davis . . . . . [6079-08]

11:30 am: **Retinal nerve fiber layer thickness map and blood flow pulsation measured with SDOCT,** M. Mujat, R. Chan, B. Cense, M. Pierce, H. Park, C. Joo, T. Chen, J. de Boer, Harvard Medical School . . . . . [6079-09]

11:50 am: **Simultaneous OCT/SLO/ICG system,** A. G. Podoleanu, Univ. of Kent (United Kingdom); R. B. Rosen, New York Eye and Ear Infirmary [6079-10]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Conv. Ctr. A7/A8 . . . . . Mon. 1:30 to 3:10 pm

Retinal Imaging Applications II

Chair: **Wolfgang Drexler**, Medizinische Univ. Wien (Austria)

1:30 pm: **Optical coherence tomography of the human retina with dynamic focus,** C. K. Hitzenberger, M. Pircher, E. Götzinger, Medizinische Univ. Wien (Austria) . . . . . [6079-11]

1:50 pm: **Combined SLO/T-scan based en face ultrahigh resolution OCT of the human retina in vivo,** R. G. Cucu, A. G. Podoleanu, Univ. of Kent (United Kingdom); J. Pedro, J. A. Rogers, Ophthalmic Technologies Inc. (Canada); R. B. Rosen, New York Eye and Ear Infirmary . . . . . [6079-12]

2:10 pm: **Investigation of retinal vessel autoregulation using real-time spectral domain Doppler optical coherence tomography,** B. A. Bower, M. Zhao, J. A. Izatt, Duke Univ. . . . . [6079-13]

2:30 pm: **Virtual optical biopsy of retinal pathologies,** B. Hermann, B. Povazay, Medizinische Univ. Wien (Austria); C. Glittenberg, Ludwig Boltzmann Institut (Austria); S. Michels, S. Sacu, C. Ahlers, H. Sattmann, C. Scholda, U. Schmidt-Erfurth, R. A. Leitgeb, W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6079-14]

2:50 pm: **Multiscan OCT system for A, T, B, C and 3D imaging,** C. C. Rosa, Instituto de Engenhariade Sistemas e Computadores do Porto (Portugal); J. A. Rogers, P. Justin, Ophthalmic Technologies Inc. (Canada); A. G. Podoleanu, Univ. of Kent (United Kingdom) . . . . . [6079-15]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

Conv. Ctr. A7/A8 . . . . . Mon. 3:30 to 5:50 pm

Clinical and Biomedical Research Applications

Chair: **Natalia M. Shakhova**, Institute of Applied Physics (Russia)

3:30 pm: **Colonoscopy in mice with ultrahigh-resolution OCT,** A. R. Tumlinson, J. B. McNally, The Univ. of Arizona; A. Unterhuber, B. M. Hermann, H. Sattmann, Medizinische Univ. Wien (Austria); L. P. Hariri, The Univ. of Arizona; W. Drexler, Medizinische Univ. Wien (Austria); J. K. Barton, The Univ. of Arizona . . . . . [6079-16]

3:50 pm: **Combined use of optical coherence tomography and fluorescence imaging for detection of bladder neoplasia,** E. V. Zagaynova, Institute of Applied Physics (Russia); O. S. Streltsova, Nizhny Novgorod Regional Hospital (Russia); N. M. Shakhova, A. G. Orlova, V. A. Kamensky, Institute of Applied Physics (Russia); E. E. Unusova, Nizhny Novgorod State Medical Academy (Russia); R. R. Iksanov, Institute of Applied Physics (Russia); F. I. Feldchtein, Imalux Corp. . . . . [6079-17]

4:10 pm: **Computer-aided diagnosis of dysplasia in Barrett's esophagus using multiple endoscopic OCT images,** X. Qi, D. Y. Rowland, M. V. Sivak, Jr., A. M. Rollins, Case Western Reserve Univ. . . . . [6079-18]

4:30 pm: **Cystoscopic optical coherence tomography for in vivo bladder imaging,** Y. Pan, Stony Brook Univ. . . . . [6079-19]

4:50 pm: **Functional optical coherence imaging of tumor response to pharmacological agents,** D. D. Nolte, K. Jeong, J. J. Turek, Purdue Univ. . . . . [6079-20]

5:10 pm: **Fluorescence-image-guided optical coherence tomography for early bladder cancer diagnosis,** Z. Wang, D. B. Durand, Y. Pan, Stony Brook Univ. . . . . [6079-21]

5:30 pm: **Optical coherence tomography of the oral cavity and oropharynx: a 60 patient review,** J. Ridgway, S. Guo, R. Jackson, J. Su, J. Perez, U. Mahmood, A. Kohli, W. Armstrong, T. Shibuya, R. Crumley, Z. Chen, B. J. Wong, Univ. of California/Irvine . . . . . [6079-22]

Tuesday 24 January

SESSION 5

Conv. Ctr. A7/A8 . . . . . Tues. 8:30 to 10:10 am

FDOCT New Technology I

Chair: **Johannes F. de Boer**, Massachusetts General Hospital

8:30 am: **Fourier domain mode-locked lasers for swept source OCT imaging at up to 290 kHz scan rates,** R. A. Huber, K. Taira, M. Wojtkowski, J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6079-23]

8:50 am: **Catheter-based optical frequency domain imaging at 108 frames per second,** S. A. Yun, M. S. Shishkov, W. Y. Oh, B. J. Vakoc, B. H. Park, G. J. Tearney, J. F. de Boer, B. E. Bouma, Harvard Medical School . . . [6079-24]

9:10 am: **Three-dimensional investigation of in vivo anterior eye segments by swept-source optical coherence tomography with ready-for-shipping scanning light source,** Y. Yasuno, V. D. Madjarova, S. Makita, Univ. of Tsukuba (Japan); M. Akiba, Yamagata Promotional Organization for Industrial Technology (Japan); A. Morosawa, C. Chong, T. Sakai, Santec Corp. (Japan); K. Chan, Yamagata Promotional Organization for Industrial Technology (Japan); M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6079-25]

9:30 am: **Complex unltrahigh resolution optical coherence tomography,** A. Bachmann, R. A. Leitgeb, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6079-26]

9:50 am: **200 frames per second optical frequency domain imaging using an ultrahigh-speed linear-cavity wavelength-swept laser,** W. Y. Oh, S. H. Yun, B. J. Vakoc, G. J. Tearney, B. E. Bouma, Massachusetts General Hospital . . . . . [6079-27]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

Conv. Ctr. A7/A8 . . . . . Tues. 10:30 am to 12:10 pm

FDOCT New Technology II

Chair: **Christoph K. Hitzenberger**, Medizinische Univ. Wien (Austria)

10:30 am: **Auto-correlation self-elimination Fourier domain optical coherence tomography,** J. Ai, L. V. Wang, Texas A&M Univ. . . . . [6079-28]

10:50 am: **Spectral-domain spectrally encoded endoscopy,** D. Yelin, S. H. Yun, R. Yelin, J. T. Motz, B. E. Bouma, G. J. Tearney, Harvard Medical School . . . . . [6079-29]

11:10 am: **Three-dimensional measurement by high-speed line-field Fourier-domain optical coherence tomography,** S. Makita, Y. Nakamura, Y. Yasuno, T. Endo, M. Yamanari, V. D. Madjarova, G. Aoki, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6079-30]

11:30 am: **Frequency-domain optical coherence tomography using minimum-phase functions,** A. Ozcan, M. J. F. Digonnet, G. S. Kino, Stanford Univ. . . . . [6079-31]

11:50 am: **Layer dependent refractive index measurement by Fourier domain optical coherence tomography,** P. H. Tomlins, National Physical Lab. (United Kingdom); R. K. Wang, Oregon Health and Science Univ. and Cranfield Univ. (United Kingdom) . . . . . [6079-32]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 7

Conv. Ctr. A7/A8 . . . . . Tues. 1:30 to 3:10 pm

Full Field OCT and OCM

Chair: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign

1:30 pm: **High-resolution Fourier domain optical coherence microscopy,** R. A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland) and Medizinische Univ. Wien (Austria); L. Steinmann, C. Imboden, A. H. Bachmann, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . [6079-33]

1:50 pm: **Multimodality imaging of structure and function combining spectral-domain optical coherence and multiphoton microscopy,** C. Vinegoni, T. S. Ralston, W. Tan, W. Luo, D. L. Marks, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6079-34]

2:10 pm: **High-speed full-field time encoded frequency domain OCT of biological specimen,** B. Pova_ay, A. Unterhuber, B. Hermann, H. Sattmann, Medizinische Univ. Wien (Austria); H. Arthaber, Technische Univ. Wien (Austria); W. Drexler, Medizinische Univ. Wien (Austria) . . . . . [6079-35]

2:30 pm: **Ultrahigh-resolution full-field optical coherence tomography at 1.3-μm wavelength,** A. Dubois, G. Moneron, A. C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6079-36]

2:50 pm: **Digital holographic optical coherence imaging of tumor tissue,** D. D. Nolte, K. Jeong, J. J. Turek, Purdue Univ. . . . . [6079-37]

Poster Previews

Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

Poster authors will have the opportunity to make brief presentations of their papers.

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Real-time fiber-based multifunctional spectral domain,** B. H. Park, Wellman Ctr. for Photomedicine and Univ. of California/Irvine; M. C. Pierce, B. Cense, A. S. Yun, M. Mujat, G. J. Tearney, B. E. Bouma, J. F. de Boer, Wellman Ctr. for Photomedicine . . . . . [6079-60]

✔ **Realization of fiber-based OCT system with broadband photonic crystal fiber coupler,** S. Y. Ryu, J. Na, H. Y. Choi, B. H. Lee, Gwangju Institute of Science and Technology (South Korea); G. Yang, Fovice Co. (South Korea) . . . . . [6079-61]

✔ **Ultrahigh-resolution optical frequency domain imaging,** W. Y. Oh, B. J. Vakoc, S. H. Yun, G. J. Tearney, B. E. Bouma, Massachusetts General Hospital . . . . . [6079-62]

✔ **In-focus line field Fourier-domain optical coherence tomography by complex numerical method,** Y. Nakamura, J. Sugisaka, Y. Yasuno, Y. Sando, T. Endo, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . [6079-63]

✔ **Investigation of laminar dispersion with optical coherence tomography and optical Doppler tomography,** Y. Ahn, W. Jung, J. Zhang, Z. Chen, Beckman Laser Institute . . . . . [6079-64]

✔ **Signal of a low-coherence interferometer at excitation by light beams with a broad angular spectrum,** D. V. Lyakin, Institute of Precision Mechanics and Control (Russia) and Saratov State Univ. (Russia); V. P. Ryabukho, V. V. Tuchin, Saratov State Univ. (Russia) and Institute of Precision Mechanics and Control (Russia) . . . . . [6079-65]

✔ **Investigations of soft and hard tissues in oral cavity by spectral domain optical coherence tomography,** V. D. Madjarova, Y. Yasuno, S. Makita, Y. Hori, J. Voeffray, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . [6079-66]

✔ **Three-dimensional structural and local birefringence imaging of the bovine meniscus by use of OCT and PSOCT,** S. Guo, T. Xie, G. M. Peavy, B. J. Wong, Z. Chen, Univ. of California/Irvine . . . . . [6079-67]

✔ **Mapping procedure for ophthalmic spectral-domain polarization-sensitive optical coherence tomography,** B. Cense, M. Mujat, C. Joo, B. H. Park, T. C. Chen, M. C. Pierce, J. F. de Boer, Harvard Medical School . . . . . [6079-68]

✔ **In vivo optical coherence tomography of the nasal mucosa,** U. Mahmood, J. Perez, J. Ridgway, R. Jackson, S. Guo, J. Su, W. Armstrong, T. Shibuya, R. Crumley, Z. Chen, B. J. Wong, Univ. of California/Irvine . . . . . [6079-69]

✔ **En-face phase-sensitive optical coherence tomography,** J. Fingler, J. Williams, Z. Yaqoob, C. Yang, California Institute of Technology; R. Haskell, Harvey Mudd College; S. Fraser, California Institute of Technology [6079-70]

✔ **Full-field AO-assisted OCT for high-resolution tomographic imaging of the retina,** M. Glanc, D. Lafaille, Observatoire de Paris/LESIA (France); F. Lacombe, Mauna Kea Technologies (France); L. Vabre, X. Levecq, N. Chateau, Imagine Eyes (France) . . . . . [6079-71]

✔ **Compact standing-wave transform spectrometer with high-resolution,** J. Fu, Stanford Univ. and Exponent, Inc; X. Yu, B. Zhang, J. S. Harris, Stanford Univ. . . . . [6079-72]

✔ **High-speed frequency-swept light source at 1550-nm for Fourier domain OCT with A-scanning rate at 20kHz,** R. K. Wang, S. Cheung, Oregon Health & Science Univ.; P. H. Tomlins, National Physical Lab. (United Kingdom); C. Chong, A. Morosawa, Santec Corp. (Japan); D. Heard, Santec Europe Limited (United Kingdom) . . . . . [6079-73]

✔ **Flying spot en-face OCT for monitoring cell distribution in collagen-based constructs,** K. Kosmidis, C. D. Russell, Univ. of Liverpool (United Kingdom); A. Podoleanu, Univ. of Kent (United Kingdom); R. Black, Univ. of Liverpool (United Kingdom) . . . . . [6079-74]

✔ **Enhancement of lateral resolution of Fourier domain optical coherence tomography over diffraction-limit by defocus-detection and numerical compensation,** Y. Yasuno, J. Sugisaka, Y. Sando, Y. Nakamura, S. Makita, T. Endo, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6079-75]

✔ **Comparison of Lorentzian and Guassian based approaches for laser speckle imaging of blood flow dynamics,** J. C. Ramírez-San-Juan, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); B. Choi, J. S. Nelson, Univ. of California/Irvine/Beckman Laser Institute . . . . . [6079-76]

✔ **Dynamic OCT of sweat glands of human finger tip,** M. Ohmi, M. Haruna, Y. Ueda, T. Fuji, Osaka Univ. (Japan) . . . . . [6079-77]

✔ **Full-field optical coherence tomography using a fibre imaging bundle,** H. D. Ford, R. P. Tatam, Cranfield Univ. (United Kingdom) . . . . . [6079-78]

✔ **Quantitative measurements of flow velocity and direction using transversal Doppler optical coherence tomography,** A. Røyset, SINTEF (Norway); T. Støren, F. Stabo-Eeg, T. Lindmo, Norwegian Univ. of Science and Technology (Norway) . . . . . [6079-79]

✔ **Directional polarization sensitivity of articular cartilage by optical coherence tomography,** T. Xie, Univ. of California/Irvine . . . . . [6079-80]

✔ **A high-power broad-bandwidth 1310-nm superluminescent diode with low spectral modulation,** J. Wei, S. Park, Y. Hu, R. Enck, V. Luciani, O. A. Konoplev, Covega Corp.; S. W. Wilson, Palomar Medical Technologies, Inc; P. J. S. Heim, Covega Corp. . . . . [6079-81]

✔ **Correlation between OCT images and histology of the pig skin,** R. V. Kuranov, D. Prough, V. V. Sapozhnikova, I. Cicenaite, R. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6079-82]

✔ **Reconstruction of three-dimensional structure of an extracted tooth,** H. Furukawa, H. Hiro-Oka, T. Amano, D. Choi, Kitasato Univ. (Japan); T. Miyazawa, R. Yoshimura, NTT Photonics Labs. (Japan); K. Shimizu, K. Ohbayashi, Kitasato Univ. (Japan) . . . . . [6079-83]

✔ **Fourier domain optical coherence tomography with an 800-μm diameter axicon lens for long-depth-range probing,** K. Lee, C. Koehler, E. G. Johnson, J. P. Rolland, College of Optics and Photonics/Univ. of Central Florida . . . . . [6079-84]

✔ **Speckle noise in polarization sensitive optical coherence tomography,** A. Røyset, SINTEF (Norway); T. Støren, T. Lindmo, Norwegian Univ. of Science and Technology (Norway) . . . . . [6079-85]

✔ **In vivo depth-resolved birefringence study of the hyperlipidemic rat's liver with polarization-sensitive optical coherence,** Y. Wang, C. Lu, M. Tsai, S. Chen, C. C. Yang, National Taiwan Univ. (Taiwan) . . . . . [6079-86]

✔ **Theoretical characteristics and practical consideration on axial detection performance of time domain, Fourier domain and swept source optical coherence tomography,** B. Liu, M. E. Brezinski, Brigham and Women's Hospital . . . . . [6079-87]

✔ **Image quality improvement in spectral-domain optical coherence tomography with spectral shaping and CCD responsivity compensation,** M. Tsai, C. Lu, Y. Wang, C. C. Yang, National Taiwan Univ. (Taiwan) [6079-88]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday 25 January

SESSION 8

Conv. Ctr. A7/A8 . . . . . Wed. 8:30 to 10:10 am

New Probe Designs and Light Sources

Chair: **Zhongping Chen**, Univ. of California/Irvine

8:30 am: **Three-dimensional time and Fourier domain endoscopic OCT,** W. Jung, Univ. of California/Irvine; D. T. McCormick, Univ. of California/Berkeley; J. Zhang, Univ. of California/Irvine; N. C. Tien, Univ. of California/Davis; Z. Chen, Univ. of California/Irvine . . . . . [6079-38]

8:50 am: **Forward-cone-imaging OCT needle probe,** J. Wu, C. Gu, F. Wang, Z. Yaqoob, C. Yang, California Insitute of Technology . . . . . [6079-39]

9:10 am: **Polyimide amplified piezoelectric scanner for endoscopic optical coherence tomography,** J. M. Zara, P. E. Patterson, George Washington Univ. . . . . [6079-40]

9:30 am: **Clinical oral cancer diagnosis with optical coherence tomography equipped with specially designed probes,** C. Lu, S. Chen, M. Tsai, Y. Wang, C. C. Yang, C. Chiang, National Taiwan Univ. (Taiwan) . . . . . [6079-41]

9:50 am: **NIR semiconductor laser with fast broadband tuning,** M. V. Shramenko, E. V. Andreeva, D. S. Mamedov, V. R. Shidlovski, S. D. Yakubovich, Superlum Diodes Ltd. (Russia) . . . . . [6079-42]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 9

Conv. Ctr. A7/A8 . . . . . Wed. 10:30 am to 12:10 pm

Low-Coherence Light Scattering

Chair: **Peter E. Andersen**, Risø National Lab. (Denmark)

10:30 am: **High sensitivity measurements of the scattering dispersion of phantoms using spectral domain optical coherence tomography,** S. D. Dyer, T. Dennis, P. A. Williams, L. K. Street, S. M. Etzel, R. J. Espejo, T. A. Germer, National Institute of Standards and Technology; T. E. Milner, The Univ. of Texas at Austin . . . . . [6079-43]

10:50 am: **Multiple incidence angle optical coherence tomography,** R. C. Lin, A. M. Rollins, Case Western Reserve Univ. . . . . [6079-44]

11:10 am: **Origin of low-coherence enhanced backscattering (LEBS) of light in discrete tissue models: double scattering,** Y. L. Kim, P. Pradhan, H. Subramanian, Y. Liu, M. H. Kim, V. Backman, Northwestern Univ. . [6079-45]

11:30 am: **Demonstration of inverse scattering in optical coherence tomography,** T. S. Ralston, D. L. Marks, P. S. Carney, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6079-46]

11:50 am: **Decomposition and analysis of unresolvable optical coherence tomography signals,** P. Ioannides, C. Nicolaou, C. Pitris, Univ. of Cyprus (Cyprus) . . . . . [6079-47]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 10

Conv. Ctr. A7/A8 . . . . . Wed. 1:30 to 3:10 pm

Phase Microscopy and Doppler OCT

Chair: **Ruikang K. Wang**, Oregon Health and Science Univ.

1:30 pm: **Spectral-domain optical coherence phase microscopy for quantitative phase contrast imaging,** C. Joo, T. Akkin, B. Cense, B. H. Park, M. Mujat, J. F. de Boer, Massachusetts General Hospital . . . . . [6079-48]

1:50 pm: **Full-field swept-source phase microscopy,** M. V. Sarunic, S. H. Weinberg, J. A. Izatt, Duke Univ. . . . . [6079-49]

2:10 pm: **Phase-resolved optical frequency domain imaging,** B. J. Vakoc, S. H. Yun, J. F. de Boer, G. J. Tearney, B. E. Bouma, Wellman Ctr. for Photomedicine . . . . . [6079-50]

2:30 pm: **Measurement of absolute flow velocity vector using dual angle, delay-encoded Doppler optical coherence tomography,** C. J. Pedersen, Case Western Reserve Univ.; M. A. Shure, The Cleveland Clinic Foundation; D. Huang, Univ. of Southern California/Doheny Eye Institute; A. M. Rollins, Case Western Reserve Univ. . . . . [6079-51]

2:50 pm: **In vivo blood flow imaging by swept source-based Fourier domain optical Doppler tomography,** J. Zhang, Z. Chen, Univ. of California/Irvine . . . . . [6079-52]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 11

Conv. Ctr. A7/A8 . . . . . Wed. 3:30 to 5:50 pm

Polarization-Sensitive OCT

Chair: **James G. Fujimoto**, Massachusetts Institute of Technology

3:30 pm: **Detection of ultrastructural changes in genetically altered and exercised skeletal muscle using PS-OCT,** J. J. Pasquesi, M. D. Boppart, S. J. Kaufman, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . [6079-53]

3:50 pm: **Polarization properties of ocular tissue imaged with polarization sensitive spectral domain optical coherence tomography,** E. Götzinger, M. Pircher, C. K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . [6079-54]

4:10 pm: **Endoscopic polarization-sensitive optical coherence tomography,** M. C. Pierce, M. Shishkov, H. Park, N. Nassif, B. E. Bouma, G. J. Tearney, J. F. de Boer, Wellman Ctr. for Photomedicine . . . . . [6079-55]

4:30 pm: **Noise model for polarization-sensitive optical coherence tomography,** P. A. Williams, National Institute of Standards and Technology; N. J. Kemp, The Univ. of Texas at Austin; D. Ives, National Physical Lab. (United Kingdom); J. Park, H. G. Rylander III, T. E. Milner, The Univ. of Texas at Austin . . . . . [6079-56]

4:50 pm: **Polarization sensitive Fourier domain optical coherence tomography with continuous polarization modulation,** M. Yamanari, Y. Yasuno, S. Makita, Y. Nakamura, Y. Hori, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6079-57]

5:10 pm: **Burn depth determination using high-speed polarization-sensitive Mueller optical coherence tomography with continuous polarization modulation,** M. Todorovic, J. Ai, D. Pereda Cubian, Q. Wu, G. Stoica, L. Wang, Texas A&M Univ. . . . . [6079-58]

5:30 pm: **The 3D collagen structure of equine articular cartilage, characterized using variable-angle-of-incidence polarization-sensitive optical coherence tomography,** S. J. Matcher, N. Ugryumova, D. Attenburrow, S. Gangnus, C. P. Winlove, The Univ. of Exeter (United Kingdom) . . . . [6079-59]

Sunday-Monday 22-23 January 2006 • Proceedings of SPIE Vol. 6080

Advanced Biomedical and Clinical Diagnostic Systems IV

Conference Chairs: **Gerald E. Cohn**, Cyber Tech Applied Science; **Warren S. Grundfest**, Univ. of California/Los Angeles; **David A. Benaron**, Spectros Corp.; **Tuan Vo-Dinh**, Oak Ridge National Lab.

Cochairs: **James N. Herron**, Univ. of Utah; **James F. Leary**, Purdue Univ.; **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **Richard B. Thompson**, Univ. of Maryland/Baltimore; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

Program Committee: **Leslie Baillie**, Univ. of Maryland/College Park; **Jennifer K. Barton**, The Univ. of Arizona; **Irving J. Bigio**, Boston Univ.; **Albert C. Boccara**, École Supérieure de Physique et de Chimie Industri (France); **Stephen G. Bown**, Univ. College London (United Kingdom); **Sabato D'Auria**, Consiglio Nazionale delle Ricerche (Italy); **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.; **Amir H. Gandjbakhche**, National Institutes of Health; **Chris D. Geddes**, Univ. of Maryland/Baltimore; **Ewa M. Goldys**, Macquarie Univ. (Australia); **Joseph A. Izatt**, Duke Univ.; **Omar S. Khalil**, Abbott Labs.; **Richard M. Levenson**, CRI Inc.; **Hong Liu**, Univ. of Oklahoma; **Laura Marcu**, Cedars-Sinai Medical Ctr.; **Joseph A. Miragliotta**, Johns Hopkins Univ.; **Mary-Ann Mycek**, Univ. of Michigan; **Teresa N. Petersen**, Univ. of Aalborg (Denmark); **Richard A. Robb**, Mayo Clinic; **Marcia L. Vernon**, Institut National d'Optique (Canada); **Georges A. Wagnières**, École Polytechnique Fédérale de Lausanne (Switzerland); **William P. Wiesmann**, Sekos, Inc.; **Tony Wilson**, Univ. of Oxford (United Kingdom); **Ruth M. Woodward**, HT Consultants Ltd. (United Kingdom); **Xiao-Hong N. Xu**, Old Dominion Univ.

Sunday 22 January

SESSION 1

Conv. Ctr. B2 . . . . . Sun. 9:10 to 11:10 am

Novel Diagnostic Technologies

Chair: **David A. Benaron**, Spectros Corp.

9:10 am: **New applications of time prism pair in biomedical imaging system,** D. Hwang, Y. Lee, Mokwon Univ. (South Korea) . . . . . [6080-01]

9:30 am: **Noninvasive measurement of blood hematocrit using low-coherence interferometry and retinal tracking,** N. V. Iftimia, D. X. Hammer, C. E. Bigelow, D. I. Rosen, D. Ferguson, Physical Sciences Inc. . . . . [6080-02]

9:50 am: **Quantum dot delivery into mammalian cells by pulsed electric fields,** Y. Sun, P. T. Vernier, J. Wang, C. Chong, Univ. of Southern California; L. Marcu, Univ. of Southern California/Cedars-Sinai Medical Ctr.; M. A. Gundersen, Univ. of Southern California . . . . . [6080-03]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Full-field high-speed laser Doppler imaging system for blood-flow measurements,** A. Serov, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6080-05]

10:50 am: **Short pulse laser based optical tomography system for tumor detection,** G. Pal, K. Mitra, Florida Institute of Technology; T. Vo-Dinh, Oak Ridge National Lab. . . . . [6080-07]

SESSION 2

Conv. Ctr. B2 . . . . . Sun. 11:10 am to 12:30 pm

Terahertz Spectroscopy

Chair: **Ruth M. Woodward**, HT Consultants Ltd. (United Kingdom)

11:10 am: **Using terahertz spectroscopy as a protein binding assay** *(Invited Paper),* J. Chen, SUNY/Univ. at Buffalo; J. R. Knab, Univ. at Buffalo; S. Ye, Y. He, S. Gupta, A. G. Markelz, SUNY/Univ. at Buffalo . . . . . [6080-08]

11:50 am: **Time-domain terahertz spectroscopy of artificial skin,** P. M. Corridon, I. Wilke, R. Ascazubi, Rensselaer Polytechnic Institute; C. Krest, St. John Fisher College . . . . . [6080-09]

12:10 pm: **Terahertz measurements,** R. M. Woodward, HT Consultants Ltd. (United Kingdom) . . . . . [6080-10]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 3

Conv. Ctr. B2 . . . . . Sun. 2:00 to 3:00 pm

Biosensors

Chair: **James N. Herron**, Univ. of Utah

2:00 pm: **Imaging surface plasmon resonance sensor based on the use of Fabry-Perot cavity,** H. Ho, S. Wu, C. Wong, S. Kong, C. Lin, The Chinese Univ. of Hong Kong (Hong Kong China) . . . . . [6080-12]

2:20 pm: **A Sequence-Specific and Ultrasensitive DNA Biosensor Based on an Intrinsic Photonic Amplification Mechanism,** K. Doré, H. A. Ho, M. Leclerc, D. Boudreau, Laval Univ. (Canada) . . . . . [6080-13]

2:40 pm: **Dynamics of cells function on laser cell-chip system for cancer therapy,** T. Kushibiki, Osaka Univ. (Japan); T. Sano, Osaka Univ (Japan); K. Ishii, S. Yoshihashi-Suzuki, K. Awazu, Osaka Univ. (Japan) . . . . . [6080-14]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Conv. Ctr. B2 . . . . . Sun. 3:30 to 4:10 pm

Diffuse Light Detection

Chair: **Tuan Vo-Dinh**, Oak Ridge National Lab.

3:30 pm: **Diffuse spectroscopy for inhomogeneous metal nanoparticle assays,** P. Potuluri, M. E. Sullivan, Centice Corp.; D. J. Brady, S. Marinakos, A. Chilkoti, Duke Univ. . . . . [6080-15]

3:50 pm: **Development and system characteristics of diffuse optical tomography using single rotating-source/detector mechanism,** M. Pan, W. Huang, C. Cheng, National Central Univ. (Taiwan); M. Pan, Tung Nan Institute of Technology (Taiwan) . . . . . [6080-17]

SESSION 5

Conv. Ctr. B2 . . . . . Sun. 4:10 to 5:10 pm

In Vivo Detection Devices

Chair: **Hong Liu**, National Institute of Mental Health

4:10 pm: **Development of a dual-view endoscope system,** T. Sekiya, E. Ito, M. Kanai, M. Matsumoto, Pentax Corp. (Japan) . . . . . [6080-19]

4:30 pm: **Advanced endoscopy system for simultaneous multimode imaging and non-contact spectroscopy for lung cancer detection,** H. Zeng, British Columbia Cancer Agency (Canada); M. Petek, Perceptronix Medical Inc. (Canada); M. T. Zorman, Klinicni Ctr. Ljubljana (Slovenia); Y. S. Fawzy, Perceptronix Medical Inc. (Canada) . . . . . [6080-20]

4:50 pm: **In-vivo assessment and evaluation of lung tissue morphologic and physiological changes from non-contact endoscopic reflectance spectroscopy for improving lung cancer detection,** Y. S. Fawzy, Perceptronix Medical Inc. (Canada); H. Zeng, British Columbia Cancer Agency (Canada); M. T. Zorman, Univ. of Ljubljana Medical Hospital Clinical Ctr. (Slovenia); M. Peteka, Perceptronix Medical Inc. (Canada) . . . . . [6080-18]

Monday 23 January

SESSION 6

Conv. Ctr. B2 . . . . . Mon. 8:50 to 10:10 am

Advanced Fluorescence Instrumentation

Chair: **Richard B. Thompson**, Univ. of Maryland/Baltimore

8:50 am: **Packaging and characteristics of a microfluorescence spectroscopy analyzer** *(Invited Paper),* J. F. Lo, W. Pang, E. Kim, M. A. Gundersen, L. Marcu, Univ. of Southern California . . . . . [6080-22]

9:30 am: **Brain tumor demarcation with liquid-crystal tunable filter spectral imaging: preliminary system characterization, calibration, and in vitro testing,** S. C. Gebhart, A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6080-11]

9:50 am: **Time-resolved fluorescence spectroscopy of the intrinsic fluorescent constituents of neural tissue and tumors,** P. V. Butte, Univ. of Southern California; Q. Fang, W. H. Yong, B. K. Pikul, K. L. Black, Cedars-Sinai Medical Ctr.; L. Marcu, Cedars-Sinai Medical Ctr. and Univ. of Southern California . . . . . [6080-24]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 7

Conv. Ctr. B2 . . . . . Mon. 10:40 am to 12:20 pm

Polarization Methods

Chair: **William P. Wiesmann**, Sekos, Inc.

10:40 am: **Polarization sensitive low-coherence interferometry for guidance of fine needle aspiration breast biopsy,** B. D. Goldberg, Massachusetts General Hospital and Harvard-MIT Div of Health Sciences and Technology; N. V. Iftimia, Physical Sciences Inc.; J. E. Bressner, B. H. Park, M. C. Pierce, J. F. de Boer, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . [6080-26]

11:00 am: **Differential geometry of normalized Stokes vector trajectories to determine polarization properties of multilayered anisotropic tissue,** J. Park, N. J. Kemp, H. G. Rylander III, T. E. Milner, The Univ. of Texas at Austin . . . . . [6080-27]

11:20 am: **A new approach to Mueller matrix reconstruction of skin cancer lesions using a dual rotating retarder polarimeter,** J. C. Ramella-Roman, Johns Hopkins Univ.; B. B. Boulbry, National Institute of Standards and Technology; D. D. Duncan, Johns Hopkins Univ. . . . . [6080-28]

11:40 am: **Characterizing of tissue microstructure with polarization sensitive optical coherence tomography,** B. Liu, M. Harman, S. Giattina, D. L. Stamper, S. Raby, M. Chilek, C. Demakis, M. E. Brezinski, Brigham and Women's Hospital . . . . . [6080-29]

12:00 pm: **Stokes vector determination of polarized light propagation in optical turbid medium,** S. Firdous, Sr., Pakistan Institute of Engineering and Applied Sciences (Pakistan) . . . . . [6080-30]

Lunch Break . . . . . 12:20 to 1:20 pm

SESSION 8

Conv. Ctr. B2 . . . . . Mon. 1:20 to 4:50 pm

Cell-and Tissue-Based Methods

Chair: **Richard M. Levenson**, CRI Inc.

1:20 pm: **Feeling with light for cancer and stem cells** *(Invited Paper),* J. Käs, Univ. Leipzig (Germany) . . . . . [6080-31]

2:00 pm: **Hyperspectral fluorescence imaging system for biomedical diagnostics,** M. E. Martin, M. B. Wabuyele, M. Panjehpour, M. N. Phan, B. F. Overholt, T. Vo-Dinh, Oak Ridge National Lab. . . . . [6080-32]

2:20 pm: **Nanotechnology in bio-tissue mechanics,** T. C. Fan, Univ. of Washington . . . . . [6080-33]

2:40 pm: **Data mining** *(Invited Paper),* J. F. Leary, Purdue Univ. . . . . [6080-34]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Multispectral imaging system for optical monitoring of superficial tissue defects,** H. J. Noordmans, R. d. Roode, R. M. Verdaasdonk, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [6080-35]

4:10 pm: **In-vivo microvasculature visualization using hyperspectral imaging,** B. B. Shah, A. D. Kothare, K. Behbehani, K. J. Zuzak, The Univ. of Texas at Arlington . . . . . [6080-36]

4:30 pm: **Bacterial phenotype identification using Zernike moment invariants,** B. Bayraktar, P. P. Banada, E. Bae, E. D. Hirleman, Jr., A. K. Bhunia, J. P. Robinson, B. P. Rajwa, Purdue Univ. . . . . [6080-37]

SESSION 9

Room: Conv. Ctr. B2 . . . . . Mon. 4:50 to 6:10 pm

Biosensor Technology for Point of Care Applications

Chair: **James N. Herron**, Univ. of Utah

4:50 pm: **Multi-analyte bioluminescence-based disposable ChemChips for home-based application,** J. D. Andrade, D. Bartholomeusz, R. Davies, X. Yang, J. Janatova, Univ. of Utah . . . . . [6080-45]

5:10 pm: **Optical enhanced luminescent measurements and sequential reagent mixing on a centrifugal microfluidic device for multi-analyte Point-of-Care applications,** D. Bartholomeusz, R. Davies, J. D. Andrade, Univ. of Utah . . . . . [6080-46]

5:30 pm: **Theoretical limitations on sensing selectivity in nucleic acid microarrays,** J. Bishop, S. Blair, A. Chagovetz, Univ. of Utah . . . . . [6080-47]

5:50 pm: **Rapid SNP detection for personalized medicine applications using planar waveguide fluorescence sensors,** J. N. Herron, S. Tolley, R. Smith, D. A. Christensen, Univ. of Utah . . . . . [6080-48]

Tuesday 24 January

✔ Posters-Tuesday

Chair: **Gerald E. Cohn**, Cyber Tech Applied Science

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Wide-angle lens for miniature endoscope,** M. Ou-Yang, Y. Chen, H. Lee, National Central Univ. (Taiwan) . . . . . [6080-21]

✔ **GABA receptor-dependent firing pattern of mature neuronal networks on multielectrode array,** X. Li, M. Liu, W. Zhou, Y. Li, X. Liu, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6080-38]

✔ **Tetrodotoxin-induced transformation of spontaneous firing in cultured hippocampal neuronal networks,** M. Liu, W. Zhou, X. Li, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6080-39]

✔ **Modulation of spontaneous activity of hippocampal cultures with close-loop stimulation,** Y. Li, W. Zhou, X. Li, J. He, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6080-40]

✔ **Early diagnosis of diabetic vascular complications: impairment of red blood cell deformability,** S. Shin, Y. Ku, J. Suh, Kyungpook National Univ. (South Korea) . . . . . [6080-41]

✔ **Using optical coherence tomography as an aid in chemoprevention of skin cancer,** V. R. Korde, College of Optical Sciences/The Univ. of Arizona; C. Krishnamurthy, L. D. Slayton, C. A. Brooks, J. Ranger-Moore, D. S. Alberts, Arizona Cancer Ctr.; J. K. Barton, College of Optical Sciences/The Univ. of Arizona and The Univ. of Arizona . . . . . [6080-42]

✔ **Optical detection of intravenous infiltration,** L. W. Winchester, Jr., N. Chou, CW Optics . . . . . [6080-43]

✔ **Measurement of material dispersion using spectral domain optical coherence tomography,** S. Oh, E. K. Kim, T. E. Milner, The Univ. of Texas at Austin . . . . . [6080-44]

✔ **Combined time- and depth-resolved autofluorescence spectroscopy for tissue diagnosis,** Y. Wu, The Hong Kong Univ. of Science and Technology; J. Y. Qu, The Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6080-25]

Saturday 21 January 2006 • Proceedings of SPIE Vol. 6081

Multimodal Biomedical Imaging

Conference Chair: **Fred S. Azar**, Siemens Corp Research

Cochair: **Dimitris N. Metaxas**, Rutgers Univ.

Program Committee: **Mostafa Analoui**, Pfizer Inc.; **Nicholas Ayache**, INRIA (France); **David A. Boas**, Massachusetts General Hospital; **Britton Chance**, Univ. of Pennsylvania; **Laurence P. Clarke**, National Cancer Institute; **Hamid Dehghani**, Dartmouth College; **Keyvan Farahani**, National Institutes of Health; **Xavier Intes**, ART Advanced Research Technologies Inc. (Canada); **Umar Mahmood**, Massachusetts General Hospital; **Nassir Navab**, Technische Univ. München (Germany); **Vasilis Ntziachristos**, Massachusetts General Hospital; **Brian W. Pogue**, Dartmouth College; **Yanjun Wu**, GlaxoSmithKline; **Arjun G. Yodh**, Univ. of Pennsylvania; **Yantian Zhang**, National Institutes of Health

Saturday 21 January

SESSION 1

Conv. Ctr. B1 . . . . . Sat. 8:50 to 10:10 am

Advances in Spectroscopic Imaging

Chairs: **Xavier Intes**, ART Advanced Research Technologies Inc. (Canada); **Fred S. Azar**, Siemens Corporate Research

8:50 am: **Estimating CMRO2 with multimodality imaging using a multi-compartment vascular model,** M. Allen, The Univ. of Texas at Arlington; T. J. Huppert, D. A. Boas, Massachusetts General Hospital . . . . . [6081-27]

9:10 am: **Measurement of quadriceps endurance by fNIRS,** D. Erdem, O. Sayli, Bogaziçi Univ. (Turkey); M. Karahan, Marmara Univ. (Turkey); A. Akin, Bogaziçi Univ. (Turkey) . . . . . [6081-01]

9:30 am: **Measurement of oxidative metabolism of the working human muscles by near-infrared spectroscopy,** A. Yucetas, O. Sayli, Bogaziçi Univ. (Turkey); M. Karahan, Marmara Univ. (Turkey); A. Akin, Bogaziçi Univ. (Turkey) . . . . . [6081-02]

9:50 am: **Particle sizing with spatially resolved Fourier-holographic light scattering angular spectroscopy,** S. A. Alexandrov, T. R. Hillman, D. D. Sampson, The Univ. of Western Australia (Australia) . . . . . [6081-03]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Conv. Ctr. B1 . . . . . Sat. 10:30 am to 12:00 pm

Multimodality Imaging

Chairs: **Dimitris N. Metaxas**, Rutgers Univ.; **Fred S. Azar**, Siemens Corporate Research

10:30 am: **Monitoring tumor growth and regression in small animals with optical tomography and magnetic resonance imaging,** J. M. Masciotti, X. Gu, J. H. Hur, F. Provenzano, Q. Wu, Columbia Univ.; J. Papa, D. Yamashiro, J. J. Kandel, Columbia Univ. Medical Ctr.; A. H. Hielscher, Columbia Univ. . . . . [6081-05]

10:50 am: **Registration and analysis of in-vivo multispectral images for correction of motion and comparison in time,** H. J. Noordmans, R. d. Roode, M. Staring, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6081-06]

11:10 am: **Near-infrared/ultrasound dual modal imaging for breast cancer detection,** R. X. Xu, B. Qiang, J. O. Olsen, S. P. Povoski, L. D. Yee, The Ohio State Univ.; J. Mao, ViOptix, Inc. . . . . [6081-07]

11:30 am: **Molecular Imaging impact on multimodality platforms and the future potential role of optical methods in medicine** *(Invited Paper),* C. P. Schultz, Siemens Medical Solutions . . . . . [6081-08]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 3

Conv. Ctr. B1 . . . . . Sat. 1:00 to 2:30 pm

Analysis and Reconstruction Techniques

Chairs: **Fred S. Azar**, Siemens Corporate Research; **Xavier Intes**, ART Advanced Research Technologies Inc. (Canada)

1:00 pm: **Recovering 3D tumor locations from 2D bioluminescence images and registration with CT images,** X. Huang, D. N. Metaxas, Rutgers Univ.; L. G. Menon, P. Mayer-Kuckuk, J. R. Bertino, D. Banerjee, Robert Wood Johnson Medical School . . . . . [6081-09]

1:20 pm: **Comparison of optical imaging and functional magnetic resonance imaging of the human brain using a photon hitting-density weight function in the calculation of the BOLD signal,** S. Fantini, A. Sassaroli, Tufts Univ.; B. B. Frederick, McLean Hospital; Y. Tong, Tufts Univ. . . . [6081-10]

1:40 pm: **A binocular machine vision system for non-melanoma skin cancer 3D reconstruction,** D. S. Gorpas, K. Politopoulos, D. Yova, E. Alexandratou, National Technical Univ. of Athens (Greece) . . . . . [6081-11]

2:00 pm: **Combining confidence-rated classifiers to efficiently incorporate unlabeled medical data: classification of microscopic cell images (Invited Paper, Presentation Only),** D. N. Metaxas, Rutgers Univ. . . . . [6081-12]

SESSION 4

Conv. Ctr. B1 . . . . . Sat. 2:30 to 3:50 pm

Small Animal Imaging

Chairs: **Dimitris N. Metaxas**, Rutgers Univ.; **Fred S. Azar**, Siemens Corporate Research

2:30 pm: **Multiwavelength optical and high throughput microPET imaging (Invited Paper, Presentation Only),** Y. Wu, GlaxoSmithKline; J. W. Wellen, GlaxoSmithKline (United Kingdom); S. K. Sarkar, GlaxoSmithKline . . . [6081-13]

3:00 pm: **Radiative transport-based small animal fluorescence tomography with X-ray computed tomography priors,** A. Joshi, J. C. Rasmussen, E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6081-14]

3:20 pm: **Co-registration of fluorescence molecular tomography with MRI and c-ray microCT and high frequency ultrasound** *(Invited Paper, Presentation Only),* V. Ntziachristos, Massachusetts General Hospital [6081-15]

Coffee Break . . . . . 3:50 to 4:10 pm

SESSION 5

Conv. Ctr. B1 . . . . . Sat. 4:10 to 6:40 pm

Network for Translational Research in Optical Imaging: Breast Cancer Diffuse Optical Imaging

Chairs: **Fred S. Azar**, Siemens Corporate Research;
Xavier Intes, ART Advanced Research Technologies Inc. (Canada)

4:10 pm: **Time domain optical imaging applied to animal model and breast imaging (Invited Paper, Presentation Only),** X. Intes, ART Advanced Research Technologies Inc. (Canada) . . . . . [6081-16]

4:40 pm: **A software platform for visualization and multimodal registration of diffuse optical tomography and MRI of breast cancer,** F. S. Azar, N. Hajjioui, M. ElBawab, A. Khamene, L. Grady, Siemens Corporate Research; K. Lee, R. Choe, A. Corlu, S. D. Konecky, A. G. Yodh, Univ. of Pennsylvania; F. Sauer, Siemens Corporate Research . . . . . [6081-17]

5:00 pm: **Dynamic tomography imaging system for pressure-enhanced near-infrared breast imaging,** S. Jiang, B. W. Pogue, K. D. Paulsen, Dartmouth College . . . . . [6081-18]

5:20 pm: **Instrumentation of rapid near-infrared diffuse optical tomography for imaging of tissue at 35 frames per second,** D. Piao, S. Jiang, H. Dehghani, S. Srinivasan, B. W. Pogue, Dartmouth College . . . . . [6081-19]

5:40 pm: **Nonlinear image reconstruction algorithm for diffuse optical tomography using iterative block solver and automatic mesh generation from tomosynthesis images,** Q. Fang, D. Boas, Massachusetts General Hospital; G. Boverman, Northeastern University; Q. Zhang, Kauffman, Massachusetts General Hospital . . . . . [6081-28]

6:00 pm: **State-space modeling for multi-modality fusion of BOLD and Diffuse Optical Tomography,** T. J. Huppert, S. G. Diamond, M. A. Franceschini, D. A. Boas, Massachusetts General Hospital . . . . . [6081-26]

6:20 pm: **Co-registration of Magnetic Resonance Imaging and broadband Diffuse Optical Spectroscopy in breast tissue,** A. Li, Univ. of California/Irvine; C. S. Klifa, Univ. of California/San Francisco; N. S. Shah, Univ. of California/Irvine; F. S. Azar, Siemens Corporate Research; A. E. Cerussi, Univ. of California/Irvine; N. M. Hylton, Univ. of California/San Francisco; B. J. Tromberg, Univ. of California/Irvine . . . . . [6081-30]

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Laser Doppler blood-flow imaging combined with topographical imaging of the sample,** R. Michaely, A. Serov, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6081-20]

✔ **Ultra-fast facial topometry using pulsed holography,** A. Thelen, S. Frey, S. Hirsch, N. Ladriere, Ctr. of Advanced European Studies and Research (Germany); P. Hering, Heinrich-Heine-Univ. Dusseldorf (Germany) and Ctr. of Advanced European Studies and Research (Germany) . . . . . [6081-22]

✔ **Direct reconstruction of fluorophore concentrations in fluorescence molecular tomography using multigrid algorithm,** J. C. Ye, Korea Advanced Institute of Science and Technology (South Korea) . . . . [6081-23]

✔ **Multimodal intravital microscopy of immune cells and melanomas for longitudinal studies,** R. Toledo-Crow, Memorial Sloan-Kettering Cancer Ctr. . . . . [6081-24]

✔ **A DOT kinetics imager for use in conjunction with MRI,** D. R. Busch, Jr., Univ. of Pennsylvania; X. Intes, ART Advanced Research Technologies Inc. (Canada); A. G. Yodh, M. D. Schnall, B. Chance, Univ. of Pennsylvania . . . . . [6081-25]

✔ **Visual Enhancement of Laparoscopic Nephrectomy: Application of an Algorithm on the 3-CCD Camera,** N. J. Crane, National Institutes of Health . . . . . [6081-29]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona;
Lihong Wang, Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Sunday 22 January 2006 • Proceedings of SPIE Vol. 6082

Endoscopic Microscopy

Conference Chairs: **Guillermo J. Tearney**, Harvard Medical School; **Thomas D. Wang**, Stanford Univ.

Program Committee: **Arthur F. Gmitro**, The Univ. of Arizona; **Martin R. Harris**, OptiScan Pty. Ltd. (Australia); **Ralf Kiesslich**, Johannes Gutenberg Univ. Mainz (Germany); **Stephen Lam**, British Columbia Cancer Agency (Canada); **Hiroshi Mashimo**, Harvard Medical School; **Kenzi Murakami**, Olympus Corp. (Japan); **Norman S. Nishioka**, Massachusetts General Hospital; **Mark J. Schnitzer**, Stanford Univ.; **Peter T. C. So**, Massachusetts Institute of Technology

Sunday 22 January

SESSION 1

Conv. Ctr. B1 . . . . . Sun. 8:30 to 10:10 am

Novel Techniques

Chair: **Guillermo J. Tearney**, Massachusetts General Hospital

8:30 am: **Spectral- and frequency-encoded fluorescence endoscopy,** J. T. Motz, D. Yelin, B. J. Vakoc, B. E. Bouma, G. J. Tearney, Harvard Medical School/Wellman Ctr. for Photomedicine/Massachusetts General Hospital . . . . . [6082-01]

8:50 am: **Surgical imaging catheter for confocal microendoscopy with advanced contrast agent delivery and focus systems,** A. A. Tanbakuchi, College of Optical Sciences/The Univ. of Arizona; A. R. Rouse, The Univ. of Arizona; A. F. Gmitro, College of Optical Sciences/The Univ. of Arizona [6082-02]

9:10 am: **Novel design for a confocal endoscope,** R. B. Pillers, N. G. Publicover, Univ. of Nevada/Reno . . . . . [6082-03]

9:30 am: **Dual-clad fiber for spectrally encoded confocal microscopy,** C. Boudoux, D. Yelin, B. E. Bouma, Harvard Medical School/Wellman Ctr. for Photomedicine; R. L. Shubochkin, T. F. Morse, Boston Univ.; G. J. Tearney, Harvard Medical School/Wellman Ctr. for Photomedicine . . . . . [6082-04]

9:50 am: **Design of an in vivo multispectral confocal microendoscope for clinical trials,** A. R. Rouse, A. A. Tanbakuchi, J. A. Udovich, A. F. Gmitro, The Univ. of Arizona . . . . . [6082-05]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Conv. Ctr. B1 . . . . . Sun. 10:40 am to 12:20 pm

In Vivo Microendoscopy

Chair: **Thomas D. Wang**, Stanford Univ.

10:40 am: **Collagen colitis: new diagnostic possibilities,** A. W. Hoffman, R. Kiesslich, S. F. Biesterfeld, Johannes Gutenberg Univ. Mainz (Germany) . . . . . [6082-06]

11:00 am: **Endoscopic optical coherence tomography for identifying intramucosal carcinoma and high-grade dysplasia in Barrett's esophagus,** J. A. Evans, Harvard Medical School/Massachusetts General Hospital; J. M. Poneros, Brigham and Women's Hospital; B. E. Bouma, J. E. Bressner, E. F. Halpern, M. S. Shishkov, G. Y. Lauwers, M. Mino-Kenudson, N. S. Nishioka, G. J. Tearney, Harvard Medical School/Massachusetts General Hospital . . . . . [6082-07]

11:20 am: **In vivo fibered confocal reflectance imaging: totally noninvasive morphological cellular imaging brought to the endoscopist,** A. Osdoit, M. Genet, S. Loiseau, B. Abrat, F. Lacombe, Mauna Kea Technologies (France) . . . . . [6082-08]

11:40 am: **In vivo fluorescence imaging of gastrointestinal neoplasia with a novel fiber optic confocal microendoscope,** P. Hsiung, J. T. Liu, Stanford Univ.; S. Friedland, R. M. Soetikno, P. Sahbaie, Stanford Univ./Palo Alto VA Hospital; J. M. Crawford, Univ. of Florida; C. H. Contag, T. D. Wang, Stanford Univ. . . . . [6082-09]

12:00 pm: **Application of ultrahigh resolution endoscopic optical coherence,** Y. Chen, A. D. Aguirre, P. Hsiung, P. R. Herz, Massachusetts Institute of Technology; H. Mashimo, Harvard Medical School and Veterans Administration Medical Ctr.; S. Desai, M. C. Pedrosa, M. Figueiredo, Veterans Administration Medical Ctr.; J. M. Schmitt, Lightlab Imaging; J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6082-10]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 3

Conv. Ctr. B1 . . . . . Sun. 1:20 to 2:40 pm

Endoscopic Microscopy

Chair: **Stephen Lam**, British Columbia Cancer Agency (Canada)

1:20 pm: **Dual modality imaging of a novel model of ovarian carcinognesis,** E. M. Kanter, R. Walker, S. Marion, M. Brewer, P. Hoyer, J. Barton, The Univ. of Arizona . . . . . [6082-11]

1:40 pm: **Mauna Kea technologies' F400 prototype: a new tool for in vivo microscopic imaging during endoscopy,** B. Viellerobe, A. Osdoit, C. Cavé, F. Lacombe, S. Loiseau, B. Abrat, Mauna Kea Technologies (France) . [6082-12]

2:00 pm: **Comprehensive microscopy of the esophagus using optical frequency domain imaging,** B. J. Vakoc, A. S. Yun, M. S. Shishkov, W. Oh, J. A. Evans, N. S. Nishioka, B. E. Bouma, G. J. Tearney, Harvard Medical School/Wellman Ctr. for Photomedicine . . . . . [6082-13]

2:20 pm: **Flow-induced birefringence: the hidden PSF killer in high performance injection-molded plastic optics,** M. D. Chidley, T. S. Tkaczyk, M. R. Descour, College of Optical Sciences/The Univ. of Arizona . . . . [6082-14]

Tuesday 24 January

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✔ **The UTCOMS: a wireless pill-cam nanoendoscope,** M. M. Lee, Dongshin Univ. (South Korea); B. Cho, Sunchon Natinal Univ. (South Korea); K. Eshraghian, Eshraghian Labs. Pty Ltd. (Australia); Y. Kim, Dongshin Univ. (South Korea) . . . . . [6082-15]

✔ **In vivo molecular and morphological imaging by confocal real-time mini-microscopy,** M. Goetz, R. Kiesslich, Johannes Gutenberg Univ. Mainz (Germany) . . . . . [6082-16]

✔ **Optical quality assessment of rigid endoscopes during clinical lifetime,** H. J. Noordmans, I. van Mil, S. Daoudi, H. van den Brink, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6082-17]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Saturday-Sunday 21-22 January 2006 • Proceedings of SPIE Vol. 6083

Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VI

Conference Chair: **Israel Gannot**, The George Washington Univ. and Tel Aviv Univ. (Israel)

Program Committee: **Richard O. Claus**, Virginia Polytechnic Institute and State Univ.; **Ilko K. Ilev**, U.S. Food and Drug Administration; **Karl-Friedrich Klein**, Fachhochschule Giessen-Friedberg (Germany); **Pierre Lucas**, The Univ. of Arizona; **Yuji Matsuura**, Tohoku Univ. (Japan)

Saturday 21 January

SESSION 1

Conv. Ctr. A5 . . . . . Sat. 8:30 to 10:20 am

Chair: **Richard O. Claus**, Virginia Polytechnic Institute and State Univ.

8:30 am: **Silicon-Based Photonic Bandgap Microsensors: From the Laboratory to Smart Bandages** *(Invited Paper),* P. M. Fauchet, Univ. of Rochester; A. P. Pentland, Univ. of Rochester Medical Center; B. L. Miller, Univ. of Rochester; L. A. DeLouise, Univ. of Rochester Medical Center; H. Ouyang, M. Lee, Univ. of Rochester . . . . . [6083-01]

9:00 am: **A full-color scanning fiber endoscope,** E. J. Seibel, Univ. of Washington . . . . . [6083-02]

9:20 am: **Optical IR fiber for medical diagnosis and food safety,** M. M. Anne, B. Bureau, J. Adam, C. Boussard, Univ. de Rennes I (France) . . . . . [6083-03]

9:40 am: **Computational modeling of device-tissue interface geometries for time-resolved fluorescence in layered tissue,** J. Pfefer, A. Agrawal, U.S. Food and Drug Administration; R. Drezek, Rice Univ. . . . . [6083-04]

10:00 am: **Temperature and Pressure Fiber Optic Sensors Applied to Minimally Invasive Diagnostics and Therapies,** C. B. Hamel, E. Pinet, Fiso Technologies (Canada) . . . . . [6083-05]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

Room: Conv. Ctr. A5 . . . . . Sat. 10:50 am to 12:40 pm

Keynote Session

Chair: **Israel Gannot**,
The George Washington Univ. and Tel Aviv Univ. (Israel)

Keynote Presentation
10:50 am: **"From the notebooks of a troubled inventor"** *(Invited Paper),* G. J. Iddan, RDC Ltd. (Israel) . . . . . [6083-06]

11:20 am: **Application of therapeutic laser light using singlemode fiber delivery in a scanning fiber endoscope system,** B. W. Tuttle, E. J. Seibel, Univ. of Washington . . . . . [6083-07]

11:40 am: **High-OH UV-fibers with higher stability,** V. K. Khalilov, G. W. Nelson, Polymicro Technologies LLC; K. Klein, Fachhochschule Giessen-Friedberg (Germany) . . . . . [6083-08]

12:00 pm: **IR vitreous materials for sensing the molecule signatures,** G. Delaizir, Univ. of Rennes 1 (France); X. Zhang, B. Bureau, Univ. de Rennes 1 (France); P. Lucas, The Univ. of Arizona . . . . . [6083-09]

12:20 pm: **Fiber optic detection system for gas chromatography and on-line analysis,** H. Eckhardt, K. Klein, J. Belmahdi, Fachhochschule Giessen-Friedberg (Germany) . . . . . [6083-10]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSION 3

Conv. Ctr. A5 . . . . . Sat. 1:40 to 3:20 pm

Chair: **Pierre Lucas**, The Univ. of Arizona

1:40 pm: **Non-Invasive Optical Sensing of Blood Hemoglobin and Glucose** *(Invited Paper),* H. Primack, OrSense Ltd. (Israel) . . . . . [6083-11]

2:00 pm: **Bundled hollow-optical fiber for delivery of 30-MW peak power Nd:YAG laser pulses,** Y. Matsuura, Y. Ozgur, Tohoku Univ. (Japan); M. Miyagi, Sendai National College of Technology (Japan) . . . . . [6083-12]

2:20 pm: **High-resolution confocal fiber-optic biosensing,** I. K. Ilev, R. W. Waynant, U.S. Food and Drug Administration . . . . . [6083-13]

2:40 pm: **Hollow-optical fiber probe for confocal Raman endoscopy,** T. Katagiri, The Institute of Physical and Chemical Research (RIKEN) (Japan); Y. Komachi, Machida Endoscope Co., Ltd. (Japan); Y. Hattori, The Institute of Physical and Chemical Research (RIKEN) (Japan); Y. Matsuura, Tohoku Univ. (Japan); M. Miyagi, Sendai National College of Technology (Japan); H. Tashiro, H. Sato, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6083-14]

3:00 pm: **Bio-sensing: The use of a novel sensitive optical detector,** K. R. Linga, E. E. Godik, J. Krutov, Amplification Technologies, Inc. . . [6083-15]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Conv. Ctr. A5 . . . . . Sat. 3:50 to 5:10 pm

Chair: **Karl-Friedrich Klein**,
Fachhochschule Giessen-Friedberg (Germany)

3:50 pm: **Nanostructured fiber optic sensors for detection of volatile organic compounds in breath,** H. Ruan, Y. Kang, Y. Wang, NanoSonic Inc.; R. O. Claus, Virginia Polytechnic Institute and State Univ. . . . . [6083-16]

4:10 pm: **Dynamic assessment of women pelvic floor function by using a fiber Bragg grating sensor system,** L. A. Ferreira, F. M. Araujo, Instituto de Engenhariade Sistemas e Computadores do Porto (Portugal); T. Mascarenhas, Hospital de S. João (Portugal); R. M. Natal Jorge, A. A. Fernandes, Univ. do Porto (Portugal) . . . . . [6083-17]

4:30 pm: **A novel laser angioplasty guided hollow fiber using mid-infrared laser,** S. Sachiko, Osaka Univ. (Japan) . . . . . [6083-18]

4:50 pm: **Uniform polymer-film formation in hollow fiber by circulatory coating method,** K. Iwai, M. Miyagi, Sendai National College of Technology (Japan); Y. Shi, Y. Matsuura, Tohoku Univ. (Japan) . . . . . [6083-19]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Sunday 22 January

SESSION 5

Conv. Ctr. A5 . . . . . Sun. 8:30 to 10:20 am

Chair: **Yuji Matsuura**, Tohoku Univ. (Japan)

8:30 am: **All-Fiber and Fiber Compatible Acousto-optic Modulators with Potential Biomedical Applications** *(Invited Paper),* I. S. Abdulhalim, Department of Electrooptic Engineering, Ben Gurion University (Israel); I. Gannot, Department of Biomedical Engineering, Tel Aviv University (Israel) . . . . . [6083-20]

9:00 am: **Properties and reliability of hard plastic-clad silica fibers,** B. J. Skutnik, B. Foley, CeramOptec Industries, Inc. . . . . [6083-21]

9:20 am: **Medical applications of 3 um delivery waveguide system,** M. Nemec, H. Jelinkova, P. Koranda, Czech Technical Univ. in Prague (Czech Republic); M. Miyagi, Sendai National College of Technology (Japan); Y. Shi, Y. Matsuura, Tohoku Univ. (Japan) . . . . . [6083-22]

9:40 am: **Towards a disposable in vivo miniature implantable fluorescence detector,** S. Bellis, A. Mathewson, J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . . [6083-23]

10:00 am: **Side-firing germanium oxide optical fibers for delivery of Erbium:YAG laser radiation** *(Invited Paper),* N. M. Fried, A. K. Ngo, Johns Hopkins Univ. . . . . [6083-24]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 6

Conv. Ctr. A5 . . . . . Sun. 10:50 am to 12:40 pm

Chair: **Ilko K. Ilev**, U.S. Food and Drug Administration

10:50 am: **SERS-based Photonic Crystal Fiber Sensing Platform** *(Invited Paper),* H. H. Du, Stevens Institute of Technology . . . . . [6083-25]

11:20 am: **Thin ordered and flexible bundles of silver-halide fibers,** Y. Lavi, A. Millo, A. Katzir, Tel Aviv Univ. (Israel) . . . . . [6083-26]

11:40 am: **Liquid light guides for high-efficiency coupling to diffuse source spectrometers,** C. A. Fernandez, E. C. Cull, S. T. McCain, M. E. Gehm, D. J. Brady, Duke Univ. . . . . [6083-27]

12:00 pm: **Enhanced spectral sensitivity of fiber long-period gratings to refractive index of aqueous solutions utilising copper patterned coatings,** T. D. Allsop, H. Dobb, D. J. Webb, I. Bennion, Aston Univ. (United Kingdom); R. Neal, D. Mapps, The Univ. of Plymouth (United Kingdom); K. Kalli, Higher Technical Institute (Cyprus) . . . . . [6083-28]

12:20 pm: **Fiber-delivery system for high-power UV-A lightsources,** S. Bohnert, K. Klein, Fachhochschule Giessen-Friedberg (Germany); D. Dinges, Omicron Laserage Laserprodukte GmbH (Germany); W. Fuerstenberg, OMICRON LASERAGE Laserprodukte GmbH (Germany) . . . . . [6083-35]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSION 7

Conv. Ctr. A5 . . . . . Sun. 1:40 to 3:30 pm

Chair: **James A. Harrington**, Rutgers Univ.

1:40 pm: **Fiber-coupled AOTF spectrometer** *(Invited Paper),* N. Gupta, Army Research Lab. . . . . [6083-30]

2:10 pm: **Design and fabrication of disposable percutaneous optochemical sensor,** K. Liao, Univ. of Southern California . . . . . [6083-31]

2:30 pm: **Cell-based bio-optical sensors using chalcogenide fibers,** P. Lucas, A. Wilhelm, M. R. Riley, The Univ. of Arizona . . . . . [6083-32]

2:50 pm: **Compact fluorescence detection using in-fiber microchannels,** R. Irawan, C. M. Tay, S. C. Tjin, C. Y. Fu, Nanyang Technological Univ. (Singapore) . . . . . [6083-33]

3:10 pm: **Theoretical and Experimental Investigations of Metal Sulfide Dielectric Coatings for Hollow Waveguides,** M. Ben-David, M. Catalogna, I. Gannot, Tel Aviv Univ. (Israel); V. Gopal, J. Harrington, Rutgers Univ. [6083-34]

Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6084

Optical Interactions with Tissue and Cells XVII

Conference Chairs: **Steven L. Jacques**, Oregon Health and Science Univ.; **William P. Roach**, Air Force Research Lab.

Program Committee: **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Anto; **E. Duco Jansen**, Vanderbilt Univ.; **Sean J. Kirkpatrick**, Oregon Health & Science Univ; **Alfred Vogel**, Univ. Luebeck (Germany); **Lihong V. Wang**, Texas A&M Univ.

Monday 23 January

SESSION 1

Conv. Ctr. B1 . . . . . Mon. 8:50 to 10:10 am

Theory/Modeling I

Chair: **William P. Roach**, Air Force Research Lab.

8:50 am: **Rapid modeling of diffuse light in a multilayer scattering medium,** J. L. Hollmann, L. V. Wang, Texas A&M Univ. . . . . [6084-02]

9:10 am: **Application of the multicanonical Monte-Carlo method for the efficient simulation of light propagation in biological tissues,** A. Bilenca, A. Desjardins, B. E. Bouma, G. J. Tearney, Harvard Medical School . . [6084-03]

9:30 am: **Distribution of photon packet weight of diffuse-reflected photons from a homogeneous semi-infinite highly scattering medium by Monte-Carlo simulations,** B. Aksel, A. Akin, Bogaziçi Univ. (Turkey) . . . . . [6084-04]

9:50 am: **Monte Carlo simulations of backscattered light intensity from convex and concave surfaces with an optical fiber array sensor,** M. Sundberg, T. Lindbergh, T. Strömberg, Linköpings Unv. (Sweden) . [6084-05]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

Conv. Ctr. B1 . . . . . Mon. 10:50 am to 12:30 pm

Theory/Modeling II

Chair: **Lihong V. Wang**, Texas A&M Univ.

10:50 am: **Resonant absorption in nanometer gold particles,** E. Faraggi, B. S. Gerstman, Florida International Univ. . . . . [6084-06]

11:10 am: **Chaos in the pressure generated by laser absorption by microparticles,** B. S. Gerstman, E. Faraggi, J. Sun, Florida International Univ. . . . . [6084-07]

11:30 am: **Computational modeling of the laser induced cavitation bubble dynamics and blood clot dissolution,** Z. Sikorski, Z. Chen, A. J. Przekwas, CFD Research Corp. . . . . [6084-08]

11:50 am: **Monte Carlo simulation study on phase function,** Y. Fu, S. L. Jacques, Oregon Health and Science Univ. . . . . [6084-09]

12:10 pm: **Parameter variation studies for the 'Takata' and 'Thompson-Gerstman' laser retinal damage threshold model,** K. Schulmeister, F. Edthofer, B. Seiser, Austrian Research Ctrs. GmbH - Seibersdorf (Austria); D. J. Lund, U.S. Army Medical Research Detachment . . . . . [6084-61]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 3

Conv. Ctr. B1 . . . . . Mon. 1:30 to 2:50 pm

Thermal Effects I

Chair: **E. Duco Jansen**, Vanderbilt Univ.

1:30 pm: **Threshold damage of in vivo porcine skin at 2000-nm laser irradiation,** B. Chen, S. L. Thomsen, A. J. Welch, The Univ. of Texas at Austin . . . . . [6084-10]

1:50 pm: **An alternative method of evaluating 1540-nm exposure laser damage using an optical tissue phantom,** N. M. Jindra, M. A. Figueroa, B. A. Rockwell, L. Chavey, J. Zohner, Air Force Research Lab. . . . . [6084-11]

2:10 pm: **Visible lesion thresholds and model predictions for Q-switched 1315-nm and Q-switched 1540-nm laser exposures to porcine skin,** J. J. Zohner, K. J. Schuster, L. J. Chavey, D. J. Stolarski, Northrop Grumman Corp.; S. S. Kumru, Air Force Research Lab.; C. P. Cain, Northrop Grumman Corp.; R. J. Thomas, B. A. Rockwell, Air Force Research Lab. . . . . [6084-12]

2:30 pm: **Effect of laser photothermal therapy on vasculature during cancer treatment,** W. R. Chen, Univ. of Central Oklahoma . . . . . [6084-13]

Coffee Break . . . . . 2:50 to 3:40 pm

SESSION 4

Conv. Ctr. B1 . . . . . Mon. 3:40 to 5:20 pm

Thermal Effects II

Chair: **E. Duco Jansen**, Vanderbilt Univ.

3:40 pm: **A model of thermal lensing of the closed aperture Z-scan method for the propagation of laser light in ocular media,** R. L. Vincelette, Air Force Research Lab. and The Univ. of Texas at Austin; R. J. Thomas, Air Force Research Lab.; G. D. Buffington, Fort Hays State Univ.; M. L. Edwards, B. A. Rockwell, Air Force Research Lab.; A. J. Welch, The Univ. of Texas at Austin . . . . . [6084-15]

4:00 pm: **System development and clinical studies with a scanning CO_2 laser osteotome,** M. M. Ivanenko, M. Werner, M. Klasing, Ctr. of Advanced European Studies and Research (Germany); P. Hering, Heinrich-Heine-Univ. Dusseldorf (Germany) . . . . . [6084-16]

4:20 pm: **Injury thresholds for topical-cream-coated skin of hairless guinea pigs in the near-infrared region,** G. M. Pocock, K. Buchanan, N. M. Jindra, M. A. Figueroa, Air Force Research Lab.; L. J. Chavey, Northrop Grumman Corp.; M. Palmerin, B. A. Rockwell, Air Force Research Lab. . . . . [6084-17]

4:40 pm: **Comparison of CO2, thulium and diode laser in a thermal imaging model for the optimization of various clinical applications,** R. M. Verdaasdonk, A. I. Rem, S. C. van Thoor, Univ. Medisch Ctr. Utrecht (Netherlands); H. O. Teichmann, LISA Laser Products OHG (Germany) [6084-18]

5:00 pm: **Mid-IR free-electron laser ablation of articular and fibro-cartilage: a wavelength dependence study of crater morphology and thermal injury,** J. Youn, G. M. Peavy, V. Venugopalan, Univ. of California/Irvine . . . . . [6084-19]

Tuesday 24 January

SESSION 5

Conv. Ctr. B1 . . . . . Tues. 8:30 to 10:20 am

Optical Properties I

Chair: **Sean J. Kirkpatrick**, Oregon Health and Science Univ.

8:30 am: **Characterizing tissue optical properties using confocal and low-coherence imaging** *(Invited Paper),* S. L. Jacques, Oregon Health and Science Univ. . . . . [6084-20]

9:00 am: **Effect of tissue heterogeneity on detectability of optical signals,** M. Fidan, Dogus Univ. (Turkey); A. Akin, Bogaziçi Univ. (Turkey) . . . . . [6084-21]

9:20 am: **Combined photothermal-photometric method for the determination of tissue optical properties,** E. S. Fonseca, M. E. de Jesus, Univ. da Beira Interior (Portugal) . . . . . [6084-22]

9:40 am: **Two-distance partial pathlength method for accurate measurement of muscle oxidative metabolism using fNIRS,** O. Sayli, A. Akin, Bogaziçi Univ. (Turkey) . . . . . [6084-23]

10:00 am: **Optical properties of native and coagulated lamb brain tissues in vitro in the visible and near-infrared spectral range,** K. Özer, Ö. Bozkulak, H. O. Tabakoglu, Bogaziçi Univ. (Turkey); A. Kurt, Koç Univ. (Turkey); M. Gülsoy, Bogaziçi Univ. (Turkey) . . . . . [6084-24]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 6

Conv. Ctr. B1 . . . . . Tues. 10:50 am to 12:30 pm

Optical Properties II

Chair: **Sean J. Kirkpatrick**, Oregon Health and Science Univ.

10:50 am: **Elastic scattering spectroscopy of coagulated brain tissues,** F. Ates, H. O. Tabakoglu, Ö. Bozkulak, Bogaziçi Univ. (Turkey); M. Canpolat, SpectraPath Technologies, Inc.; M. Gülsoy, Bogaziçi Univ. (Turkey) . . [6084-25]

11:10 am: **Fractal analysis of yeast cell optical speckle,** A. Flamholz, P. S. Schneider, P. K. Wong, D. H. Lieberman, T. D. Cheung, Queensborough Community College/CUNY . . . . . [6084-26]

11:30 am: **Monitoring of collagen shrinkage by use of second harmonic generation microscopy,** S. Lin, J. Chen, National Taiwan Univ. Hospital (Taiwan); W. Lo, Y. Sun, W. Chen, National Taiwan Univ. (Taiwan); J. Chan, Cathay General Hospital (Taiwan); H. Tan, National Taiwan Univ. (Taiwan) and Chang Gung Memorial Hospital (Taiwan); W. Lin, C. Hsu, National Taiwan Univ. Hospital (Taiwan); T. Young, National Taiwan Univ. (Taiwan); S. Jee, National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan)[6084-27]

11:50 am: **Light depolarization by tissue and phantoms,** M. Xu, R. R. Alfano, City College/CUNY . . . . . [6084-28]

12:10 pm: **Noninvasive in-vivo determination of absorption and reduced scattering coefficients by oblique angle illumination,** T. Lindbergh, M. Larsson, T. Strömberg, Linkopings Univ. (Sweden) . . . . . [6084-29]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 7

Conv. Ctr. B1 . . . . . Tues. 1:30 to 3:10 pm

Laser Tissue Interaction

Chair: **Steven L. Jacques**, Oregon Health and Science Univ.

1:30 pm: **Development of a noninvasive multifunctional measurement method using nanosecond pulsed laser for evaluation of regenerative medicine for articular cartilage,** M. Ishihara, National Defense Medical College (Japan); M. Sato, N. Kaneshiro, G. Mitani, Tokai Univ. (Japan); S. Sato, M. Ishihara, National Defense Medical College (Japan); J. Mochida, Tokai Univ. (Japan); M. Kikuchi, National Defense Medical College (Japan) . . . . . [6084-30]

1:50 pm: **Various shape bubbles generation by Ho:YAG laser irradiation for vascular treatments,** E. Nakatani, E. Yamashita, T. Arai, Keio Univ. (Japan) . . . . . [6084-31]

2:10 pm: **Biophysical mechanisms responsible for pulsed low-level laser excitation of neural tissue,** J. D. Wells, E. D. Jansen, A. Mahadevan-Jansen, P. E. Konrad, C. Kao, Vanderbilt Univ. . . . . [6084-32]

2:30 pm: **Experimental evidence for deeper interrogation inside cardiac tissue using transillumination and a fluorescence absorber,** V. K. Ramshesh, S. B. Knisley, Univ. of North Carolina/Chapel Hill . . . . . [6084-33]

2:50 pm: **Time-resolved reflectance and fluorescence of human skin,** K. Katika, L. Pilon, Univ. of California/Los Angeles . . . . . [6084-34]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 8

Conv. Ctr. B1 . . . . . Tues. 3:40 to 5:20 pm

Cellular Effects I

Chair: **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio

3:40 pm: **Ultrastructure of tumour cells irradiated,** K. G. Moskalik, G. A. Savostyanov, N. N. Petrov Research Institute of Oncology (Russia) . . . . . [6084-35]

4:00 pm: **Effect of pulsed laser radiation on the nucleic acids and proteins reproduction and syntheses in tumor cells,** K. G. Moskalik, N. N. Petrov Research Institute of Oncology (Russia) . . . . . [6084-36]

4:20 pm: **Laser-dephosphorylation of phosphogelatin and its indirect quantitative analysis using FT-IR,** K. Ishii, Y. Yukawa, T. Kushibiki, S. Suzuki-Yoshihashi, Osaka Univ. (Japan); M. Yamamoto, Y. Tabata, Kyoto Univ. (Japan); K. Awazu, Osaka Univ. (Japan) . . . . . [6084-37]

4:40 pm: **Femtosecond near-infrared opto-injection of single living cells: pore size in dependence of laser power,** I. Wilke, C. Peng, R. E. Palazzo, Rensselaer Polytechnic Institute . . . . . [6084-38]

5:00 pm: **Femtosecond pulse permeabilization of live mammalian cells,** V. Kohli, Univ. of Alberta (Canada); J. P. Acker, Univ. of Alberta (Canada) and Canadian Blood Services (Canada); A. Y. Elezzabi, Univ. of Alberta (Canada) [6084-39]

✔ Posters-Tuesday

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✔ **Monte-Carlo autofluorescence modeling the progression of cervical intraepithelial neoplasm,** H. K. Chiang, National Yang Ming Univ. (Taiwan); T. Y. Wang, Mackay Memorial Hospital (Taiwan); C. J. Wu, National Yang Ming Univ. (Taiwan) . . . . . [6084-01]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday 25 January

SESSION 9

Conv. Ctr. B1 . . . . . Wed. 8:00 to 9:20 am

Cellular Effects II

Chair: **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio

8:00 am: **Photochemical damage from chronic 458-nm laser exposures in an artificially pigmented hTERT-RPE1 cell line,** M. S. Foltz, Northrop Grumman Corp.; N. A. Whitlock, Lexicon Genetics Inc.; M. L. Denton, Northrop Grumman Corp.; L. E. Estlack, Conceptual MindWorks, Inc.; R. J. Thomas, B. A. Rockwell, Air Force Research Lab. . . . . [6084-40]

8:20 am: **Cellular surgery by fs-laser pulses,** A. Heisterkamp, J. Baumgart, W. Ertmer, H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) [6084-41]

8:40 am: **Laser dry and wet catapulting and ablation of cells and bacteria by CO2 and KrF lasers,** S. Shukla, K. Lyon, S. I. Kudryashov, S. D. Allen, Arkansas State Univ. . . . . [6084-42]

9:00 am: **Investigation of cell viability after laser guidance,** T. Rosenbalm, B. Z. Gao, Clemson Univ.; S. Owens, Louisiana State Univ.; D. Bakken, Clemson Univ. . . . . [6084-43]

SESSION 10

Conv. Ctr. B1 . . . . . Wed. 9:20 to 11:20 am

Imaging/Spectroscopy I

Chair: **William P. Roach**, Air Force Research Lab.

9:20 am: **Monitoring the tissue formation and organization of engineered tendon by optical coherence tomography,** P. O. Bagnaninchi, Y. Yang, N. Maffuli, Keele Univ. (United Kingdom); R. K. Wang, Oregon Health & Science Univ.; A. J. El Haj, Keele Univ. (United Kingdom) . . . . . [6084-44]

9:40 am: **Study cell invasion by optical techniques,** Y. Yang, Keele Univ. (United Kingdom); R. K. Wang, Oregon Health & Science Univ.; J. Sulé-Suso, Univ. Hospital of North Staffordshire (United Kingdom); A. J. El Haj, Keele Univ. (United Kingdom) . . . . . [6084-45]

Coffee Break . . . . . 10:00 to 10:20 am

10:20 am: **Nanoparticle-assisted detection of photothermal optical path length by phase-sensitive optical coherence tomography,** J. Kim, J. H. Oh, H. W. Kang, K. V. Sokolov, T. E. Milner, The Univ. of Texas at Austin . . [6084-46]

10:40 am: **Imaging the bone marrow stem cells morphogenesis in PGF scaffold by multiphoton autofluorescence and second harmonic (SHG) imaging,** H. Lee, National Taiwan Univ. Hospital (Taiwan); S. Teng, W. Lo, T. Lin, C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6084-47]

11:00 am: **Enhanced angular domain image in turbid medium using Gaussian line illumination,** G. H. Chapman, J. Rao, T. Liu, N. Pfeiffer, P. K. Y. Chan, Simon Fraser Univ. (Canada) . . . . . [6084-48]

SESSION 11

Conv. Ctr. B1 . . . . . Wed. 11:20 am to 1:20 pm

Imaging/Spectroscopy II

Chair: **William P. Roach**, Air Force Research Lab.

11:20 am: **Morphologic changes of human skin after irradiated by IPL with the differential interference contrast microscopic technology,** S. Wu, H. Li, B. Yu, Fujian Normal Univ. (China) . . . . . [6084-49]

11:40 am: **Absorption spectroscopy in the diagnosis of thyroid nodules,** O. Parise, Jr., Hospital Sírio Libanês (Brazil); D. M. Zezell, Insituto de Pesquisas Energéticas e Nucleares (Brazil); N. D. Vieira, Jr., L. V. G. Tarelho, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [6084-50]

12:00 pm: **Detection and quantification of levels of circulating DNA in human serum using UV-visible spectrophotometry,** A. E. Bastidas Gustin, V. Rubiel, E. Cañola, L. F. Rangel, S. Gaona, E. L. Rodriguez, Univ. del Cauca (Colombia) . . . . . [6084-51]

12:20 pm: **Ex-plant retinal laser induced threshold studies in the millisecond time regime,** K. Schulmeister, Austrian Research Ctrs. GmbH - Seibersdorf (Austria); J. Husinsky, ARC Seibersdorf Research GmbH (Austria); F. Edthofer, B. Seiser, H. Tuschl, Austrian Research Ctrs. GmbH - Seibersdorf (Austria) . . . . . [6084-52]

12:40 pm: **Detection of two-photon oxidation from a NIR laser using confocal microscopy,** K. J. Schuster, M. L. Denton, Northrop Grumman Corp.; L. Estlack, Conceptual MindWorks, Inc.; B. A. Rockwell, Air Force Research Lab. . . . . [6084-62]

1:00 pm: **Development and validation of an optical nerve stimulator,** E. D. Jansen, J. D. Wells, C. Kao, P. E. Konrad, A. Mahadevan-Jansen, Vanderbilt Univ.; H. A. Ralph, J. Webb, M. P. Bendett, Aculight Corp. . [6084-63]

Saturday 21 January 2006 • Proceedings of SPIE Vol. 6085

Complex Dynamics and Fluctuations in Biomedical Photonics III

Conference Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

Program Committee: **Vadim S. Anishchenko**, Saratov State Univ. (Russia); **Wei R. Chen**, Univ. of Central Oklahoma; **Omar S. Khalil**, Abbott Labs.; **Sean J. Kirkpatrick**, Oregon Health & Science Univ; **Jürgen Lademann**, Charité-Univ. Medizin Berlin (Germany); **Hong Liu**, Univ. of Oklahoma; **Qingming Luo**, Huazhong Univ. of Science and Technology (China); **Arkady M. Pertsov**, Upstate Medical Univ./SUNY; **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia); **Vladislav Y. Toronov**, Univ. of Illinois at Urbana-Champaign; **Ruikang K. Wang**, Oregon Health and Science Univ.; **Vladimir P. Zharov**, Univ. of Arkansas/Little Rock; **Dmitry A. Zimnyakov**, Saratov State Univ. (Russia)

Saturday 21 January

SESSION 1

Conv. Ctr. C4 . . . . . Sat. 9:10 to 11:20 am

Coherent-Domain Methods for Monitoring of Tissue Complex Structure

Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

9:10 am: **Dependent and independent light scattering from PVA hydrogel phantoms,** S. J. Kirkpatrick, Oregon Health and Science Univ. . . . . [6085-01]

9:30 am: **A novel technique for speckle reduction with multifunctional optical coherence tomography,** B. H. Park, Harvard Medical School and Univ. of California/Irvine; B. Cense, M. C. Pierce, J. F. de Boer, Harvard Medical School . . . . . [6085-02]

9:50 am: **Modeling low-coherence enhanced backscattering(LEBS) using photon random walk model of light scattering,** H. Subramanian, P. Pradhan, Y. L. Kim, Y. Liu, V. Backman, Northwestern Univ. . . . . [6085-04]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Fluctuation of probe beam in thermolens schematics as potential indicator of cell metabolism, apoptosis, necrosis and laser impact,** V. P. Zharov, Univ. of Arkansas for Medical Sciences; D. A. Zimnyakov, Saratov State Univ. (Russia); E. I. Galanzha, Univ. of Arkansas for Medical Sciences; V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6085-05]

11:00 am: **Arbitrary phase-shifting full range spectral optical coherence tomography,** Z. Ma, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ.; F. Zhang, J. Yao, Tianjin Univ. (China) . . . . . [6085-06]

SESSION 2

Conv. Ctr. C4 . . . . . Sat. 11:20 to 11:40 am

Cardiac Optical Mapping

Chair: **Wei R. Chen**, Univ. of Central Oklahoma

11:20 am: **Dynamic flux balance analysis of myocardial energy metabolism under ischemic conditions,** R. Luo, S. Liao, G. Tao, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-07]

Lunch Break . . . . . 11:40 am to 1:20 pm

SESSION 3

Conv. Ctr. C4 . . . . . Sat. 1:20 to 2:00 pm

Optical Mapping of the Brain

Chair: **Sean J. Kirkpatrick**, Oregon Health and Science Univ.

1:20 pm: **A new level-set algorithm for diffuse optical imaging of the brain,** V. Y. Toronov, M. Jacob, Y. Bresler, Univ. of Illinois at Urbana-Champaign; A. Webb, Penn State Univ. . . . . [6085-08]

1:40 pm: **Combine temporal clustering analysis with least square estimation to determine the dynamic pattern of cortical spreading depression,** S. Chen, P. Li, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-09]

SESSION 4

Conv. Ctr. C4 . . . . . Sat. 2:00 to 2:40 pm

Detection of Neural Network Activity

Chair: **Vladislav Y. Toronov**, Univ. of Illinois at Urbana-Champaign

2:00 pm: **Analyzing the origin of spontaneous synchronized burst in cultured neural networks based on multi-electrode array (MEA),** C. Chen, L. Chen, Y. Lin, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-10]

2:20 pm: **Analysis of the cultured neural network responses to different electric stimuli,** L. Chen, C. Chen, Y. Lin, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-11]

SESSION 5

Conv. Ctr. C4 . . . . . Sat. 2:40 to 5:10 pm

Optical Sensing of Complex Systems

Chair: **Qingming Luo**,
Huazhong Univ. of Science and Technology (China)

2:40 pm: **Photoacoustic imaging of blood-vessel networks of biotissue,** Y. Su, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ.; F. Zhang, J. Yao, Tianjin Univ. (China) . . . . . [6085-12]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Temporal resolution in a dual-detector based optical fluorescence imaging system,** J. Y. Chen, Y. Li, H. Liu, Univ. of Oklahoma . . . . . [6085-13]

3:50 pm: **Estimation of melanin spatial distribution in iris of human eye: prognosis for glaucoma diagnostics,** A. N. Bashkatov, E. A. Genina, L. E. Dolotov, Saratov State Univ. (Russia); E. V. Koblova, Saratov State Medical Univ. (Russia); Y. P. Sinichkin, V. V. Tuchin, Saratov State Univ. (Russia); V. V. Bakutkin, Saratov State Medical Univ. (Russia) . . . . . [6085-14]

4:10 pm: **Dynamic optical clearing effect of skin tissue under topical application of hyperosmotic agents studied with FT-IR imaging as an analytical tool,** J. Jiang, Tianjin Univ. (China); M. Boese, Bruker Optik GmbH (Germany); P. H. Turner, Bruker Optics Ltd. (United Kingdom); R. K. Wang, Oregon Health & Science Univ. . . . . [6085-15]

4:30 pm: **Theoretical model for assessing multiple scattering and coherence gating on polarized sensitive images,** I. V. Meglinski, Cranfield Univ. (United Kingdom); D. Y. Churmakov, Consultant (Belarus); L. Ritchie, M. Thomas, Cranfield Univ. (United Kingdom) . . . . . [6085-16]

4:50 pm: **Noise sources in the correlation between blood glucose and temperature-induced localized reflectance of diabetic forearm skin,** M. G. Lowery, S. Yeh, B. Calfin, T. Doan, E. B. Shain, C. F. Hanna, R. Hohs, S. Kantor, J. Lindberg, O. S. Khalil, Abbott Labs. . . . . [6085-31]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Tuesday 24 January

✔ Posters-Tuesday

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✔ **Investigation of speckle contrast ratio in optical coherence tomography,** S. G. Adie, T. R. Hillman, D. D. Sampson, The Univ. of Western Australia (Australia) . . . . . [6085-03]

✔ **Comparable application of the OCT and Abbe refractometers for measurements of glycated hemoglobin portion in blood,** O. S. Zhernovaya, V. V. Tuchin, Saratov State Univ. (Russia); R. K. Wang, Oregon Health and Science Univ. . . . . [6085-17]

✔ **Study of anisotropic diffusion of polarized light in application to polarization videoreflectometry of collagenous tissues,** O. V. Ushakova, Saratov State Technical Univ. (Russia); D. A. Zimnyakov, Saratov State Univ. (Russia) . . . . . [6085-18]

✔ **Graph-structure clustering: catching the fluctuations and variations in gene expression,** Z. Fang, Huazhong Univ. of Science and Technology (China); L. Liu, Univ. of Illinois at Urbana-Champaign; J. Yang, Case Western Reserve Univ.; Y. Li, Shanghai Ctr. for Bioinformatics Technology (China); Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-19]

✔ **Frame self-division applied in analysis of intrinsic signal optical imaging data,** W. Luo, P. Li, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-20]

✔ **Time-resolved diffuse spectroscopy in multilayer tissue and its Monte-Carlo simulation,** B. Yu, H. Li, L. Xu, Fujian Normal Univ. (China) . [6085-21]

✔ **Interaction of few molecular motors transporting one cargo along filament,** M. M. Stolnitz, Saratov State Univ. (Russia); A. A. Kudryashov, V.I. Razumovskij Municipal Clinical Hospital No. 2 (Russia) . . . . . [6085-22]

✔ **The rule of changing average synaptic coupling strength in neuronal networks under different concentration GABA receptor antagonists,** Y. Lin, C. Chen, W. Zhou, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-23]

✔ **Dynamic laser speckles as applied to study of the laser-mediated structural changes of the collagenous biotissues,** L. V. Kuznetsova, D. A. Zimnyakov, Saratov State Univ. (Russia); A. P. Sviridov, S. A. Baranov, N. Y. Ignatieva, Institute of Laser and Information Technologies Pr (Russia) . . . . . [6085-24]

✔ **Human skin UV-induced fluorescence spectra correction on the internal absorption effect,** I. A. Ovchinnikova, Y. P. Sinichkin, Saratov State Univ. (Russia) . . . . . [6085-25]

✔ **Inactivation of bacteria of P. Aeruginosa by coherent and low-coherent speckles: Cellular response on photodamages,** S. S. Ulyanov, Saratov State Univ. (Russia); O. V. Ulianova, Saratov State Agrarian Univ. (Russia) and Saratov State Univ. (Russia); Z. Sibo, Z. Zhihong, Huazhong Univ. of Science and Technology (China); E. V. Sazanova, Russian Antiplague Institute (Russia) and Saratov State Univ. (Russia); Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6085-26]

✔ **Experimental study of NIR transmittance of the human skull,** V. V. Lychagov, V. V. Tuchin, M. A. Vilensky, Saratov State Univ. (Russia); B. N. Reznik, BioRASI, Inc.; T. E. Ichim, BioRASI LLC; L. H. De Taboada, PhotoThera, Inc. . . . . [6085-27]

✔ **Wavelet-analysis in application to studying spike separation and information encoding in neuron dynamics,** A. N. Pavlov, D. V. Dumsky, A. Tupitsyn, O. Pavlova, V. Makarov, Saratov State Univ. (Russia) . [6085-28]

✔ **Noise-induced effects in excitable system with subthreshold and suprathreshold oscillatory modes,** A. V. Shishkin, R. Zhirin, D. E. Postnov, Saratov State Univ. (Russia) . . . . . [6085-29]

✔ **Noise-induced long-term potentiation via neural-glial interaction,** L. Ryazanova, D. E. Postnov, Saratov State Univ. (Russia) . . . . . [6085-30]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Sunday-Wednesday 22-25 January 2006 • Proceedings of SPIE Vol. 6086

Photons Plus Ultrasound Imaging and Sensing 2006: The Seventh Conference on Biomedical Thermoacoustics, Optoacoustics, and Acousto-optics

Conference Chairs: **Alexander A. Oraevsky**, Fairway Medical Technologies; **Lihong V. Wang**, Texas A&M Univ.

Program Committee: **Paul C. Beard**, Univ. College London (United Kingdom); **Albert C. Boccara**, École Supérieure de Physique et de Chimie Industri (France); **Richard J. Dewhurst**, Univ. of Manchester (United Kingdom); **Gerald J. Diebold**, Brown Univ.; **Charles A. DiMarzio**, Northeastern Univ.; **Stanislav Emelianov**, The Univ. of Texas at Austin; **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch at Galveston; **Martin Frenz**, Univ. Bern (Switzerland); **Mark P. Henrichs**, Fairway Medical Technologies; **Steven L. Jacques**, Oregon Health and Science Univ.; **Alexander A. Karabutov**, M.V. Lomonosov Moscow State Univ. (Russia); **Robert A. Kruger**, OptoSonics, Inc.; **Andreas Mandelis**, Univ. of Toronto (Canada); **Matthew O'Donnell**, Univ. of Michigan; **Guenther Paltauf**, Karl-Franzens-Univ. Graz (Austria); **Markus W. Sigrist**, ETH Zürich (Switzerland); **Gloria M. Spirou**; **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **Robert L. Thomas**, Wayne State Univ.; **Vladimir P. Zharov**, Univ. of Arkansas/Little Rock; **Quing Zhu**, Univ. of Connecticut

Sunday 22 January

SESSION 1

Conv. Ctr. A6 . . . . . Sun. 8:30 to 10:30 am

Novel Methods

Chair: **Alexander A. Oraevsky**, Fairway Medical Technologies

Opening Remarks and Announcement of an Award Competition
8:30 to 8:40 am

8:40 am: **Ultrasonically modulated x-ray phase contrast and ultrasonic vibration potential imaging in biological applications** *(Invited Paper),* G. J. Diebold, T. J. Hamilton, C. J. Bailat, S. Wang, C. Nguyen, C. G. Rose-Petruck, V. Gusev, Brown Univ.; S. Gehring, J. R. Wands, Brown Univ. Medical School; A. C. Beveridge, Brown Univ. . . . . [6086-01]

9:10 am: **Magnetoacoustic tomography with magnetic induction (MAT-MI),** Y. Xu, Ryerson Univ.; B. He, X. Li, Univ. of Minnesota . . . . . [6086-02]

9:30 am: **Capacitive micromachined ultrasonic transducers (CMUTs) for photoacoustic imaging** *(Invited Paper),* I. Wygant, P. S. Kuo, X. Zhuang, D. T. Yeh, O. Oralkan, B. T. Khuri-Yakub, Stanford Univ. . . . . [6086-03]

10:00 am: **Resonant optical ultrasound transducer (ROUT) arrays** *(Invited Paper),* M. O'Donnell, S. Ashkenazi, L. J. Guo, C. Chao, W. Y. Fung, T. Buma, Y. Hou, Univ. of Michigan . . . . . [6086-04]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

Conv. Ctr. A6 . . . . . Sun. 10:50 am to 12:10 pm

Molecular and Spetroscopic Imaging

Chair: **Lihong V. Wang**, Texas A&M Univ.

10:50 am: **Photoacoustic spectroscopic imaging of intra-tumor heterogeneity and molecular identification,** K. M. Stantz, B. Liu, Purdue Univ.; K. D. Miller, Indiana Univ.; R. Kruger, OptoSonics, Inc. . . . . [6086-05]

11:10 am: **Noninvasive in vivo molecular imaging of nude mice head with U87 glioblastoma brain tumor by spectroscopic photoacoustic tomography,** X. Xie, J. Oh, M. Li, G. Ku, Texas A&M Univ.; C. Li, K. Shi, W. Wang, The Univ. of Texas M.D. Anderson Cancer Ctr.; S. Similache, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6086-06]

11:30 am: **Assessment of photo-acoustic computed tomography to extract kidney cysts and spectroscopy information of polycystic kidney disease mice model,** B. Liu, Purdue Univ.; V. Gattone, Indiana Univ.-Purdue Univ. Indianapolis; R. A. Kruger, OptoSonics, Inc; K. M. Stantz, Purdue Univ. [6086-07]

11:50 am: **Imaging of gene expression in vivo with photoacoustic tomography,** R. J. Zemp, L. Li, S. Fimilache, G. Lungu, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6086-08]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 3

Conv. Ctr. A6 . . . . . Sun. 1:40 to 3:20 pm

Development of Clinical Applications

Chair: **Quing Zhu**, Univ. of Connecticut

1:40 pm: **Development of a real-time 128-channel laser optoacoustic imaging system for cancer diagnostics,** S. A. Ermilov, A. Conjusteau, K. Mehta, M. P. Henrichs, A. A. Oraevsky, Fairway Medical Technologies . . . . . [6086-09]

2:00 pm: **Clinical test of diode-laser-based optoacoustic system for noninvasive monitoring of total blood hemoglobin concentration,** I. Y. Petrova, D. S. Prough, Y. Y. Petrov, I. Patrikeev, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6086-10]

2:20 pm: **In vivo testing of laser optoacoustic system for image-guided biopsy of prostate,** A. A. Oraevsky, Fairway Medical Technologies; B. A. Bell, The Univ. of Texas Medical Branch at Galveston; S. A. Ermilov, K. Mehta, M. P. Henrichs, T. Miller, A. Yee, Fairway Medical Technologies; M. Motamedi, The Univ. of Texas Medical Branch at Galveston . . . . . [6086-11]

2:40 pm: **In vivo functional photoacoustic imaging of brain tumor hypoxia,** J. Oh, M. Li, X. Xie, S. V. Similache, G. Stoica, L. Wang, Texas A&M Univ. . . . . [6086-12]

3:00 pm: **Photoacoustic tomography of joints,** X. Wang, P. L. Carson, J. B. Fowlkes, D. L. Chamberland, R. O. Bude, D. A. Jamadar, Univ. of Michigan . . . . . [6086-13]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Conv. Ctr. A6 . . . . . Sun. 3:50 to 5:10 pm

Preclinical Development

Chair: **Wiendelt Steenbergen**, Univ. Twente (Netherlands)

3:50 pm: **Set-up and characterization of a photoacoustical endoscope,** C. Haisch, L. Hoffmann, R. Niessner, Technische Univ. München (Germany) . . . . . [6086-14]

4:10 pm: **Development of a combined intravascular ultrasound and photoacoustic imaging system,** S. Sethuraman, S. R. Aglyamov, The Univ. of Texas at Austin; J. H. Amirian, R. W. Smalling, The Univ. of Texas Health Science Ctr. at Houston; S. Y. Emelianov, The Univ. of Texas at Austin . . . . . [6086-15]

4:30 pm: **Early detection of dental caries using photoacoustics,** K. Kim, R. Witte, I. Koh, M. O'Donnell, Univ. of Michigan . . . . . [6086-16]

4:50 pm: **2D backward-mode photoacoustic imaging system for NIR (650-1200nm) spectroscopic biomedical applications,** E. Z. Zhang, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6086-17]

Monday 23 January

SESSION 5

Conv. Ctr. A6 . . . . . Mon. 8:30 to 10:30 am

Photons, Ultrasound and Nanoparticles

Chair: **Gerald J. Diebold**, Brown Univ.

8:30 am: **Elimination of leukemic cells from human transplants by laser nano-thermolysis** *(Invited Paper),* D. Lapotko, E. Lukianova, A.V. Luikov Heat and Mass Transfer Institute (Belarus); M. Potapnev, State Hematological Ctr. (Belarus); O. Aleinikova, A.V. Luikov Heat and Mass Transfer Institute (Belarus); A. A. Oraevsky, Fairway Medical Technologies . . . . . [6086-18]

9:00 am: **Photoacoustics of single live cells and particles** *(Invited Paper),* S. D. Allen, S. I. Kudryashov, Arkansas State Univ.; E. I. Galanzha, E. Galitovskaya, V. P. Zharov, Univ. of Arkansas for Medical Sciences [6086-19]

9:30 am: **Gold and silver nanoparticles as optoacoustic contrast agents for medical imaging,** A. Conjusteau, S. A. Ermilov, Fairway Medical Technologies; N. A. Kotov, Univ. of Michigan; M. P. Henrichs, A. A. Oraevsky, Fairway Medical Technologies . . . . . [6086-20]

9:50 am: **Single-energy wash-in photoacoustic blood flow measurements using shape transitions of gold nanorods,** C. Wei, S. Huang, National Taiwan Univ. (Taiwan); Y. Chiou, C. Chen, C. C. Wang, National Chung-Cheng Univ. (Taiwan); P. Li, National Taiwan Univ. (Taiwan) . . . . . [6086-21]

10:10 am: **Multiple targeting in photoacoustic imaging using bioconjugated gold nanorods,** P. Li, C. Wei, C. Liao, National Taiwan Univ. (Taiwan); C. Chen, C. C. Wang, National Chung-Cheng Univ. (Taiwan); Y. Wu, D. Shieh, National Cheng-Kung Univ. (Taiwan) . . . . . [6086-22]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 6

Conv. Ctr. A6 . . . . . Mon. 11:00 am to 12:20 pm

Animal and In Vivo Diagnostics

Chair: **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences

11:00 am: **Tissue diagnosis using accoustically induced blood stasis and optical spectroscopy,** B. Winey, Univ. of Rochester . . . . . [6086-23]

11:20 am: **Photoacoustic imaging of venous valves,** W. Steenbergen, R. G. Kolkman, N. Bosschaart, T. G. Van Leeuwen, Univ. Twente (Netherlands) . . . . . [6086-24]

11:40 am: **In vivo functional photoacoustic tomography of traumatic brain injury in rats,** J. Oh, X. Xie, M. Li, S. V. Similache, G. Stoica, L. Wang, Texas A&M Univ. . . . . [6086-25]

12:00 pm: **Three-dimensional noninvasive near-infrared photoacoustic tomography of whole small animal head,** K. H. Song, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6086-26]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 7

Conv. Ctr. A6 . . . . . Mon. 1:40 to 3:00 pm

Measurement of Blood Oxygenation

Chair: **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch at Galveston

1:40 pm: **Technical considerations in quantitative blood oxygenation measurement using photoacoustic microscopy in small animals in vivo,** K. Maslov, M. Sivaramakrishnan, H. Zhang, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6086-27]

2:00 pm: **A high frame rate photoacoustic imaging system and its applications to perfusion measurements,** C. Liao, S. Huang, C. Wei, P. Li, National Taiwan Univ. (Taiwan) . . . . . [6086-28]

2:20 pm: **Animal tests of multi-wavelength optoacoustic system for noninvasive monitoring of cerebral blood oxygenation,** Y. Y. Petrov, D. S. Prough, I. Y. Petrova, I. Cicenaite, D. J. Deyo, I. Patrikeyev, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6086-29]

2:40 pm: **Animal study of noninvasive optoacoustic monitoring of blood oxygenation in the internal jugular vein,** H. F. Brecht, D. S. Prough, Y. Y. Petrov, I. Y. Petrova, D. J. Deyo, I. Patrikeev, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6086-30]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8

Conv. Ctr. A6 . . . . . Mon. 3:30 to 5:50 pm

Artifacts Removal, Signal Processing, and Image Reconstruction

Chair: **Steven L. Jacques**, Oregon Health and Science Univ.

3:30 pm: **Numerical modeling of light distribution for optoacoustic determination of blood effective attenuation coefficient,** I. Patrikeev, Y. V. Petrov, I. Y. Petrova, D. S. Prough, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6086-31]

3:50 pm: **Correction of the effect of acoustic heterogeneities in thermoacoustic tomography using transmission ultrasound tomography,** X. Jin, L. Wang, Texas A&M Univ. . . . . [6086-32]

4:10 pm: **Experimental investigation of time-reversal of photoacoustic waves,** E. Bossy, G. Montaldo, M. Tanter, B. C. Forget, F. Ramaz, M. Fink, C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6086-33]

4:30 pm: **Speckles in photoacoustic tomography,** L. Li, L. V. Wang, Texas A&M Univ. . . . . [6086-34]

4:50 pm: **Signal-to-noise ratios in acoustophotonic imaging,** C. A. DiMarzio, Northeastern Univ. . . . . [6086-35]

5:10 pm: **Image reconstruction in photoacoustic tomography with truncated cylindrical measurement apertures,** M. A. Anastasio, J. Zhang, Illinois Institute of Technology . . . . . [6086-36]

5:30 pm: **Boundary conditions in photoacoustic tomography,** L. V. Wang, Texas A&M Univ. . . . . [6086-37]

Tuesday 24 January

SESSION 9

Conv. Ctr. A6 . . . . . Tues. 8:30 to 10:30 am

Acousto-optical Imaging

Chair: **Albert C. Boccara**, École Supérieure de Physique et de Chimie Industrielles (France)

8:30 am: **In-situ measurement of the effective photorefractive time-response during an acousto-optics imagery recording,** F. Ramaz, École Supérieure de Physique et de Chimie Industrielles (France); M. Gross, Lab. Kastler Brossel (France); P. Delaye, Univ. Paris-Sud II (France); M. Atlan, B. C. Forget, P. Santos, E. Bossy, École Supérieure de Physique et de Chimie Industrielles (France); G. Roosen, Univ. Paris-Sud II (France); A. C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . [6086-38]

8:50 am: **Acousto-optic imaging with heterodyne parallel speckle detection: towards in vivo measurements,** P. Santos, M. Atlan, B. C. Forget, Univ. Pierre et Marie Curie (France); E. Bossy, F. Ramaz, A. C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France); M. Gross, École Normale Supérieure (France) . . . . . [6086-39]

9:10 am: **Towards very-high resolution imaging in ultrasound-modulated optical tomography in biological tissues,** S. Sakadzic, S. Kothapalli, L. V. Wang, Texas A&M Univ. . . . . [6086-40]

9:30 am: **Comparison of detection schemes for ultrasound modulated optical tomography,** S. P. Morgan, C. Li, B. R. Hayes-Gill, The Univ. of Nottingham (United Kingdom) . . . . . [6086-41]

9:50 am: **Two-dimensional imaging of biological tissue with photorefractive crystal-based ultrasound-modulated optical tomography,** X. Xu, H. Zhang, D. Qing, P. R. Hemmer, L. V. Wang, Texas A&M Univ. . . . . [6086-42]

10:10 am: **Acoustic radiation-force modulated optical tomography,** C. H. Kim, R. J. Zemp, L. V. Wang, Texas A&M Univ. . . . . [6086-43]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 10

Conv. Ctr. A6 . . . . . Tues. 11:00 am to 12:40 pm

Hybrid and Dual Modality Systems

Chair: **Charles A. DiMarzio**, Northeastern Univ.

11:00 am: **Imaging with dual RF and optical contrasts by photoacoustic tomography,** G. Ku, L. V. Wang, Texas A&M Univ. . . . . [6086-44]

11:20 am: **Simultaneous reconstruction of speed-of-sound and electromagnetic absorption distributions in photoacoustic tomography,** J. Zhang, M. A. Anastasio, Illinois Institute of Technology . . . . . [6086-45]

11:40 am: **Noninvasive in vivo tumor imaging using photoacoustics and comparison with contrast enhanced MRI,** K. K. Thumma, R. G. Kolkman, W. Steenbergen, T. A. van Leeuwen, Univ. Twente (Netherlands) . . . . . [6086-46]

12:00 pm: **The combination of pulsed acousto-optic imaging and B-mode diagnostic ultrasound for 3D imaging in ex vivo biological tissue,** L. Sui, T. W. Murray, R. A. Roy, Boston Univ. . . . . [6086-47]

12:20 pm: **Dynamic near-infrared imaging with ultrasound guidance (dNIRUS): analytical model and benchtop validation on multilayer tissue simulating phantoms,** R. X. Xu, The Ohio State Univ. . . . . [6086-48]

Lunch Break . . . . . 12:40 to 2:00 pm

SESSION 11

Conv. Ctr. A6 . . . . . Tues. 2:00 to 3:40 pm

High-resolution and Microscopy Systems

Chair: **Robert A. Kruger**, OptoSonics, Inc.

2:00 pm: **Photothermal coherent confocal microscope,** M. R. Andrews, S. Sullivan, M. Bouchard, C. A. DiMarzio, Northeastern Univ. . . . . [6086-49]

2:20 pm: **Three-dimensional photoacoustic imaging of subcutaneous microvasculature in vivo,** H. Zhang, M. Li, K. Maslov, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6086-50]

2:40 pm: **Virtual-detector synthetic aperture focusing technique with application in in-vivo photoacoustic microscopy,** M. Li, H. Zhang, K. Maslov, G. Stoica, L. Wang, Texas A&M Univ. . . . . [6086-51]

3:00 pm: **In vivo blood oxygenation imaging of subcutaneous vessels by use of photoacoustic microscopy,** H. Zhang, K. Maslov, S. Similache, M. Sivaramakrishnan, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6086-52]

3:20 pm: **Two-dimensional optoacoustic array for high-resolution imaging,** S. Ashkenazi, Y. Hou, T. Buma, K. Kim, R. Witte, M. O'Donnell, Univ. of Michigan . . . . . [6086-53]

Coffee Break . . . . . 3:40 to 4:00 pm

SESSION 12

Conv. Ctr. A6 . . . . . Tues. 4:00 to 5:40 pm

Quantitative Imaging

Chair: **Paul C. Beard**, Univ. College London (United Kingdom)

4:00 pm: **Ultrasonic attenuation correction in optoacoustic tomography,** P. J. La Rivière, The Univ. of Chicago; J. Zhang, M. A. Anastasio, Illinois Institute of Technology . . . . . [6086-54]

4:20 pm: **Absolute measurements of local chromophore concentrations using pulsed photoacoustic spectroscopy,** J. G. Laufer, C. E. Elwell, D. T. Delpy, P. C. Beard, Univ. College London (United Kingdom) . . . . [6086-55]

4:40 pm: **Examination of contrast mechanisms in optoacoustic imaging of thermal lesions,** C. Richter, Univ. of Toronto/Ontario Cancer Inst (Canada) and Ryerson Univ. (Canada); G. M. Spirou, Univ. of Toronto/Ontario Cancer Inst (Canada); A. A. Oraevsky, Fairway Medical Technologies; W. M. Whelan, M. C. Kolios, Ryerson Univ. (Canada) . . . . . [6086-56]

5:00 pm: **Analytic explanation of spatial resolution and optical absorption sensitivity in photoacoustic tomography with a circular scanning detector geometry,** R. J. Zemp, L. Li, L. V. Wang, Texas A&M Univ. . . . . [6086-57]

5:20 pm: **Quantitative photoacoustic image reconstruction for molecular imaging,** B. T. Cox, S. R. Arridge, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6086-58]

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

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✔ **Photoacoustic molecular imaging based on multi-element phase-controlled focus technique,** H. Gu, D. Xing, D. Yang, South China Normal Univ. (China) . . . . . [6086-63]

✔ **Modulation depth of the detected signal versus the propagation of the diffused light and the optical property in the ultrasound zone,** H. Li, L. Zhu, J. Cai, S. Xie, Fujian Normal Univ. (China) . . . . . [6086-65]

✔ **Correlation transport and diffusion of ultrasound-modulated multiply-scattered light,** S. Sakadzic, L. V. Wang, Texas A&M Univ. . . . . [6086-66]

✔ **Subsurface photodisruption in pig skin as monitored by high-frequency ultrasound,** C. Tse, M. J. Zohdy, J. Y. Ye, M. O'Donnell, Univ. of Michigan . . . . . [6086-67]

✔ **Simulation study on sensitive detection of small absorbers in photoacoustic tomography,** Y. Su, F. Zhang, J. Yao, Tainjin Univ. (China); R. K. Wang, Oregon Health & Science Univ. . . . . [6086-68]

✔ **Dynamics of L-tryptophan in aqueous solutions by simultaneous LIF and PAS,** K. K. Mahato, S. D. Kamath, V. B. Kartha, Manipal Academy of Higher Education (India) . . . . . [6086-69]

✔ **Further development of the correlation transport equation of ultrasound-modulated multiply scattered light: a diagrammatic approach,** S. T. Sakadzic, L. V. Wang, Texas A&M Univ. . . . . [6086-70]

✔ **Photoacoustic and optical monitoring of vapor bubble formation, dynamics and cavitation in water and 2-propanol superheated by CO_2-laser: from nanoseconds to seconds,** S. I. Kudryashov, K. Lyon, S. D. Allen, J. Lin, Arkansas State Univ. . . . . [6086-71]

✔ **Modeling of photon migration in the human lung using the finite volume solver,** Z. Sikorski, M. Furmanczyk, A. J. Przekwas, CFD Research Corp. . . . . [6086-72]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

Wednesday 25 January

SESSION 13

Room: Conv. Ctr. A6 . . . . . Wed. 8:30 to 10:20 am

Optical Detection and Optical Sources of Acoustic Waves

Chair: **Guenther Paltauf**, Karl-Franzens-Univ. Graz (Austria)

8:30 am: **Thermoacoustic tomography using a fiber-based Fabry-Perot interferometer as an integrating line detector,** P. Burgholzer, C. Hofer, Upper Austrian Research (Austria); G. Paltauf, Karl-Franzens-Univ. Graz (Austria); M. Haltmeier, O. Scherzer, Leopold-Franzens-Univ. Innsbruck (Austria) [6086-59]

8:50 am: **Analysis of photoacoustic signal frequencies in deep tissue phantoms using high-sensitive interferometric optical sensors,** H. Lamela, V. B. Cunningham, C. Macia, J. A. Garcia Souto, P. Acedo, Univ. Carlos III de Madrid (Spain) . . . . . [6086-60]

9:10 am: **Development of a pulsed NIR multiwavelength laser diode excitation source for biomedical photoacoustic applications,** T. J. Allen, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6086-61]

9:30 am: **A photoacoustic imaging system employing a curved-phased ultrasonic array and parallel electronics,** A. Maurudis, F. Huang, P. Guo, S. Yan, D. Castillo, Univ. of Connecticut; L. V. Wang, Texas A&M Univ.; Q. Zhu, Univ. of Connecticut . . . . . [6086-62]

Award Presentation and Closing Remarks . . . 9:50 to 10:20 am

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6087

Biophotonics and Immune Responses

Conference Chair: **Wei R. Chen**, Univ. of Central Oklahoma

Program Committee: **Samuel Achilefu**, Washington Univ.; **Gianfranco L. Canti**, Univ. Degli Studi di Milano (Italy); **Sandra O. Gollnick**, Roswell Park Cencer Institute; **Michael R. Hamblin**, Harvard Medical School; **Zheng Huang**, HealthONE Alliance; **Mladen Korbelik**, BC Cancer Agency (Canada); **Karl-Goran Tranberg**, Lunds Univ. Hospital (Sweden); **Xunbin Wei**, Harvard Medical School; **Vladimir P. Zharov**, Univ. of Arkansas/ Little Rock

Monday 23 January

SESSION 1

Conv. Ctr. A5 . . . . . Mon. 8:30 to 10:10 am

Novel Combination Therapy in Cancer Treatment

Chairs: **Michael R. Hamblin**, Harvard Medical School; **Wei R. Chen**, Univ. of Central Oklahoma

8:30 am: **Light and immune systems - activation and detection of immunological activities** *(Invited Paper),* W. R. Chen, Univ. of Central Oklahoma . . . . . [6087-01]

9:00 am: **Combination immunotherapy and photodynamic therapy** *(Invited Paper),* M. R. Hamblin, A. P. Castano, P. Mroz, Harvard Medical School . . . . . [6087-02]

9:30 am: **Enhancing photodynamic therapy of a metastatic mouse breast cancer by immune stimulation,** M. R. Hamblin, A. P. Castano, Harvard Medical School . . . . . [6087-03]

9:50 am: **Treatment of basal cell carcinoma by PDT enhances antitumor immunity,** E. Kabingu, A. R. Oseroff, S. O. Gollnick, Roswell Park Cancer Institute . . . . . [6087-04]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Conv. Ctr. A5 . . . . . Mon. 10:40 am to 12:20 pm

Clinical Studies: Induction and Detection of Immunological Responses

Chairs: **Zheng Huang**, HealthONE Alliance; **Feng Wu**, Churchill Hospital (United Kingdom)

10:40 am: **High-intensity focused ultrasound ablation in the treatment of patients with solid malignancies: clinical experiences in China and England** *(Invited Paper),* F. Wu, Chongqing Medical Univ. (China) . . . . . [6087-05]

11:10 am: **Photodynamic therapy induced immune response and its antitumor effect** *(Invited Paper),* Z. Huang, HealthONE Alliance . . . . [6087-06]

11:40 am: **In situ photoimmunotherapy for melanoma - preliminary clinical results,** M. F. Naylor, Oklahoma Medical Research Foundation; W. R. Chen, Univ. of Central Oklahoma . . . . . [6087-07]

12:00 pm: **Local antitumor immunity enhanced by high- intensity focused ultrasound treatment in patients with breast cancer,** F. Wu, Z. Xu, P. Lu, X. Zhu, Q. Zhou, F. Xie, Y. Cao, Z. Wang, Chongqing Medical Univ. (China) . . . . . [6087-08]

Lunch Break . . . . . 12:20 to 2:00 pm

SESSION 3

Conv. Ctr. A5 . . . . . Mon. 2:00 to 3:20 pm

Mechanism of Laser-Induced Immune Responses I

Chairs: **Karl-Goran Tranberg**, Lunds Univ. (Sweden); **Mladen Korbelik**, British Columbia Cancer Agency (Canada)

2:00 pm: **Laser tumor thermotherapy: Is there a clinically relevant effect on the immune system?** *(Invited Paper),* K. Tranberg, Lunds Univ. (Sweden) . . . . . [6087-09]

2:30 pm: **Acute phase response induced following tumor treatment by photodynamic therapy: relevance for the therapy outcome** *(Invited Paper),* M. Korbelik, J. Sun, British Columbia Cancer Agency (Canada) . . . . . [6087-10]

3:00 pm: **Antitumor lymphocytic response in lymph nodes and spleen after laser thermotherapy of an intrahepatic colon carcinoma,** K. Tranberg, K. Ivarsson, H. O. Sjögren, U. Stenram, Lunds Univ. (Sweden) . . . . . [6087-11]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Conv. Ctr. A5 . . . . . Mon. 3:50 to 5:20 pm

Mechanism of Laser-Induced Immune Responses II

Chair: **Sandra O. Gollnick**, Roswell Park Cancer Institute

3:50 pm: **Induction of antitumor immunity by PDT** *(Invited Paper),* S. O. Gollnick, Roswell Park Cancer Institute . . . . . [6087-12]

4:20 pm: **PDT regime dependent activation of antitumor immunity,** P. C. Kousis, B. W. Henderson, S. O. Gollnick, Roswell Park Cancer Institute . . . . . [6087-13]

4:40 pm: **Heat shock protein 70-mediated antitumor immunity after high-intensity focused ultrasound treatment for hepatic carcinoma,** F. Wu, Y. Zhang, J. Deng, J. Feng, B. Zhai, F. Xie, Z. Wang, Chongqing Medical Univ. (China) . . . . . [6087-14]

5:00 pm: **Tissue temperature distribution measurement and laser immunotherapy for cancer treatment,** Y. Chen, Univ. of Central Oklahoma; S. C. Gnyawali, Oklahoma State Univ.; K. Andrienko, Univ. of Central Oklahoma; H. Liu, Univ. of Oklahoma; W. R. Chen, Univ. of Central Oklahoma . . . [6087-15]

Tuesday 24 January

SESSION 5

Conv. Ctr. A5 . . . . . Tues. 8:30 to 10:10 am

Detection of Laser-Induced Cellular and Immune Activities I

Chairs: **Da Xing**, South China Normal Univ. (China); **Xunbin Wei**, Harvard Medical School

8:30 am: **A mechanism of cell apoptosis by light irradiation** *(Invited Paper),* D. Xing, South China Normal Univ. (China) . . . . . [6087-16]

9:00 am: **Real-time detection of circulating apoptotic cells by in vivo flow cytometry** *(Invited Paper),* X. Wei, C. P. Lin, Harvard Medical School . [6087-17]

9:30 am: **Observation of mitochondrial morphology and biochemistry changes undergoing apoptosis by angularly resolved light scattering and cryoimaging,** M. Ranji, D. L. Jaggard, B. Chance, Univ. of Pennsylvania . . . . . [6087-18]

9:50 am: **Dynamic imaging of interaction between protein 14-3-3 and Bid in living cells,** T. Chen, D. Xing, South China Normal Univ. (China) . . . . . [6087-19]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Conv. Ctr. A5 . . . . . Tues. 10:40 am to 12:40 pm

Detection of Laser-Induced Cellular and Immune Activities II

Chairs: **Wei R. Chen**, Univ. of Central Oklahoma;
Da Xing, South China Normal Univ. (China)

10:40 am: **Molecular imaging of low-power laser irradiation induced cell proliferation,** X. Gao, F. Wang, D. Xing, South China Normal Univ. (China) . . . . . [6087-20]

11:00 am: **Novel confocal intravital microscope for visualizing murine lymphocytes, tracking of GFP positive lymphocytes in response to antigenic stimulus,** W. Luk, T. Sato, C. H. Contag, T. D. Wang, Stanford Univ. . . . . [6087-21]

11:20 am: **A glass window on the animals immune system for visualization of bone marrow and blood cells by extracorporeal circulation in closed circuit,** S. Meer, American Institute of Aeronautics and Astronautics (Israel) . . . . . [6087-22]

11:40 am: **Laser-induced enhancement of transdermal drug delivery for lidocaine through hairless mouse skin,** T. Uchizono, K. Awazu, Osaka Univ. (Japan) . . . . . [6087-23]

12:00 pm: **Influence of laser irradiation of melanoma and bladder cancer cells on adhesion of blood platelets to cancer cells in vitro,** L. Gasparyan, EMRED Oy (Finland); G. E. Brill, Saratov Medical Univ. (Russia); A. Makela, Acupuncture and Bioenergy Research Institute (Finland) . . . . . [6087-24]

12:20 pm: **Time-lapse microscopy studies of bystander effects induced by photosensitization,** Y. Chen, Wellman Center for Photomedicine and Harvard Medical School and Massachusetts General Hospital; R. W. Redmond, Massachusetts General Hospital . . . . . [6087-28]

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✔ **FRET and FCS analysis of Bax activities in cell apoptosis,** T. Chen, X. Gao, D. Xing, South China Normal Univ. (China) . . . . . [6087-25]

✔ **Combination of photodynamic and ultrasonic therapy for treatment of infected wounds: impact on immune system,** Y. A. Menyaev, Bauman Moscow State Technical Univ. (Russia); V. P. Zharov, Univ. of Arkansas for Medical Sciences . . . . . [6087-26]

✔ **Study of photodynamic activity of hypericin and synthetic photosensitizers on human erythrocytes in vitro,** H. Vardapetyan, Russian-Armenian (Slavonic) State Univ. (Armenia); S. Tiratsuyan, A. Hovhannisyan, L. Hunanyan, A. Martirosyan, Yerevan State Univ. (Armenia); R. Ghazaryan, Yerevan State Medical Univ. (Armenia); S. Ghambaryan, G. Gyulkhandanyan, Institute of Biotechnology (Armenia) . . . . . [6087-27]

Technical Group Meeting

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Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona;
Lihong Wang, Texas A&M Univ.

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Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6088

Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues IV

Conference Chairs: **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.; **Robert C. Leif**, Newport Instruments; **Dan V. Nicolau**, Swinburne Univ. of Technology (Australia)

Cochairs: **Joseph P. Robinson**, Purdue Univ.; **James F. Leary**, Purdue Univ.; **Ramesh Raghavachari**, U.S. Food and Drug Administration

Program Committee: **Christopher H. Contag**, Stanford Univ.; **Paul Dan A. Cristea**, Univ. Politehnica Bucharest (Romania); **Alberto Diaspro**, Univ. degli Studi di Genova (Italy); **Erik G. Fällman**, Umeå Univ. (Sweden); **Jesper Glückstad**, Risø National Lab. (Denmark); **Ewa M. Goldys**, Macquarie Univ. (Australia); **Charles P. Lin**, Harvard Medical School; **Andreas Nowatzyk**, Cedars-Sinai Medical Ctr.; **Markus Sauer**, Univ. Bielefeld (Germany); **Attila Tarnok**, Univ. Leipzig (Germany)

Monday 23 January

SESSION 1

Conv. Ctr. C4 . . . . . Mon. 8:50 am to 12:30 pm

Imaging Cells and Tissues I

Chair: **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.

8:50 am: **Fluorescence and fluorescence-lifetime imaging microscopy (FLIM) to characterize yeast strains by autofluorescence,** H. Bhatta, E. M. Goldys, J. Ma, Macquarie Univ. (Australia) . . . . . [6088-01]

9:10 am: **Study of cell adhesion and migration by using a plasmon-enhanced total internal reflection fluorescence microscope,** S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6088-03]

9:30 am: **Fiber-coupled confocal microscope (FCM) for real time imaging of cellular signals in situ,** T. Sakurai, Hamamatsu Univ. School of Medicine (Japan) . . . . . [6088-04]

9:50 am: **Light-scattering spectroscopic optical coherence tomography for differentiating cells in 3D cell culture,** C. Xu, P. S. Carney, W. Tan, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6088-05]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Imaging multiple endogenous and exogenous fluorescent species in cells and tissues** *(Invited Paper),* J. A. Timlin, H. D. T. Jones, L. T. Nieman, D. M. Haaland, Sandia National Labs.; J. F. Guzowski, The Univ. of New Mexico . . . . . [6088-06]

11:10 am: **Multispectral imaging detects breast cancer in fresh unstained specimens,** A. Chung, D. L. Farkas, S. Karlan, Y. Xiong, Cedars-Sinai Medical Ctr. . . . . [6088-07]

11:30 am: **Optical imaging measurements of oxygen transport fluctuations and gradients in tumor microvascular networks,** B. S. Sorg, Univ. of Florida and Duke Univ.; M. E. Hardee, B. J. Moeller, M. W. Dewhirst, Duke Univ. . . . . [6088-08]

11:50 am: **A novel optical imaging system for investigating sarcomere dynamics in single skeletal muscle fibers,** A. Panchangam, R. Witte, D. R. Claflin, M. O'Donnell, J. A. Faulkner, Univ. of Michigan . . . . . [6088-09]

12:10 pm: **Spectral analysis of lung cancer serum using fluorescence and Raman spectroscopy,** D. Wang, Shenyang Ligong Univ. (China) . . . . [6088-10]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 2

Conv. Ctr. C4 . . . . . Mon. 1:30 to 4:40 pm

Imaging Cells and Tissues II

Chair: **Sebastian Wachsmann-Hogiu**, Cedars-Sinai Medical Ctr.

1:30 pm: **Fluorescence Resonance Energy Transfer - a test-bench for fundamental laws of nature in vivo,** V. Raicu, University of Wisconsin-Milwaukee, Department of Physics . . . . . [6088-11]

1:50 pm: **Raman spectroscopic analysis of atypical proliferative lesions of the breast,** K. Subramanian, C. A. Kendall, Gloucestershire Royal Hospital (United Kingdom) and Cranfield Univ. (United Kingdom); K. McCarthy, J. Brown, J. Bristol, C. Chan, Gloucestershire Royal Hospital (United Kingdom); N. Stone, Gloucestershire Royal Hospital (United Kingdom) and Crnafiled Univ. (United Kingdom) . . . . . [6088-12]

2:10 pm: **Partial-wave spectroscopic microscopy for preneoplastic detection,** Y. Liu, P. Pradhan, X. Li, Y. L. Kim, M. H. Kim, Northwestern Univ.; J. L. Koetsier, R. K. Wali, H. K. Roy, Northwestern Univ. and Evanston Northwestern Healthcare; V. Backman, Northwestern Univ. . . . . [6088-13]

2:30 pm: **Use of formalin-fixed tissues for ex-vivo imaging with OCT,** S. Shortkroff, A. Goodwin, S. Giattina, M. E. Brezinski, Brigham and Women's Hospital . . . . . [6088-14]

2:50 pm: **Phase-shifting interferometric holography of living cells,** D. M. Giel, M. Fratz, A. Brandenburg, Fraunhofer-Institut für Physikalische Messtechnik (Germany) . . . . . [6088-15]

Coffee Break . . . . . 3:10 to 3:40 pm

3:40 pm: **Cellular growth imaging on nanostructured silicon layers,** L. De Stefano III, L. Rotiroti, I. Rea, I. Rendina, Istituto per la Microelettronica e Microsistemi (Italy); V. Marigo, C. Spampanato, Telethon Institute of Genetics and Medicine (Italy) . . . . . [6088-16]

4:00 pm: **Monitoring activity of living cells marked with colloidal semiconductor quantum dots,** P. M. de Farias, B. S. Santos, F. D. Menezes, R. Ferreira, Univ. Federal de Pernambuco (Brazil); L. C. Barbosa, D. B. Almeida, A. A. Thomaz, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6088-17]

4:20 pm: **Screening far red probes for use on optical biochip devices,** K. L. Njoh, Cardiff Univ. (United Kingdom); L. Patterson, Univ. of Bradford (United Kingdom); M. Zloh, Univ. College London (United Kingdom); S. M. Ameer-Beg, Gray Cancer Institute (United Kingdom); D. R. Matthews, R. J. Errington, P. J. Smith, Cardiff Univ. (United Kingdom) . . . . . [6088-61]

Tuesday 24 January

SESSION 3

Conv. Ctr. C4 . . . . . Tues. 8:30 am to 12:40 pm

Classification, Quantification and Informatics I

Chair: **Ramesh Raghavachari**, U.S. Food and Drug Administration

8:30 am: **Proliferation/apoptosis determination by tissue cytometry in gastrointestinal fresh frozen sections using triple labeling and automated scanning fluorescence microscopy,** J. Bocsi, Univ. Leipzig (Germany); F. Sipos, L. Ficsór, V. S. Varga, Semmelweis Univ. (Hungary); A. Tárnok, Univ. Leipzig (Germany); B. Molnár, Semmelweis Univ. (Hungary) . . . . . [6088-18]

8:50 am: **Apoptosis of circulating lymphocytes during pediatric cardiac surgery,** M. Pipek, J. Bocsi, J. Hambsch, P. Schneider, A. Tarnok, Univ. Leipzig (Germany) . . . . . [6088-19]

9:10 am: **Clinical cytomics,** A. Tarnok, Univ. Leipzig (Germany) . . . . . [6088-20]

9:30 am: **The development of a laboratory digital imaging project (LDIP) data exchange specification,** R. C. Leif, Newport Instruments; U. J. Balis, Massachusetts General Hospital; J. J. Berman, National Cancer Institute; B. A. Friedman, Univ. of Michigan . . . . . [6088-21]

9:50 am: **Classifying single proliferating eukaryotic cells by the cell-cycle phase using artificial neural networks and principle component analysis,** S. Boydston-White, T. Chernenko, A. Regina, M. Romeo, Hunter College/CUNY; M. D. Miljkovi, M. Diem, Hunter College/CUNY and The City Univ. of New York . . . . . [6088-22]

10:10 am: **Effective optimization method to compress a femtosecond optical pulse,** H. Liu, L. Lin, G. Mu, Nankai Univ. (China) . . . . . [6088-23]

Coffee Break . . . . . 10:30 to 11:00 am

11:00 am: **Computer vision algorithms in DNA ploidy image analysis,** E. Alexandratou, A. Sofou, P. Maragos, D. M. Yova, National Technical Univ. of Athens (Greece); N. Kavantzas, Univ. of Athens (Greece) . . . . . [6088-24]

11:20 am: **Genomic signal analysis of pathogen variability,** P. D. A. Cristea, Univ. Politehnica Bucharest (Romania) . . . . . [6088-25]

11:40 am: **Adaptative, signal-preserving compression of microscopic images using noise modeling in wavelet domain and JPEG 2000 coding,** T. Bernas, B. P. Rajwa, E. K. Asem, J. P. Robinson, Purdue Univ. . . . . [6088-26]

12:00 pm: **Segmentation of prostate tissue microarray images,** H. E. Cline, A. Can, D. Padfield, General Electric Co. . . . . [6088-27]

12:20 pm: **Oxygen concentration measurement with a phosphorescence lifetime-based microsensor array using a digital light modulation microscope,** S. Chao, M. R. Holl, S. C. McQuaide, D. R. Meldrum, Univ. of Washington . . . . . [6088-28]

Lunch Break . . . . . 12:40 to 2:00 pm

SESSION 4

Conv. Ctr. C4 . . . . . Tues. 2:00 to 4:50 pm

Classification, Quantification and Informatics II

Chair: **Attila Tarnok**, Univ. Leipzig (Germany)

2:00 pm: **A 16-channel avalanche photodiode detector array for visible and near-infrared flow cytometry,** W. G. Lawrence, J. F. Christian, Radiation Monitoring Devices, Inc.; E. Podniesinski, P. K. Wallace, Roswell Park Cancer Institute . . . . . [6088-30]

2:20 pm: **Absolute fluorescence calibration** *(Invited Paper),* I. T. Young, Y. Garini, B. J. Vermolen, G. Liqui Lung, G. Brouwer, S. Hendrichs, J. Spoelstra, E. Wilhelm, M. Zaal, M. el Morabit, Technische Univ. Delft (Netherlands) . . . . . [6088-31]

2:50 pm: **Confocal Microscopy System Performance: Spectroscopy and Foundations for Quantitation** *(Invited Paper),* R. M. Zucker, U.S. Environmental Protection Agency; J. Lerner, LightForm . . . . . [6088-32]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Image correlation method for measuring flow and diameter changes in contracting mesenteric microlymphatics in situ,** J. B. Dixon, J. Moore, Jr., D. C. Zawieja, A. A. Gashev, G. L. Cote, Texas A&M Univ. [6088-33]

4:10 pm: **Portable real-time fluorescence cytometry of microscale cell culture analog devices,** D. Kim, Yonsei Univ. (South Korea); D. A. Tatosian, M. L. Shuler, Cornell Univ. . . . . [6088-34]

4:30 pm: **Acousto-optic tuneable filters - advances and applications to microscopy,** C. N. Pannell, Optronic Labs., Inc.; E. S. Wachman, ChromoDynamics Inc.; D. L. Farkas, Cedars-Sinai Medical Ctr.; J. Ward, Gooch & Housego PLC (United Kingdom); W. Seale, NEOS Technologies, Inc. [6088-35]

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Techniques for moveable traps: the influence of aberrations in optical tweezers** *(Invited Paper),* E. G. Fällman, M. J. Andersson, O. Axner, Umeå Univ. (Sweden) . . . . . [6088-36]

✔ **Comparative imaging of the vacuolar reticulum of Saprolegnia,** O. Lilje, E. S. Lilje, The Univ. of Sydney (Australia) . . . . . [6088-52]

✔ **Effects of isoflurane on measurements of fluorescence spectra and confocal laser scanning microscope imaging in baby Acetabularia acetabulum,** W. L. Chen, South China Normal Univ. (China) . . . . . [6088-53]

✔ **Sorting particles in a microfluidic system using SLM-reconfigurable intensity patterns,** I. R. Perch-Nielsen, P. J. L. Rodrigo, J. Glückstad, Risø National Lab. (Denmark); E. Eriksson, M. F. Goksör-Ericsson, J. Enger, D. Hanstorp, Chalmers Univ. of Technology (Sweden) . . . . . [6088-54]

✔ **Glutamate-induced intracellular calcium oscillations in astrocytes with confocal microscopy,** Y. Zhang, W. Zhou, X. Liu, G. Zhu, Y. X. Wu, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6088-55]

✔ **Application of confocal microscopy on glutamate-induced intracellular calcium transient in neurons,** G. Zhu, W. Zhou, Y. Zhang, X. liu, Y. X. Wu, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6088-56]

✔ **Application of a FRET probe for studying the dynamics of caspase-3 activation in living HeLa cells by sequentially treated cisplatin and TRAIL,** J. Lin, Z. Zhang, Q. Yi, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6088-57]

✔ **Intracellular dynamics observed by mode switching of microscope with a light incidence to the interface at alternate angles through the ultrahigh NA objective,** Y. Wakazono, T. Sakurai, Hamamatsu Univ. School of Medicine (Japan); M. Ohara-Imaizumi, S. Nagamatsu, Kyorin Univ. (Japan); S. Yamamoto, S. Terakawa, Hamamatsu Univ. School of Medicine (Japan) . . . . . [6088-58]

✔ **Using fluorescent sensors to detect MMP2 (gelatinase A) activity at cellular surface,** J. Yang, Z. Zhang, Q. Yi, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6088-59]

✔ **Spatially resolved pharmacokinetic rate images of ICG using near-infrared optical methods,** B. Alacam, B. Yazici, Rensselaer Polytechnic Institute; X. Intes, ART Advanced Research Technologies Inc. (Canada); N. Shoko, B. Chance, Univ. of Pennsylvania . . . . . [6088-60]

✔ **Three-dimensional optical imaging for plastic and reconstructive surgery planning and assessment,** N. E. Ionescu, Emergency Clinic and Hospital Bagdasar-Arseni (Romania) . . . . . [6088-63]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday 25 January

SESSION 5

Conv. Ctr. C4 . . . . . Wed. 9:00 to 11:40 am

Optical Manipulation of Biological Objects I

Chair: **Dan V. Nicolau**, Swinburne Univ. of Technology (Australia)

9:00 am: **Practical lab tools for living cells based on microstereolithography and multiple dynamic holographic optical tweezers** *(Invited Paper),* S. Monneret, F. Belloni, Institut Fresnel (France); D. D. Marguet, Ctr. National de la Recherche Scientifique (France) . . . . . [6088-37]

9:30 am: **Force measuring optical tweezers system for long time measurements of P pili stability,** E. G. Fällman, M. J. Andersson, B. E. Uhlin, O. Axner, Umeå Univ. (Sweden) . . . . . [6088-42]

9:50 am: **Red blood cell membrane viscoelasticity, agglutination and zeta potential measurements with double optical tweezers,** A. Fontes, H. P. Fernandes, M. d. L. Barjas-Castro, A. A. de Thomaz, L. d. Y. Pozzo, L. C. Barbosa, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6088-39]

10:10 am: **Fiber optic trapping of low-refractive-index particles,** K. S. Mohanty, Maharaja Sayajirao Univ. of Baroda (India); C. Liberale, Univ. degli Studi di Pavia (Italy); S. K. Mohanty, Ctr. for Advanced Technology (India); V. Degiorgio, Univ. degli Studi di Pavia (Italy); S. Cabrini, A. Carpentiero, V. Garbin, M. Prasciolu, D. A. Cojoc, Istituto Nazionale per la Fisica della Material (Italy); E. D. Fabrizio, Univ. degli studi Magna Græcia di Catanzaro (Italy) . . . . . [6088-40]

Coffee Break . . . . . 10:30 to 11:00 am

11:00 am: **Combined microchannel-type erythrocyte deformability test with optical tweezers,** W. G. Lee, H. Bang, J. Park, K. Cho, C. Chung, D. Han, J. K. Chang, Seoul National Univ. (South Korea) . . . . . [6088-41]

11:20 am: **Technique for determination of the number of PapA units in an E. Coli P pilus,** O. Axner, M. Andersson, E. Fällman, B. E. Uhlin, Umeå Univ. (Sweden) . . . . . [6088-38]

Lunch/Exhibition Break . . . . . 11:40 am to 1:00 pm

SESSION 6

Room: Conv. Ctr. C4 . . . . . Wed. 1:00 to 4:30 pm

Optical Manipulation of Biological Objects II

Chair: **Dan V. Nicolau**, Swinburne Univ. of Technology (Australia)

1:00 pm: **Nanolaser spectroscopy: new tool for brewing a better beer?** *(Invited Paper),* P. L. Gourley, J. K. Hendricks, A. E. McDonald, R. G. Copeland, Sandia National Labs. . . . . [6088-62]

1:30 pm: **Optofluidic microscope and its applications in developmental biology,** X. Heng, California Institute of Technology; D. Erickson, Cornell Univ.; D. Psaltis, C. Yang, California Institute of Technology . . . . . [6088-44]

1:50 pm: **Selective incision of individual cytoskeletal elements in living cells with a femtosecond laser nanoscissor,** S. Kumar, University of California, Berkeley; I. Maxwell, Harvard Univ.; A. Heisterkamp, Laser Zentrum Hannover e.V.; T. Lele, Childrens Hospital Boston and Harvard Medical School; E. Mazur, D. E. Ingber, ... [6088-45]

2:10 pm: **Laser-Activated Bubbles in Living Cells,** D. Lapotko, A.V. Luikov Heat and Mass Transfer Institute (Belarus) . . . . . [6088-46]

2:30 pm: **Designing of a stage feedback constant force magnetic tweezers microscope,** C. Lee, C. Chien, W. Chen, C. Dong, L. Wen, National Taiwan Univ. (Taiwan) . . . . . [6088-47]

2:50 pm: **Optical trapping investigation on the effects of salicylate on electromechanical properties of plasma membranes,** L. Lee, Baylor College of Medicine; F. Qian, B. Anvari, Rice Univ.; W. E. Brownell, Baylor College of Medicine . . . . . [6088-48]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Testing the optimality of fungal behaviour in microconfined spaces with optical manipulation techniques,** D. V. Nicolau, Swinburne Univ. of Technology (Australia) . . . . . [6088-49]

3:50 pm: **Optical micromanipulation inside the cell: a focus in cell division,** L. Sacconi, Univ. degli Studi di Firenze (Italy); I. M. Tolic-Nørrelykke, Max Planck Institute (Germany); C. Stringari, F. S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6088-50]

4:10 pm: **An all-optical approach to modulate and quantitatively analyse embryo morphogenetic movements by using ultrashort laser pulses,** W. Supatto, Institut Curie (France); D. Débarre, École Polytechnique (France); B. Moulia, Institut National de la Recherche Agronomique (France); E. Farge, Institut Curie (France); E. Beaurepaire, École Polytechnique (France) . [6088-51]

Sunday-Tuesday 22-24 January 2006 • Proceedings of SPIE Vol. 6089

Multiphoton Microscopy in the Biomedical Sciences VI

SPIE and the organizers gratefully acknowledge the following contributors to the conference on Multiphoton Microscopy in the Biomedical Sciences VI: **Carl Zeiss Inc., Chroma Technology Corp., Coherent, High Q Laser, Leica Microsystems, Spectra-Physics Lasers**

Sunday 22 January

Welcome Remarks

Conv. Ctr. A4 . . . . . Sun. 8:30 am

Chair: **Ammasi Periasamy**, Univ. of Virginia

SESSION 1

Conv. Ctr. A4 . . . . . Sun. 8:40 to 9:20 am

Opening Lecture

Chair: **Ammasi Periasamy**, Univ. of Virginia

8:40 am: **Time-resolved nanoscale imaging of biomolecules in single cells and tissues: prospects for small animal imaging,** B. A. Herman, V. K. Ramanujan, V. F. E. Centonze, The Univ. of Texas Health Science Ctr. at San Antonio . . . . . [6089-01]

SESSION 2

Conv. Ctr. A4 . . . . . Sun. 9:20 am to 12:40 pm

FRET, FLIM, FCS

Chair: **Alberto Diaspro**, Univ. degli Studi di Genova (Italy)

9:20 am: **Spectral, lifetime, and anisotropy standards for live-cell multiphoton FRET imaging** *(Invited Paper),* S. V. Koushik, C. Thaler, S. S. Vogel, National Institutes of Health . . . . . [6089-02]

9:50 am: **Spectrally resolved fluorescence lifetime and FRET measurements,** C. U. Biskup, Friedrich-Schiller-Univ. Jena (Germany); L. Kelbauskas, Arizona State Univ.; W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany); K. Benndorf, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6089-03]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Three-dimensional FRET microscopy** *(Invited Paper),* A. D. Hoppe, J. A. Swanson, Univ. of Michigan; S. L. Shorte, Institut Pasteur . . . . . [6089-04]

11:00 am: **Confocal FRET and FLIM microscopy to characterize the distribution of membrane receptors,** H. Wallrabe, A. Periasamy, Univ. of Virginia; C. Kim, R. Talati, Albany Medical College; M. Barroso, Albany Medical Ctr. . . . . [6089-05]

11:20 am: **Improving fluorescence diagnosis of cancer by SLIM,** A. C. Rueck, F. Dolp, I. Kinzler, C. Hauser, C. Scalfi-Happ, Univ. Ulm (Germany) . . . [6089-06]

11:40 am: **Scanning total internal reflection fluorescence lifetime imaging,** A. M. Quirke, Gray Cancer Institute (United Kingdom); S. M. Ameer-Beg, Gray Cancer Institute (United Kingdom) and King's College London (United Kingdom); M. Parsons, T. C. Ng, M. Irving, King's College London (United Kingdom); B. Vojnovic, Gray Cancer Institute (United Kingdom) . . . . . [6089-07]

12:00 pm: **Two-photon spectral imaging microscopy of skin tissues,** J. A. Palero, Univ. Utrecht (Netherlands); H. S. de Bruijn, H. J. Sterenborg, Univ. Medisch Ctr. Rotterdam (Netherlands); H. C. Gerritsen, Univ. Utrecht (Netherlands) . . . . . [6089-08]

12:20 pm: **The LSM 5 family: An integrated imaging and spectroscopic platform for single-molecule detection,** K. Weisshart, B. Zimmermann, Carl Zeiss Jena GmbH (Germany); R. Ankerhold III, Carl Zeiss jena GmbH (Germany); R. Wolleschensky, Carl Zeiss Jena GmbH (Germany) . . . . . [6089-09]

Lunch Break . . . . . 12:40 to 1:50 pm

SESSION 3

Conv. Ctr. A4 . . . . . Sun. 1:50 to 5:50 pm

CARS and Raman Microscopy

Chair: **X. Sunney Xie**, Harvard Univ.

1:50 pm: **Phase-sensitive CARS microscopy** *(Invited Paper),* C. L. Evans, E. O. Potma, X. S. Xie, Harvard Univ. . . . . [6089-10]

2:20 pm: **Tip effects in near-field Raman/CARS microscopy** *(Invited Paper),* S. Kawata, Osaka Univ. (Japan) . . . . . [6089-11]

2:50 pm: **Nonlinear optical imaging of central nervous system** *(Invited Paper, Presentation Only),* J. Cheng, Purdue Univ. . . . . [6089-12]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **CARS microscopy for the monitoring of fat deposition mechanisms in a living organism,** A. M. Enejder, T. Hellerer, P. Hillertz, C. Brackmann, C. Axäng, M. Pilon, Chalmers Tekniska Högskola (Sweden) . . . . . [6089-13]

4:10 pm: **Broadband microscopic CARS imaging: principles and applications** *(Invited Paper),* V. V. Yakovlev, Univ. of Wisconsin/ Milwaukee . . . . . [6089-14]

4:40 pm: **Single molecule detection of biomolecules by surface enhanced coherent anti-Stokes Raman scattering** *(Invited Paper),* T. Koo, S. Chan, A. A. Berlin, Intel Corp. . . . . [6089-15]

5:10 pm: **Compact and turn-key multiple wavelength light sources for CARS microscopy,** W. Seitz, High Q Laser (US) Inc.; D. Kopf, H. Huber, High Q Laser Production GmbH (Austria); I. Rimke, APE GmbH (Germany) [6089-16]

5:30 pm: **Fiber based coherent anti-Stokes Raman scattering endoscope,** F. Legare, F. S. Ganikhanov, X. S. Xie, Harvard Univ. . . . . [6089-17]

✔ Posters-Sunday

Posters will be placed on display from 5:30 pm Sunday afternoon in the hallway near the conference room. A poster session, with authors present at their posters, will be held on Sunday from 6:00 to 7:30 pm.

Poster presenters may post their poster papers Sunday starting at 5:30 pm and will need to remove their papers immediately following the poster session. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

**Presentations included in the student poster competition.*

✔ **Axial elongation in mouse embryos involves mediolateral cell intercalation behavior in the paraxial mesoderm,** W. Yen, Univ. of Virginia; C. Burdsal, Tulane Univ.; A. Periasamy, A. E. Sutherland, Univ. of Virginia . . . . . [6089-57]*

✔ **Metabolic mapping of human breast cell lines via multiphoton fluorescence lifetime imaging of the coenzyme NADH,** L. Yan, K. W. Eliceiri, P. J. Keely, N. Ramanujam, J. G. White, Univ. of Wisconsin/ Madison . . . . . [6089-58]*

✔ **In vivo multiphoton-mediated imaging of corneal tissue with near-infrared femtosecond laser pulses: Corneal optical tomography and its application in refractive surgery,** B. Wang, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6089-59]*

✔ **Two-photon laser scanning microscopy on native cartilage and collagen-membranes for tissue-engineering,** J. Martini, K. Tönsing, M. Dickob, D. Anselmetti, Univ. Bielefeld (Germany) . . . . . [6089-60]*

✔ **Imaging articular cartilage using second harmonic generation microscopy,** J. C. Mansfield, C. P. Winlove, K. M. Knapp, S. J. Matcher, The Univ. of Exeter (United Kingdom) . . . . . [6089-61]*

✔ **Combined two-photon excited fluorescence and second harmonic generation imaging microscopy of collagen structures,** S. Psilodimitrakopoulos, National Technical Univ. of Athens (Greece); G. Filippidis, C. Kouloumentas, Foundation for Research and Technology-Hellas (Greece); D. M. Yova, National Technical Univ. of Athens . . [6089-62]*

✔ **4Pi-SHG imaging of single mammalian myofibrils,** M. Vogel, Ruprecht-Karls-Univ. Heidelberg (Germany); M. Lang, German Cancer Research Ctr. (Germany); S. Schürmann, F. V. Wegner, O. Friedrich, Ruprecht-Karls-Univ. Heidelberg (Germany); J. Engelhardt, S. W. Hell, German Cancer Research Ctr. (Germany); R. H. Fink, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [6089-64]*

✔ **Efficiency of two-photon excitation fluorescence and second harmonic generation with ultrashort pulses,** S. Tang, T. B. Krasieva, Z. Chen, Univ. of California/Irvine; G. Tempea, Femtolasers Produktions GmbH (Austria); B. J. Tromberg, Univ. of California/Irvine . . . . . [6089-65]*

✔ **Direct measurement of absolute molecular two-photon absorption cross-sections by a fluorescence technique,** M. Kauert, J. Ricka, Univ. Bern (Switzerland) . . . . . [6089-66]*

✔ **Fourier transform spectroscopy methods in multiphoton microscopy,** J. P. Ogilvie, École Polytechnique (France) and Univ. of Michigan; E. Beaurepaire, A. Alexandrou, M. Joffre, École Polytechnique (France) . . . . . [6089-67]*

✔ **Second harmonic generation by collagens I and IV: chiroptical and structural effects,** A. PENA, INSERM/CNRS (France) and École Polytechnique (France); T. Boulesteix, T. Dartigalongue, M. Schanne-Klein, École Polytechnique (France) and INSERM/CNRS (France) . . . . . [6089-68]*

✔ **Two-photon fluorescent microlithography for live cell imaging,** S. Costantino, K. G. Heinze, P. W. Wiseman, McGill Univ. (Canada) [6089-70]*

✔ **Quantitative FRET Data Analysis: Protein Localization in Living Specimens,** Y. Chen, Univ. of Virginia . . . . . [6089-71]

✔ **Imaging melanin by two-photon absorption microscopy,** T. Ye, Duke Univ.; G. Yurtsever, M. Fischer, Univ. of Pennsylvania; W. S. Warren, Sr., Duke Univ. and Univ. of Pennsylvania . . . . . [6089-72]

✔ **Microvascular geometry of the intact eye revealed with dual channel multiphoton microscopy,** K. C. Hodgson, R. M. Bateman, K. R. Walley, C. (. van Breemen, The Univ. of British Columbia (Canada) . . . . . [6089-73]

✔ **Evanescent multiphoton-excitation of cells grown on planar waveguides,** T. Anhut, Fraunhofer-Institut für Biomedizinische Technik (Germany); G. L. Duveneck, Zeptosens AG (Switzerland); I. Riemann, K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) [6089-75]

✔ **Structural changes at the cellular and subcellular level in the cerebral cortex of mice visualized by means of trans-cranial multi photon in-vivo microscopy,** P. J. Helm, Univ. of Oslo (Norway) . . . . . [6089-76]

Monday 23 January

SESSION 4

Conv. Ctr. A4 . . . . . Mon. 8:30 am to 12:30 pm

FRET, FLIM, FCS

Chairs: **Keith M. Berland**, Emory Univ.;
Joachim D. Mueller, Univ. of Minnesota

8:30 am: **New fluorescent probes and new perspectives in bioscience** *(Invited Paper),* A. Miyawaki, RIKEN Brain Science Institute (Japan) . . [6089-18]

9:10 am: **Cumulant Analysis in Two-Color Fluorescence Fluctuation Spectroscopy** *(Invited Paper),* B. Wu, J. D. Mueller, Univ. of Minnesota [6089-19]

9:40 am: **Multispectral fluorescence lifetime imaging by TCSPC,** W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany); C. U. Biskup, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6089-20]

10:00 am: **New developments in mirror and filter design,** M. C. Stanley, Chroma Technology Corp. . . . . [6089-21]

Coffee Break . . . . . 10:20 to 10:40 am

10:40 am: **Calibration and analysis of observation volumes in two-photon fluorescence fluctuation spectroscopy** *(Invited Paper),* J. Wu, K. M. Berland, Emory Univ. . . . . [6089-22]

11:10 am: **Fluorescence lifetime imaging of human skin and hair,** A. Ehlers, I. Riemann, T. Anhut, Fraunhofer-Institut für Biomedizinische Technik (Germany); M. Kaatz, P. Elsner, Friedrich-Schiller-Univ. Jena (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6089-23]

11:30 am: **Novel pulsed blue and green laser sources for FLIM and advanced FCS capability,** U. Ortmann, PicoQuant GmbH (Germany) [6089-24]

11:50 am: **Time-resolved multifocal two-photon microscope for biomedical imaging,** A. Deniset, S. Lévêque-Fort, M. P. Fontaine-Aupart, G. Roger, P. M. Georges, Univ. Paris-Sud II (France) . . . . . [6089-25]

12:10 pm: **A comparison on two-photon autofluorescence spectral and lifetime data,** P. Xu, T. Mauro, Univ. of California/San Francisco . . . . [6089-26]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 5

Room: Conv. Ctr. A4 . . . . . Mon. 1:30 to 6:00 pm

Technology Development and Applications I

Chairs: **Warren R. Zipfel**, Cornell Univ.;
Karsten König, Fraunhofer-Institut für Biomedizinische Technik (Germany)

1:30 pm: **Multiphoton tomography of skin cancer** *(Invited Paper),* K. König, I. Riemann, A. Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); R. LeHarzic, Fraunhofer-Institut für Biomedizinische Technik (Germany) and JenLab GmbH (Germany); M. Kaatz, J. Fluhr, P. Elsner, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6089-27]

2:00 pm: **Can electron multiplying CCD technology replace the PMT?,** C. G. Coates, D. J. Denvir, Andor Technology (United Kingdom); M. Robbins, e2v technologies (United Kingdom); J. B. Pawley, Univ. of Wisconsin/ Madison . . . . . [6089-28]

2:20 pm: **Photonic crystal fiber as a tunable light source for visible wavelength two-photon microscopy,** J. A. Palero, V. Boer, J. Vijverberg, Univ. Utrecht (Netherlands); H. J. Sterenborg, Univ. Medisch Ctr. Rotterdam (Netherlands); H. C. Gerritsen, Univ. Utrecht (Netherlands) . . . . . [6089-29]

2:40 pm: **Simultaneous excitation of multiple fluororophores with a compact femtosecond laser,** F. Michel, S. Gueguen, E. P. Mottay, Amplitude Systemes (France); P. Legros, D. Choquet, Univ. Victor Segalen Bordeaux 2 (France) . . . . . [6089-30]

3:00 pm: **New developments in ultrafast lasers for biological applications,** I. A. Read, Spectra-Physics . . . . . [6089-31]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Multiphoton microscopy in cancer research** *(Invited Paper),* W. R. Zipfel, Cornell Univ. . . . . [6089-32]

4:20 pm: **Diffusion of optical clearing agents in skin studied by two photon microscopy,** R. Cicchi, D. Massi, Univ. degli Studi di Firenze (Italy); D. D. Sampson, The Univ. of Western Australia (Australia); R. Sapienza, D. Stambouli, D. S. Wiersma, European Lab. for Non-linear Spectroscopy (Italy) and Univ. degli Studi di Firenze (Italy); F. S. Pavone, Univ. degli Studi di Firenze (Italy) [6089-33]

4:40 pm: **Mapping femtosecond pulse front distortion and GVD in multiphoton microscopy,** I. D. Tullis, S. M. Ameer-Beg, P. R. Barber, V. Rankov, B. Vojnovic, Gray Cancer Institute (United Kingdom) . . . . . [6089-34]

5:00 pm: **Development of a novel multiphoton microscope for 3D functional recording of fast neuronal activity,** D. Reddy, Rice Univ.; P. Saggau, Baylor College of Medicine . . . . . [6089-35]

5:20 pm: **Increasing two-photon fluorescence signals by coherent control,** E. R. Tkaczyk, A. Mignot, J. Y. Ye, T. B. Norris, Univ. of Michigan . . . . [6089-36]

5:40 pm: **Fiber-optic scanning endoscope for multi-photon fluorescence imaging,** M. T. Myaing, D. J. MacDonald, University of Washington; X. Li, Univ. of Washington . . . . . [6089-37]

Tuesday 24 January

SESSION 6

Room: Conv. Ctr. A4 . . . . . Tues. 8:30 am to 12:10 pm

Technology Development and Applications II

Chair: **Peter T. C. So**, Massachusetts Institute of Technology

8:30 am: **T2P-GFP: two-photon photoactivation of PA-GFP in the 720-840 nm spectral region.** *(Invited Paper),* I. Testa, Univ. degli Studi di Genova; M. Schneider, Univ. des Saarlandes (Germany); S. Barozzi, European Institute of Oncology (Italy); G. Vicidomini, Univ. degli Studi di Genova (Italy); D. Parazzoli, M. Faretta, European Institute of Oncology (Italy); A. Diaspro, Univ. degli Studi di Genova (Italy) . . . . . [6089-38]

9:00 am: **High-speed turbid tissue imaging with a multifocal multiphoton microscope based on multianode PMT,** K. H. Kim, K. Bahlmann, P. T. C. So, Massachusetts Institute of Technology . . . . . [6089-39]

9:20 am: **Confocal Microscopy System Performance: Foundations for Calibration, Quantitation and Spectroscopy,** R. M. Zucker, U.S. Environmental Protection Agency; J. Lerner, Lightform . . . . . [6089-40]

9:40 am: **New ultrafast laser system based on the chromium: forsterite offers wavelength alternative to Ti:sapphire,** C. C. Barnes, A. J. Carson, S. E. Egorov, A. A. Ivanov, A. V. Konyshchenko, Del Mar Photonics, Inc. . . . . [6089-41]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Fiberoptic multiphoton excitation microscopy for in vivo optical biopsy: handheld microscopy and endomicroscopy,** D. Kim, P. T. C. So, Massachusetts Institute of Technology . . . . . [6089-42]

10:50 am: **Advances in Lasers for Multiphoton Excitation Microscopy,** C. Dorman, Coherent Scotland Ltd. (United Kingdom) . . . . . [6089-43]

11:10 am: **Multiphoton nanosurgery in cells and tissues,** I. Riemann, F. Stracke, D. Sauer, Fraunhofer-Institut für Biomedizinische Technik (Germany); S. Martin, JenLab GmbH (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6089-45]

11:30 am: **In vivo imaging using a portable 3.9 g 2-photon fluorescence microendoscope,** B. A. Flusberg, Stanford Univ.; J. C. Jung, Oxford Univ. (United Kingdom) and Stanford Univ.; E. D. Cocker, W. Piyawattanametha, M. J. Schnitzer, Stanford Univ. . . . . [6089-46]

11:50 am: **In vivo intrinsic emission spectral imaging microscopy of mouse skin tissues,** J. A. Palero, Univ. Utrecht (Netherlands); H. de Bruijn, A. van der Ploeg van den Heuvel, H. J. Sterenborg, Univ. Medisch Ctr. Rotterdam (Netherlands); H. C. Gerritsen, Univ. Utrecht (Netherlands) . . . . . [6089-47]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7

Room: Conv. Ctr. A4 . . . . . Tues. 1:30 to 5:20 pm

Second Harmonic Generation (SHG)

Chairs: **Guy C. Cox**, The Univ. of Sydney (Australia); **Jerome Mertz**, Boston Univ.

1:30 pm: **Development of an SHG assay as a diagnostic tool in liver cirrhosis** *(Invited Paper),* G. C. Cox, E. P. W. Kable, M. Gorrell, The Univ. of Sydney (Australia) . . . . . [6089-48]

2:00 pm: **Second harmonic generation imaging of normal and diseased states,** P. J. Campagnola, W. A. Mohler, O. Nadiarnykh, S. Plotnikov, Univ. of Connecticut Health Ctr. . . . . [6089-49]

2:20 pm: **Multiphoton autofluroescence and second harmonic generation (SHG) mapping across an entire mouse cornea,** W. Lo, S. Teng, National Taiwan Univ. (Taiwan); H. Tan, National Taiwan Univ. (Taiwan) and Chang Gung Memorial Hospital (Taiwan); K. Kim, Massachusetts Institute of Technology; H. Lee, National Taiwan Univ. (Taiwan) and National Taiwan Univ. Hospital (Taiwan); Y. F. Chen, National Taiwan Univ. (Taiwan); P. T. C. So, Massachusetts Institute of Technology; C. Dong, National Taiwan Univ. (Taiwan) . . . . [6089-50]

2:40 pm: **Multiphoton biopsy of cancerous tissues,** C. C. Wang, F. C. Li, W. Lo, S. Kuo, C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6089-51]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Thick-tissue imaging with autoconfocal microscopy** *(Invited Paper),* K. Chu, J. Mertz, Boston Univ. . . . . [6089-52]

4:00 pm: **Time dependence of the voltage-sensitivity of second harmonic generation from styryl dyes,** A. C. Millard, L. Jin, L. M. Loew, Univ. of Connecticut Health Ctr. . . . . [6089-53]

4:20 pm: **Structure sensitivity in third-harmonic generation (THG) microscopy of live Drosophila embryos,** D. Débarre, École Polytechnique/CNRS (France); W. Supatto, Institut Curie/CNRS (France); E. Beaurepaire, École Polytechnique/CNRS (France) and INSERM (France) . . . . . [6089-54]

4:40 pm: **Functional imaging of muscle cells by second hamonic generation,** V. Nucciotti, L. Sacconi, M. Linari, V. Lombardi, G. Piazzesi, N. Piroddi, C. Poggesi, C. Tesi, F. Vanzi, F. S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6089-55]

5:00 pm: **Scanning multiphoton microscopy of SHG signals from single myofibrils of mammalian skeletal muscle,** M. Vogel, S. Schürmann, O. Friedrich, F. V. Wegner, M. Both, R. H. Fink, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [6089-56]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6090

Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIII

Conference Chairs: **Jose-Angel Conchello**, Oklahoma Med RES Found; **Carol J. Cogswell**, Univ. of Colorado at Boulder; **Tony Wilson**, Univ. of Oxford (United Kingdom)

Program Committee: **G. J. Brakenhoff**, Univ. van Amsterdam (Netherlands); **Thomas G. Brown**, Univ. of Rochester; **Mats G. Gustafsson**, Univ. of California/San Francisco; **Gordon S. Kino**, Stanford Univ.; **Eithne M. McCabe**, The Univ. of Dublin, Trinity College (Ireland); **Rudolf Oldenbourg**, Marine Biological Lab.

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Multi-wavelength phase imaging interference microscopy,** N. Warnasooriya, M. K. Kim, Univ. of South Florida . . . . . [6090-29]

✔ **Use of Bessel beams and position-sensitive detectors in scanning photon microscope for improved field depth and contrast,** A. T. Khmaladze, M. K. Kim, Univ. of South Florida . . . . . [6090-30]

✔ **Optimum condition for high-quality 3D reconstruction in confocal scanning microscopy,** T. Kim, T. J. Kim, S. W. Lee, D. Gweon, Korea Advanced Institute of Science and Technology (South Korea) . . . . [6090-32]

✔ **Effect of bead size on measuring PSF,** H. Yoo, I. Song, D. G. Gweon, Korea Advanced Institute of Science and Technology (South Korea) . . . . [6090-34]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday 25 January

SESSION 1

Conv. Ctr. A5 . . . . . Wed. 8:50 to 10:10 am

Recent Advances In Confocal Microscopy

Chair: **Jose-Angel Conchello**, Oklahoma Medical Research Foundation

8:50 am: **Design, construction, and application of a new hyperspectral confocal microscope,** M. B. Sinclair, D. M. Haaland, J. A. Timlin, H. D. Jones, Sandia National Labs. . . . . [6090-01]

9:10 am: **Slit-scanning confocal Raman microscopy for observation of living cells,** K. Fujita, K. Hamada, M. Kobayashi, Osaka Univ. (Japan); M. Roy, The Univ. of Sydney (Australia); S. Kawata, Osaka Univ. (Japan) . . . . . [6090-02]

9:30 am: **FDTD Simulation of a theta-line scanning confocal microscope,** B. Simon, C. A. DiMarzio, Northeastern Univ. . . . . [6090-03]

9:50 am: **A dual-axes reflectance confocal microscope for diagnosing neoplasia in colonic mucosa,** J. T. Liu, M. J. Mandella, G. S. Kino, C. H. Contag, T. D. Wang, Stanford Univ. . . . . [6090-04]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Conv. Ctr. A5 . . . . . Wed. 10:40 am to 12:20 pm

Tomographic Methods in Microscopy

Chair: **Gordon S. Kino**, Stanford Linear Accelerator Center

10:40 am: **Flexible technologies for high-speed confocal live cell imaging,** R. Ankerhold, B. Zimmermann, R. Wolleschensky, Carl Zeiss Jena GmbH (Germany) . . . . . [6090-06]

11:00 am: **Highly confined depth focus for Fourier domain optical coherence microscopy,** R. A. Leitgeb, L. Steinmann, C. Imboden, A. H. Bachmann, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6090-07]

11:20 am: **Tomographic hyperspectral microscope without a missing cone,** M. E. Gehm, D. J. Brady, Duke Univ. . . . . [6090-08]

11:40 am: **Tomographic imaging of retinal tissues by wavelength scanning digital interference holography,** M. Potcoava, M. K. Kim, Univ. of South Florida . . . . . [6090-09]

12:00 pm: **Biological cell (pollen grain) refractive index tomography with digital holographic microscopy,** F. Charrière, École Polytechnique Fédérale de Lausanne (Switzerland); E. Cuche, LynceeTec SA (Switzerland); P. P. Marquet, Univ. de Lausanne (Switzerland); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6090-10]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 3

Conv. Ctr. A5 . . . . . Wed. 1:40 to 3:40 pm

Imaging Phase Specimens I

Chair: **Mats G. Gustafsson**, Univ. of California/San Francisco

1:40 pm: **Accurate cell counts in live mouse embryos using optical quadrature and differential interference contrast microscopy,** W. C. Warger II, J. A. Newmark, B. Zhao, C. M. Warner, C. A. DiMarzio, Northeastern Univ. . . . . [6090-11]

2:00 pm: **Three-dimensional measurement of microorganism by retardation modulated differential interference contrast,** G. Aoki, M. Itoh, Y. Yasuno, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6090-12]

2:20 pm: **Quantitative phase-contrast microscopy by angular spectrum digital holography,** C. J. Mann, M. K. Kim, Univ. of South Florida . . . [6090-13]

2:40 pm: **A new technique for reconstruction of 3D images of cells,** I. Lyuboshenko, Phasique, Telecom Paris (France); C. Laplace-Builhé, Généthon (France); J. Vonesch, Univ. Louis Pasteur (France) and IGBMC - Inst of Genetics and Molecular and Cell Biology; H. Maître, École Nationale Supérieure des Télécommunications (France) . . . . . [6090-33]

3:00 pm: **The truth about DIC microscopy: asymmetry of the phase gradient transfer function,** S. V. King, Univ. of Colorado/Boulder; C. J. Cogswell, Univ. of Colorado/Boulder and CDM Optics, Inc. . . . . [6090-14]

3:20 pm: **Algorithms for extracting true phase from rotationally-diverse and phase-shifted DIC images,** C. Preza, Washington Univ.; S. V. King, C. J. Cogswell, Univ. of Colorado/ Boulder . . . . . [6090-05]

Coffee Break . . . . . 3:40 to 4:10 pm

SESSION 4

Conv. Ctr. A5 . . . . . Wed. 4:10 to 5:30 pm

Imaging Phase Specimens II

Chair: **Rudolf Oldenbourg**, Marine Biological Lab.

4:10 pm: **Measuring the surface topography at focal adhesions using laser feedback interferometry,** B. Ovryn, Albert Einstein College of Medicine; M. Bambino, The Cooper Union for the Advancement of Science & Art [6090-15]

4:30 pm: **Investigation of 3D microscopy using intensity diffraction tomography,** Y. Huang, M. A. Anastasio, Illinois Institute of Technology; G. Gbur, The Univ. of North Carolina at Charlotte; P. S. Carney, Univ. of Illinois at Urbana-Champaign . . . . . [6090-16]

4:50 pm: **Adaptive optics for microscopy, micromachining and optical data storage,** T. Wilson, Univ. of Oxford (United Kingdom) . . . . . [6090-17]

5:10 pm: **Dynamic structured illumination microscopy: Focused imaging and optical sectioning of moving objects,** L. Krzewina, M. K. Kim, Univ. of South Florida . . . . . [6090-31]

Thursday 26 January

SESSION 5

Conv. Ctr. A5 . . . . . Thurs. 8:30 to 10:10 am

Microscope Characterization and New Methods in Non-Confocal Microscopy

Chair: **Thomas G. Brown**, Univ. of Rochester

8:30 am: **A novel stochastic resolution criterion for fluorescence microscopes,** S. Ram, The Univ. of Texas Southwestern Medical Ctr. at Dallas and The Univ. of Texas at Arlington; E. S. Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas; R. J. Ober, The Univ. of Texas at Dallas and The Univ. of Texas Southwestern Medical Ctr. at Dallas . . . . . [6090-18]

8:50 am: **A study of Gaussian approximations of fluorescence microscopy PSF models,** B. Zhang, Institut Pasteur (France) and École Nationale Supérieure des Télécommunications (France); J. B. Zerubia, Institut National de Recherche en Informatique et en Automatique (France); J. Olivo-Marin, Institut Pasteur (France) . . . . . [6090-19]

9:10 am: **Simultaneous imaging of several focal planes in fluorescence microscopy for the study of cellular dynamics in 3D,** P. Prabhat, The Univ. of Texas at Dallas and The Univ. of Texas Southwestern Medical Ctr. at Dallas; S. Ram, The Univ. of Texas Southwestern Medical Ctr. at Dallas and The Univ.of Texas at Arlington; E. S. Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas; R. J. Ober, The Univ. of Texas at Dallas and The Univ.of Texas Southwestern Medical Ctr. at Dallas . . . . . [6090-20]

9:30 am: **Quasi-confocal optical sectioning with speckle illumination,** C. Ventalon, J. Mertz, Boston Univ. . . . . [6090-21]

9:50 am: **A new approach to extended focus for high-speed, high-resolution biological microscopy,** S. R. L. Abrahamsson, M. G. Gustafsson, Univ. of California/San Francisco . . . . . [6090-22]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Conv. Ctr. A5 . . . . . Thurs. 10:40 am to 12:40 pm

Deconvolution and Related Methods and Novel Methods in Microsocpy

Chair: **Carol J. Cogswell**, Univ. of Colorado at Boulder

10:40 am: **Multiphoton imaging of basal cell carcinoma (BCC),** R. Cicchi, P. Carli, D. Massi, S. Sestini, D. Stambouli, F. S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6090-23]

11:00 am: **3D deconvolution of adaptive-optics corrected retinal images,** G. Chenegros, L. M. Mugnier, ONERA (France); M. Glanc, Observatoire de Paris (France); F. Lacombe, Mauna Kea Technologies (France) . . . . . [6090-24]

11:20 am: **Image enhancement for digital visualization of 3D integral imaging,** R. Ponce-Diaz, M. B. Alvarez-Elizondo, J. A. Sáenz, Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico); B. Javidi, Univ. of Connecticut . . . . . [6090-25]

11:40 am: **Image estimation for structured illumination microscopy II: a better way to make a good thing better,** J. Conchello, Oklahoma Medical Research Foundation . . . . . [6090-26]

12:00 pm: **Three-dimensional imaging using spectral encoding heterodyne interferometry,** D. Yelin, S. H. Yun, J. T. Motz, B. E. Bouma, G. J. Tearney, Harvard Medical School and Wellman Ctr. for Photomedicine . . . . . [6090-27]

12:20 pm: **Closing the spectral gap,** R. T. Borlinghaus, Leica Microsystems Heidelberg GmbH (Germany) . . . . . [6090-28]

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Optical Biopsy VI

Conference Chairs: **Robert R. Alfano**, CUNY/City College; **Alvin Katz**, CUNY/City College

Program Committee: **Stavros G. Demos**, Lawrence Livermore National Lab.; **Amir H. Gandjbakhche**, National Institutes of Health; **Israel Gannot**, National Institutes of Health; **Richard B. Rosen**, New York Eye and Ear Infirmary; **Urs Utzinger**, The Univ. of Arizona; **Wubao B. Wang**, City College/CUNY

Tuesday 24 January

SESSION 1

Conv. Ctr. C1 . . . . . Tues. 9:10 am to 12:00 pm

Fluorescence Detection

Chair: **Alvin Katz**, City College/CUNY

9:10 am: **Clinical device for early detection of ovarian cancer using optical spectroscopy,** R. George, College of Optical Sciences/The Univ. of Arizona; R. Krishnamurthy, Rice Univ.; B. Lovisa, N. D. Kirkpatrick, U. Utzinger, The Univ. of Arizona . . . . . [6091-01]

9:30 am: **Development of fluorescence and near-IR emission wing spectroscopy microendoscope for the breast cancer ductoscopy,** I. Zeylikovich, Y. BudansKy, A. Katz, G. C. Tang, R. R. Alfano, City College/CUNY . . . . . [6091-02]

9:50 am: **In vivo spectroscopic monitoring of renal ischemia and reperfusion in a rat model,** R. N. Raman, C. D. Pivetti, D. L. Matthews, C. Troppmann, Univ. of California/Davis; S. G. Demos, Lawrence Livermore National Lab. and Univ. of California/Davis . . . . . [6091-03]

10:10 am: **Extraction of intrinsic fluorescence and simultaneous evaluation of optical parameters from tissue mimicking model media - a spatially resolved fluorescence technique,** A. Pradhan, V. S. Raja, S. Gupta, Indian Institute of Technology/Kanpur (India) . . . . . [6091-04]

Coffee Break . . . . . 10:30 to 11:00 am

11:00 am: **A scanning system for fluorescence lifetime imaging,** M. Hassan, I. Gannot, V. V. Chernomordik, P. D. Smith, R. Pursley, A. H. Gandjbakhche, National Institutes of Health . . . . . [6091-05]

11:20 am: **Hybrid native fluorescence and phosphorescence spectroscopy for cancer detection,** A. Alimova, A. Katz, V. Sriramoju, Y. Budansky, A. A. Bykov, R. Zelikovitch, R. R. Alfano, City College/CUNY . . . . . [6091-06]

11:40 am: **Dye-Enhanced Reflectance and Fluorescence Confocal Microscopy as an Optical Pathology Tool,** A. N. Yaroslavsky, Massachusetts General Hospital; E. V. Salomatina, J. Novak, Wellman Ctr. for Photomedicine; V. Neel, Massachusetts General Hospital . . . . . [6091-07]

Lunch Break . . . . . 12:00 to 1:20 pm

SESSION 2

Conv. Ctr. C1 . . . . . Tues. 1:20 to 2:20 pm

Polarization

Chair: **Israel Gannot**, National Institutes of Health

1:20 pm: **Polarized light scattering characterization of cancerous cells,** E. A. Vitol, T. P. Kurzweg, B. Nabet, Drexel Univ. . . . . [6091-10]

1:40 pm: **Time-resolved ring structure of backscattered circularly polarized beams from forward scattering media,** K. G. Phillips, M. Xu, S. K. Gayen, R. R. Alfano, City College/CUNY . . . . . [6091-11]

2:00 pm: **Polarization based optical sectioning of multilayer cell patterns,** S. Gupta, D. J. Cho, J. C. Ye, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6091-12]

SESSION 3

Conv. Ctr. C1 . . . . . Tues. 2:20 to 5:10 pm

OCT/Scattering/NLO/Imaging

Chair: **Stavros G. Demos**, Lawrence Livermore National Lab.

2:20 pm: **In vivo spatiotemporal multiphoton and second harmonic generation microscopy of epithelial carcinogenesis,** T. Shilagard, J. Sun, M. Motamedi, G. Vargas, The Univ. of Texas Medical Branch at Galveston . . . . . [6091-13]

2:40 pm: **Noncontact diagnosis of tissue elasticity by means of measurement of Brillouin scattering,** T. Hasegawa, Sumitomo Electric Industries, Ltd. (Japan); R. Nakamura, H. Iseki, Tokyo Women's Medical Univ. (Japan) . . . . . [6091-14]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Early-stage diagnosis of cervix using PS-OCT,** J. y. Yoo, S. Lee, M. Kang, Y. T. Kim, B. Kim, Yonsei Univ. (South Korea) . . . . . [6091-15]

3:50 pm: **Fractal mechanism of light scattering for tissue optical biopsy,** M. Xu, M. Alrubaiee, S. K. Gayen, R. R. Alfano, City College/CUNY . . [6091-16]

4:10 pm: **Effects of the anisotropy factor of scattering and the finite spatial coherence length of light source on enhanced backscattering,** P. Pradhan, Y. L. Kim, H. Subramanian, V. Backman, Northwestern Univ. . . . . [6091-17]

4:30 pm: **Real-time imaging of tissue microstructures using intrinsic optical signatures,** B. Lin, C. A. Lieber, D. L. Matthews, R. Ramsamooj, Univ. of California/Davis; S. G. Demos, Lawrence Livermore National Lab. and Univ. of California/Davis . . . . . [6091-18]

4:50 pm: **Development of optical biopsy system for small experimental animals,** H. Sato, Y. Hattori, Y. Oshima, The Institute of Physical and Chemical Research (RIKEN) (Japan); Y. Komachi, Machida Endoscope Co., Ltd. (Japan) and The Institute of Physical and Chemical Research (RIKEN) (Japan); T. Katagiri, The Institute of Physical and Chemical Research (RIKEN) (Japan); T. Asakura, Tohoku Univ. (Japan) and Miyagi Gakuin Woman's Univ. (Japan); T. Shimosegawa, Y. Matsuura, Tohoku Univ. (Japan); M. Miyagi, Sendai National College of Technology (Japan); G. Kanai, Machida Endoscope Co., Ltd. (Japan); N. Ura, Soma Optics, Ltd. (Japan); K. Masutani, Micro Science Inc. (Japan); H. Tashiro, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6091-21]

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

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✔ **Hyperspectral microscopic analysis of normal, adenoma and carcinoma microarray tissue sections,** M. Maggioni, G. L. Davis, Yale Univ.; F. J. Warner, Plain Sight Systems, Inc. and Yale Univ.; F. B. Geshwind, A. C. Coppi, R. A. DeVerse, Plain Sight Systems, Inc.; R. R. Coifman, Plain Sight Systems, Inc. and Yale Univ. . . . . [6091-19]

✔ **Spatially-modulated photon density waves in heterogeneous turbid media: finite-element modeling and phantom experiments,** M. Pugh, Univ. of California/Irvine and Harvey Mudd College; D. J. Cuccia, A. Li, A. J. Durkin, F. P. Bevilacqua, B. J. Tromberg, Univ. of California/Irvine . [6091-20]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Conference 6092 • Room: Conv. Ctr. A7

Saturday 21 January 2006 • Proceedings of SPIE Vol. 6092

Ultrasensitive and Single-Molecule Detection Technologies

Conference Chairs: **Jörg Enderlein**, Forschungszentrum Jülich (Germany); **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

Program Committee: **Maxime Dahan**, Ecole Normale Superieure (France); **Sabato D'Auria**, Consiglio Nazionale delle Ricerche (Italy); **Ewa M. Goldys**, Macquarie Univ. (Australia); **Johan Hofkens**, Katholieke Univ. Leuven (Belgium); **Borys Kierdaszuk**, Warsaw Univ. (Poland); **Gabor Laczko**, Univ. of Szeged (Hungary); **Joseph A. Miragliotta**, Johns Hopkins Univ.; **Teresa N. Petersen**, Univ. of Aalborg (Denmark); **Markus Sauer**, Univ. Bielefeld (Germany); **Andong Xia**, Institute of Chemistry (China)

Saturday 21 January

SESSION 1

Conv. Ctr. A7 . . . . . Sat. 8:40 to 10:00 am

Chair: **Jörg Enderlein**, Forschungszentrum Jülich (Germany)

8:40 am: **Single molecule studies with TIR-FCS** *(Invited Paper),* K. Hassler, Ecole Polytechnique Fédérale de Lausanne (Switzerland); P. Rigler, Univ. Basel (Switzerland); R. Rigler, M. Gösch, Ecole Polytechnique Fédérale de Lausanne (Switzerland); J. Widengren, Kungliga Tekniska Högskolan (Sweden); T. Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6092-01]

9:00 am: **Single molecule spectroscopy: approaches for the investigation of biomolecular complexes within cells,** D. Siegberg, P. I. Heinlein, C. M. Roth, D. Herten, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [6092-02]

9:20 am: **Two focus FCS,** T. Dertinger, Forschungszentrum Jülich (Germany) and PicoQuant GmbH (Germany); B. Krämer, PicoQuant GmbH (Germany); I. Gregor, Forschungszentrum Jülich (Germany); F. Koberling, R. Erdmann, PicoQuant GmbH (Germany); J. Enderlein, Forschungszentrum Jülich (Germany) . . . . . [6092-03]

9:40 am: **Multiparametric detection of the one and two-photon excited fluorescence of single molecules of a super folder green fluorescence protein,** M. Cotlet, P. M. Goodwin, G. S. Waldo, J. H. Werner, Los Alamos National Lab. . . . . [6092-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Conv. Ctr. A7 . . . . . Sat. 10:30 am to 12:20 pm

Chair: **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

10:30 am: **Three-dimension tracking of fluorescent particles** *(Invited Paper),* G. A. Lessard, P. M. Goodwin, J. H. Werner, Los Alamos National Lab. [6092-05]

11:00 am: **Fluorescence resonance energy transfer enhanced luminescence (FRETEL) of Quantum Dyes(r),** R. C. Leif, Newport Instruments; M. C. Becker, Phoenix Flow Systems; A. J. Bromm, Jr., L. M. Vallarino, Virginia Commonwealth Univ.; S. Yang, Newport Instruments . . . . . [6092-06]

11:20 am: **Single molecule electron transfer process of ruthenium complexes,** D. Hu, P. Lu, Pacific Northwest National Lab. . . . . [6092-07]

11:40 am: **Improved single pair FRET measurements through pulsed interleaved excitation, time-correlated single photon counting and fluorescence correlation spectroscopy,** B. Kraemer, PicoQuant GmbH (Germany); S. Ruettinger, Physikalisch-Technische Bundesanstalt (Germany); M. Roos, Robert Koch-Institut (Germany); F. Koberling, M. Patting, M. Wahl, U. Ortmann, R. Erdmann, PicoQuant GmbH (Germany) . . . . . [6092-08]

12:00 pm: **Combined TIRF-AFM setup: controlled quenching of individual quantum dots,** R. Eckel, V. Walhorn, Bielefeld Univ. (Germany); T. Nann, Albert-Ludwigs-Univ. Freiburg (Germany); D. Anselmetti, R. Ros, Bielefeld Univ. (Germany) . . . . . [6092-09]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 3

Conv. Ctr. A7 . . . . . Sat. 1:30 to 3:20 pm

Chair: **Dirk-Peter Herten**, Ruprecht-Karls-Univ. Heidelberg (Germany)

1:30 pm: **Photothermal heterodyne imaging: single nanoparticles absorption spectroscopy and DNA microarrays with improved signal dynamics** *(Invited Paper),* L. Cognet, G. Blab, S. Berciaud, B. Lounis, Univ. Bordeaux 1 (France) . . . . . [6092-10]

2:00 pm: **Highly efficient fluorescence-based biochip,** T. Ruckstuhl, R. Blue, N. Kent, S. Spillman, H. M. McEvoy, C. M. McDonagh, B. D. MacCraith, Dublin City Univ. (Ireland) . . . . . [6092-11]

2:20 pm: **Advances in the development of a novel method to be used in proteomics using metallic nanoparticles,** H. R. C. Dietrich, I. T. Young, Y. Garini, Delft Univ. of Technology (Netherlands) . . . . . [6092-12]

2:40 pm: **Levitated droplet dye laser: a new approach for single molecule detection,** H. Azzouz, Danmarks Tekniske Univ. (Denmark); L. Alkhafadiji, Lunds Univ. (Sweden); J. Johansson, AstraZeneca R&D Mölndal (Sweden); N. A. Mortensen, Danmarks Tekniske Univ. (Denmark); S. Nilsson, Lunds Institute of Technology (Sweden); A. Kristensen, Danmarks Tekniske Univ. (Denmark) . . . . . [6092-13]

3:00 pm: **Dynamic saturation optical microscopy,** J. Enderlein, T. Dertinger, Forschungszentrum Jülich (Germany) . . . . . [6092-14]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Conv. Ctr. A7 . . . . . Sat. 3:50 to 4:30 pm

Chair: **Michael Börsch**, Univ. Stuttgart (Germany)

3:50 pm: **Novel detectors and electronics for single photon counting, fluorescence lifetime imaging, fluorescence correlation spectroscopy and combination of these techniques,** R. Erdmann, PicoQuant GmbH (Germany); J. Enderlein, Forschungszentrum Jülich (Germany); R. Biasi, Microgate S.r.l. (Italy) . . . . . [6092-15]

4:10 pm: **Ultrasensitive detection of protein-ligand interaction by porous silicon high Q factor microcavities,** L. De Stefano III, L. Rotiroti, I. Rea, I. Rendina, Istituto per la Microelettronica e Microsistemi (Italy); S. D'Auria, V. Scogniamiglio, M. Rossi, Consiglio Nazionale delle Ricerche (Italy) [6092-16]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Sunday 22 January

SESSION 5

Conv. Ctr. A7 . . . . . Sun. 8:30 to 10:20 am

Chair: **Xavier Michalet**, Univ. of California/Los Angeles

8:30 am: **Three-dimension localization of the a-subunit in F0F1-ATP synthase by time resolved single-molecule FRET** *(Invited Paper),* M. Börsch, Univ. Stuttgart (Germany); S. D. Dunn, Univ. of Western Ontario (Canada); B. Zimmermann, Albert-Ludwigs-Univ. Freiburg (Germany); N. Zarrabi, Univ. Stuttgart (Germany); Y. Bi, Univ. of Western Ontario (Canada); M. Düser, Univ. Stuttgart (Germany) . . . . . [6092-18]

9:00 am: **Probing dynamics of individual biomolecules by single molecule spectroscopy,** W. Verheijen, H. Ujii, C. Flors, J. Hotta, J. Hofkens, Katholieke Univ. Leuven (Belgium) . . . . . [6092-34]

9:20 am: **Highly sensitive rapid fluorescence detection of protein residues on surgical instruments,** V. I. Kovalev, J. S. Barton, Heriot-Watt Univ. (United Kingdom); P. P. Richardson, A. C. Jones, The Univ. of Edinburgh (United Kingdom) . . . . . [6092-20]

9:40 am: **Ultrasensitive detection in optically dense physiological media: applications to fast reliable biological assays,** E. G. Matveeva, I. Gryczynski, J. R. Lakowicz, Z. K. Gryczynski, Univ. of Maryland/Baltimore . . . . . [6092-21]

10:00 am: **Silicon photon multipliers for improved biomolecule detection,** M. M. Sheehan, Tyndall National Institute (Ireland); J. C. Jackson, SensL Technologies Ltd. (Ireland); M. MacSweeney, F. Lin, M. Manning, Tyndall National Institute (Ireland); A. Mathewson, Tyndall National Institute (Ireland) and SensL Technologies Ltd. (Ireland) . . . . . [6092-19]

Coffee Break . . . . . 10:20 to 10:40 am

SESSION 6

Conv. Ctr. A7 . . . . . Sun. 10:40 am to 12:30 pm

Chair: **Jörg Enderlein**, Forschungszentrum Jülich (Germany)

10:40 am: **A time- and space-resolved single-photon counting detector for fluorescence microscopy and spectroscopy** *(Invited Paper),* X. Michalet, Univ. of California/Los Angeles; O. H. W. Siegmund, J. V. Vallerga, P. Jelinsky, Univ. of California/Berkeley; J. E. Millaud, Lawrence Livermore National Lab.; S. Weiss, Univ. of California/Los Angeles . . . . . [6092-22]

11:10 am: **Protein profile study of the ovarian cancer using HPLC-LIF,** S. Chidangil, Manipal Academy of Higher Education (India) . . . . . [6092-23]

11:30 am: **Surface immobilized antibody-antigen binding affinity studies by single molecule fluorescence imaging,** J. P. Temirov, A. Bradbury, J. H. Werner, Los Alamos National Lab. . . . . [6092-24]

11:50 am: **Development of ultrafast single photon counting imager for single molecule imaging,** K. Arisaka, Univ. of California/Los Angeles [6092-25]

12:10 pm: **Handle single molecule tethering molecules on functionalized AFM tips,** Z. Xiao, Z. Lu, Southeast Univ. (China); C. Cai, Univ. of Houston . . . . . [6092-26]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 7

Conv. Ctr. A7 . . . . . Sun. 1:30 to 3:50 pm

Chair: **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

1:30 pm: **Bioassay platform for fiber-coupled avalanche photodiode for improved biomolecule detection,** M. MacSweeney, Tyndall National Institute (Ireland); M. M. Sheehan, TYndall National Institute (Ireland); J. C. Jackson, SensL Technologies Ltd. (Ireland); F. Lin, M. Manning, Tyndall National Institute (Ireland); A. Mathewson, SensL Technologies Ltd. (Ireland) and Tyndall National Institute (Ireland) . . . . . [6092-27]

1:50 pm: **Minimization of detection volume by surface plasmon-coupled emission,** Z. K. Gryczynski, Univ. of Maryland/Baltimore; J. Borejdo, Univ. of North Texas; N. Calander, Chalmers Univ. of Technology (Sweden); R. Grygorczyk, Univ. de Montréal (Canada); J. M. Harper, Univ. of New Hampshire; I. Gryczynski, Univ. of Maryland/Baltimore . . . . . [6092-35]

2:10 pm: **Spectral-domain optical coherence reflectometry for highly sensitive detection of biological and chemical species,** C. Joo, T. Akkin, B. Cense, B. H. Park, M. Mujat, J. F. de Boer, Massachusetts General Hospital . . . . . [6092-29]

2:30 pm: **Demonstration of sub-femtomole sensitivity for small molecules with microsphere ring resonator sensors,** I. M. White, N. M. Hanumegowda, X. Fan, Univ. of Missouri/Columbia . . . . . [6092-30]

2:50 pm: **Protein profile study of the cancer of the cervix using HPLC-LIF,** S. Chidangil, Manipal Academy of Higher Education (India) . . . . . [6092-31]

3:10 pm: **EMCCD ultrasensitive spectroscopic solutions,** C. G. Coates, O. Bernard, D. Denvir, Andor Technology (United Kingdom) . . . . . [6092-32]

3:30 pm: **Novel sensor for ultrasensitive and single-molecule detection,** K. Linga, E. E. Godik, J. Krutov, Amplification Technologies, Inc. . . . . [6092-33]

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

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✔ **Identification of triplet state and photoisomerization by means of ensemble and single-molecule measurements,** A. Xia, Z. Huang, S. Wang, Institute of Chemistry (China); F. Koberling, M. Patting, R. Erdmann, PicoQuant GmbH (Germany) . . . . . [6092-17]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Saturday-Sunday 21-22 January 2006 • Proceedings of SPIE Vol. 6093

Biomedical Vibrational Spectroscopy III: Advances in Research and Industry

Conference Chairs: **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **Wolfgang H. Petrich**, Roche Diagnostics GmbH (Germany)

Program Committee: **Andrew J. Berger**, Univ. of Rochester; **Lin-P'ing Choo-Smith**, National Research Council Canada (Canada); **Armin Lambrecht**, Fraunhofer-Institut für Physikalische Messtechnik (Germany); **Dieter Naumann**, Robert Koch Institut (Germany); **Juergen Popp**, Friedrich-Schiller-Univ. Jena (Germany)

Saturday 21 January

SESSION 1

Conv. Ctr. C3 . . . . . Sat. 1:00 to 3:20 pm

Detection of Analytes

Chair: **Lin-P'ing Choo-Smith**, National Research Council Canada (Canada)

1:00 pm: **Cells and biofluids analysed in aqueous environment by infrared spectroscopy,** D. Naumann, P. Lasch, H. Fabian, Robert Koch-Institut (Germany) . . . . . [6093-01]

1:20 pm: **Blood compatibility of artificial blood vessels probed by infrared spectroscopic imaging,** G. Steiner, Technische Univ. Dresden (Germany); M. Maitz, Southwest Jiaotong Univ. (China); S. Tunc, Akdeniz Univ. (Turkey); R. Salzer, Technische Univ. Dresden (Germany) . . . . . [6093-02]

1:40 pm: **Reliable long-term continuous blood glucose monitoring for patients in critical care using microdialysis and infrared spectrometry,** H. M. Heise, U. Damm, V. R. Kondepati, Univ. Dortmund (Germany) . . [6093-03]

2:00 pm: **Vibrational spectroscopy as a routine tool for the quantitative analysis of serum?,** D. Rohleder, Roche Diagnostics GmbH (Germany) and Univ. Würzburg (Germany); G. Kocherscheidt, K. Gerber, Dioptic GmbH (Germany); W. Kiefer, Univ. Würzburg (Germany); W. Koehler, BaseLine GbR (Germany); J. Moecks, W. Petrich, Roche Diagnostics GmbH (Germany) . . . . . [6093-04]

2:20 pm: **Noninvasive in vivo tissue and pulse modulated Raman spectroscopy of human capillary blood and plasma,** J. Chaiken, E. D. Voss, K. Ellis, Syracuse Univ. . . . . [6093-05]

2:40 pm: **Biological analyte concentration prediction using corrected liquid core optical fiber Raman spectroscopy,** D. Qi, Univ. of Rochester . [6093-06]

3:00 pm: **UV-resonance-Raman studies of blood plasma of patients with septic shock,** J. Popp, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6093-42]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 2

Conv. Ctr. C3 . . . . . Sat. 3:50 to 5:10 pm

Technical Advances in Vibrational Spectroscopy

Chair: **Juergen Popp**, Friedrich-Schiller-Univ. Jena (Germany)

3:50 pm: **Terahertz characterization of diluted DNA solutions,** T. Globus, T. Khromova, B. L. Gelmont, Univ. of Virginia; D. L. Woolard, Army Research Lab.; L. K. Tamm, Univ. of Virginia . . . . . [6093-07]

4:10 pm: **Refractive index-mismatched in coherent anti-Stokes Raman scattering (CARS) microscopy,** H. Rigneault, N. Djaker, D. Gachet, P. Lenne, Institut Fresnel (France) . . . . . [6093-08]

4:30 pm: **Molecular level studies of interfacial protein and peptide structures using sum frequency generation vibrational spectroscopy,** Z. Chen, Univ. of Michigan . . . . . [6093-09]

4:50 pm: **New infrared sources for breath analysis,** A. Lambrecht, M. Braun, S. Hartwig, J. Nurnus, J. Wöllenstein, Fraunhofer-Institut für Physikalische Messtechnik (Germany) . . . . . [6093-11]

BiOS Hot Topics

7:00 to 9:30 pm · Convention Center: Room J2/J3

See p. 12 for more information.

Sunday 22 January

SESSION 3

Conv. Ctr. C3 . . . . . Sun. 8:00 to 10:20 am

Cellular and Molecular Applications

Chair: **Armin Lambrecht**, Fraunhofer-Institut für Physikalische Messtechnik (Germany)

8:00 am: **Near-infrared Raman spectroscopy of oral bacteria,** A. J. Berger, Q. Zhu, R. G. Quivey, Univ. of Rochester . . . . . [6093-12]

8:20 am: **Rapid identification of single microbes by various Raman spectroscopic techniques,** J. Popp, P. Rösch, M. Harz, M. Schmitt, Friedrich-Schiller-Univ. Jena (Germany); K. Peschke, O. Ronneberger, H. Burkhardt, Albert-Ludwigs-Univ. Freiburg (Germany); H. Motzkus, Schering AG (Germany); M. Lankers, rap.ID Particle Systems GmbH (Germany); S. Hofer, H. Thiele, Kayser-Threde GmbH (Germany) . . . . . [6093-13]

8:40 am: **Micro-Raman imaging of normal and malignant human skin cells,** M. A. Short, Simon Fraser Univ. (Canada); H. Lui, The Univ. of British Columbia (Canada); H. Zeng, British Columbia Cancer Agency (Canada); D. I. McLean, The Univ. of British Columbia (Canada); M. X. K. Chen, Simon Fraser Univ. (Canada) . . . . . [6093-14]

9:00 am: **Probing molecules by surface-enhanced Raman spectroscopy,** C. M. Netti, J. T. Rogers, S. Mahnkopf, P. Stopford, M. E. Zoorob, M. D. Charlton, K. Todd, J. R. Lincoln, Mesophotonics Ltd. (United Kingdom) . . . . . [6093-15]

9:20 am: **Surface enhanced Raman detection of peptide tyrosine and serine phosphorylation,** J. Moger, The Univ. of Exeter (United Kingdom) . . . [6093-16]

9:40 am: **Detection of osteoarthritis biomarkers using surface enhanced Raman spectroscopy in the near-infrared,** G. S. Mandair, K. A. Dehring, Univ. of Michigan; A. R. Smukler, B. J. Roessler, Univ. of Michigan Medical School; M. D. Morris, Univ. of Michigan . . . . . [6093-17]

10:00 am: **Raman microscopy of phagocytosis: shedding light on innate immunity,** H. van Manen, D. Roos, C. Otto Univ. Twente (Netherlands) [6093-43]

Coffee Break . . . . . 10:20 to 10:40 am

SESSION 4

Conv. Ctr. C3 . . . . . Sun. 10:40 am to 12:20 pm

Macroscopic Applications

Chair: **Dieter Naumann**, Robert Koch-Institut (Germany)

10:40 am: **Infrared spectroscopy a novel tool to aid classification of DCIS,** K. Subramanian, N. Stone, C. A. Kendall, Biophotonics Research Group (United Kingdom); K. McCarthy, J. Brown, J. Bristol, C. Chan, Gloucestershire Royal Hospital (United Kingdom) . . . . . [6093-18]

11:00 am: **Advances in Raman spectroscopy for the diagnosis of Alzheimer's disease,** C. D. Sudworth, J. K. Archer, Lasers for Life (United Kingdom); D. M. Mann, Univ. of Manchester (United Kingdom) . . . . . [6093-19]

11:20 am: **Application of NIR Raman spectroscopy for detecting and characterizing dental caries,** A. C. Ko, L. Choo-Smith, M. Hewko, R. Zhu, M. Sowa, National Research Council Canada (Canada); C. C. Dong, Univ. of Manitoba (Canada); B. Cleghorn, Dalhousie Univ. (Canada) . . . . . [6093-20]

11:40 am: **Optical detection of carotenoid antioxidants in living human tissue,** W. Gellermann, I. V. Ermakov, Univ. of Utah . . . . . [6093-21]

12:00 pm: **Confocal Raman microspectroscopy: measuring the effects of topical moisturisers on stratum corneum water gradient, in vivo,** A. Sieg, J. Crowther, P. Blenkiron, P. Matts, Procter & Gamble Co. (United Kingdom); C. A. Marcott, Procter & Gamble Co. . . . . [6093-22]

Lunch/Exhibition Break . . . . . 12:20 to 1:40 pm

SESSION 5

Conv. Ctr. C3 . . . . . Sun. 1:40 to 3:20 pm

Instrumentation and Data Analysis

Chair: **Andrew J. Berger**, Univ. of Rochester

1:40 pm: **Transcutaneous Raman spectroscopy of bone tissue using a non-confocal fiber optic array probe,** M. D. Morris, M. V. Schulmerich, W. F. Finney, Univ. of Michigan; S. A. Goldstein, T. M. Vanasse, Univ. of Michigan Medical School . . . . . [6093-23]

2:00 pm: **Multimodal multiplex Raman spectroscopy optimized for in vivo chemometrics,** S. T. McCain, M. E. Gehm, Y. Wang, N. P. Pitsianis, D. J. Brady, Duke Univ. . . . . [6093-24]

2:20 pm: **Classification of colonic tissues using Raman spectroscopy and multivariate techniques,** Z. Huang, National Univ. of Singapore (Singapore) . . . . . [6093-25]

2:40 pm: **Does bladder cancer detection benefit from depth resolved confocal Raman spectroscopy?,** M. C. Grimbergen, Univ. Medical Ctr. Utrecht (Netherlands); C. F. van Swol, St. Antonius Ziekenhuis (Netherlands); J. R. A. van Moorselaar, Univ. Medisch Ctr. Utrecht (Netherlands); A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6093-26]

3:00 pm: **A comparison of EMCCD, CCD and emerging technologies optimized for low-light spectroscopy applications,** A. A. O'Grady, Princeton Instruments, Inc./Acton Research . . . . . [6093-27]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 6

Room: Conv. Ctr. C3 . . . . . Sun. 3:50 to 5:10 pm

Data Interpretation

Chair: **Wolfgang H. Petrich**, Roche Diagnostics GmbH (Germany)

3:50 pm: **Determining the gross biochemical composition of cells and tissue with Raman and infrared spectrosocpy,** J. R. Mourant, K. R. Short, J. R. Dominguez, S. R. Carpenter, T. R. Powers, J. P. Freyer, Los Alamos National Lab. . . . . [6093-28]

4:10 pm: **Raman spectroscopic biochemical mapping of tissues,** N. Stone, M. C. Hart Prieto, C. A. Kendall, G. Shetty, H. Barr, Gloucestershire Hospitals NHS Foundation Trust (United Kingdom) . . . . . [6093-29]

4:30 pm: **Biochemical characterization of cell-death via Raman spectroscopy,** N. Kunapareddy, Boston Univ. and Los Alamos National Lab.; J. R. Mourant, J. P. Freyer, Los Alamos National Lab. . . . . [6093-30]

4:50 pm: **Using organotypic raft cultures to understand the biological basis of Raman spectra,** M. Keller, Vanderbilt Univ.; C. A. Lieber, Univ. of California/Davis; A. Robichaux Viehoever, A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6093-31]

Reception

A reception for conference participants will be held following the last session.

Tuesday 24 January

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Vibrational spectroscopic analysis of breast calcifications and surrounding tissue,** R. Baker, J. Smith, N. Stone, Gloucestershire Hospitals NHS Foundation Trust (United Kingdom); K. D. Rogers, Cranfield Univ. (United Kingdom) . . . . . [6093-32]

✔ **Study of human breast tissues biochemistry by FT-Raman spectroscopy,** R. A. Bitar, Univ. do Vale do Paráiba (Brazil); W. A. A. Jara, Univ. do Vale do Paraíba (Brazil); C. J. T. Criollo, Univ. Federal de Minas Gerais (Brazil); H. S. Martinho, Univ. do Vale do Paraíba (Brazil); L. N. Z. Ramalho, Univ. of Sao Paulo (Brazil); A. A. Martin, Univ. do Vale do Paraíba (Brazil) . . [6093-33]

✔ **Tip-enhanced Raman scattering of DNA related compounds,** A. Rasmussen, V. Deckert, Institute for Analytical Sciences Dortmund (Germany) . . . . . [6093-36]

✔ **Recent progress in noninvasive diabetes screening by diffuse reflectance near-infrared skin spectroscopy and multivariate classification,** H. M. Heise, Univ. Dortmund (Germany); M. Licht, D. Ihrig, Univ. of Applied Sciences of Suedwestfalen (Germany); C. Moll, M. Stuecker, Ruhr-Univ. Bochum (Germany) . . . . . [6093-37]

✔ **Spectroscopic diagnosis of ovarian cancer,** A. M. Patsiokas, A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6093-38]

✔ **In vivo analysis of tissue by Raman microprobe: examination of human skin lesions and oesophagus Barrett's mucosa on an animal model,** O. Piot, A. Tfayli, Univ. de Reims Champagne-Ardenne (France); G. Cadiot, M. D. Diebold, S. Derancourt, P. Bernard, Hospitalise au Chu de Reims (France); M. Manfait, Univ. de Reims Champagne-Ardenne (France) [6093-39]

✔ **Lymphocyte classification by single cell Raman microspectroscopy,** Z. J. Smith, Univ. of Rochester . . . . . [6093-40]

✔ **Rapid Raman spectroscopy of musculoskeletal tissue using a visible laser and an electron-multiplying CCD (EMCCD) detector,** K. Golcuk, G. S. Mandair, A. F. Callender, W. F. Finney, N. Sahar, D. H. Kohn, D. H. Kohn, M. D. Morris, Univ. of Michigan . . . . . [6093-41]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday 25 January 2006 • Proceedings of SPIE Vol. 6094

Optical Diagnostics and Sensing VI

Conference Chairs: **Gerard L. Coté**, Texas A&M Univ.; **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr.; **Werner Gellermann**, Univ. of Utah; **Yuri I. Gurfinkel**, Central Clinical Hospital (Russia); **Jürgen Lademann**, Charité-Univ. Medizin Berlin (Germany); **Michael J. McShane**, Louisiana Tech Univ.; **Kenith E. Meissner**, Texas A&M Univ.; **Risto A. Myllylä**, Univ. of Oulu (Finland); **Jeffery S. Reynolds**, Bayer Healthcare; **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **Kexin Xu**, Tianjin Univ. (China); **Dmitry A. Zimnyakov**, Saratov State Univ. (Russia)

Tuesday 24 January

✔ Posters-Tuesday

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✔ **Absorption spectra of sulfhemoglobin derivates of human blood,** I. H. Yarynovska, A. I. Bilyi, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [6094-17]

✔ **Noninvasive blood glucose monitoring with laser diode,** X. Zhang, J. Chen, J. H. Yeo, Nanyang Technological Univ. (Singapore) . . . . . [6094-18]

✔ **Dendrimer optimization for a glucose-sensitive fluorescent assay,** H. T. Beier, B. L. Ibey, R. M. Rounds, Texas A&M Univ.; M. V. Pishko, The Pennsylvania State Univ.; G. L. Coté, Texas A&M Univ. . . . . [6094-20]

✔ **The feasibility investigation of noninvasive blood glucose sensing based on bypass animal trial,** X. Gu, B. Deng, W. Chen, K. Xu, Tianjin Univ. (China) . . . . . [6094-21]

✔ **Discussion on floating-reference method for noninvasive measurement of blood glucose with near-infrared spectroscopy,** Y. Luo, L. An, R. Liu, K. Xu, Tianjin Univ. (China) . . . . . [6094-22]

✔ **Analysis of leeching and stability of microporated PEG spheres for fluorescent analyte detection,** R. M. Rounds, B. L. Ibey, H. T. Beier, Texas A&M Univ.; M. V. Pishko, The Pennsylvania State Univ.; G. L. Coté, Texas A&M Univ. . . . . [6094-23]

✔ **A CMOS imaging system for objective wound assessment,** K. Humphreys, M. L. Gradziel, C. Markham, T. E. Ward, National Univ. of Ireland/Maynooth (Ireland) . . . . . [6094-24]

✔ **A scanning computer-aided microscope for multiple large sample applications,** S. McLeod, JMAR Technologies, Inc.; D. Taatjes, The Univ. of Vermont . . . . . [6094-25]

✔ **Sensitivity of different light scattering techniques to variations of optical parameters of a blood layer in vitro studied by Monte Carlo simulations,** M. Y. Kirillin, A. V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia); J. T. Hast, R. A. Myllylä, Univ. of Oulu (Finland) . . . . . [6094-26]

✔ **Interpretation of interference signals in label free integrated interferometric biosensors** *(Invited Paper),* H. M. Heikkinen, Univ. of Oulu (Finland); S. Ollitervo, VTT Elektroniikka (Finland); M. Okkonen, J. T. Hast, Univ. of Oulu (Finland); M. Känsäkoski, VTT Elektroniikka (Finland); R. A. Myllylä, Univ. of Oulu (Finland) . . . . . [6094-27]

✔ **Synthesis of CdSe/CdS core/shell quantum dots for biological sensing applications,** Y. Xu, P. Mariam, V. Sethi, M. Jones, K. Meehan, Virginia Polytechnic Institute and State Univ. . . . . [6094-28]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Wednesday 25 January

SESSION 1

Conv. Ctr. C1 . . . . . Wed. 8:30 to 10:10 am

Optical Monitoring of Glucose

Chair: **Gerard L. Coté**, Texas A&M Univ.

8:30 am: **Dendrimer based fluorescent glucose sensor for diabetic monitoring,** B. L. Ibey, H. T. Beier, R. M. Rounds, Texas A&M Univ.; M. V. Pishko, The Pennsylvania State Univ.; G. L. Coté, Texas A&M Univ. . . [6094-01]

8:50 am: **Hydrogel microarray for monitoring of pH and dissolved oxygen in cell culture media,** S. Lee, B. L. Ibey, Texas A&M Univ.; M. V. Pishko, The Pennsylvania State Univ.; G. L. Coté, Texas A&M Univ. . . . . [6094-02]

9:10 am: **Optical microsensor for continuous glucose measurements in interstitial fluid,** J. T. Olesberg, C. Cao, J. Yager, J. P. Prineas, C. Coretsopoulos, M. A. Arnold, The Univ. of Iowa; L. J. Olafsen, M. Santilli, Univ. of Kansas . . . . . [6094-03]

9:30 am: **Assessment of reproducibility of noninvasive blood glucose monitoring with optical coherence tomography,** V. V. Sapozhnikova, D. Prough, R. Kuranov, I. Cecinaite, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6094-04]

9:50 am: **Feasibility of glucose sensing by time- and spatial-resolved detection: Monte Carlo simulations of diffuse reflection in a three-layer skin model,** J. T. Hast, Univ. of Oulu (Finland); A. V. Bykov, A. P. Popov, A. V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia); R. A. Myllylä, Univ. of Oulu (Finland) . . . . . [6094-05]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Conv. Ctr. C1 . . . . . Wed. 10:40 am to 12:40 pm

Optical Assessment of Blood Components, Whole Blood and Blood Flow Parameters

Chair: **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia)

10:40 am: **Combined laser Doppler and laser speckle imaging for real-time blood flow measurements,** A. Serov, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6094-06]

11:00 am: **Effect of multiple scattering on the accuracy of velocity profile reconstruction from the Monte-Carlo simulated OCDT signal in a model of biological tissues,** A. V. Priezzhev, A. V. Bykov, M. Y. Kirillin, M.V. Lomonosov Moscow State Univ. (Russia); R. A. Myllylä, Univ. of Oulu (Finland) . . . [6094-07]

11:20 am: **In vivo blood flow measurements in distal fingertips using noninvasive laser Doppler flowmetry (LDF),** K. I. Suh, R. R. Ansari, J. D. Kirsop, A. J. Alon, NASA Glenn Research Ctr.; J. A. Jones, NASA Johnson Space Ctr. . . . . [6094-08]

11:40 am: **Investigation of follicular penetration by means of laser Doppler blood flow measurements,** J. Lademann, Charité-Univ. Medizin Berlin (Germany); U. Erdmenger, Charité-Univ Medizin Berlin (Germany); A. Teichmann, N. Otberg, Charité-Univ. Medizin Berlin (Germany); R. Schuetz, Freie Univ. Berlin (Germany); M. C. Meinke, W. Sterry, Charité-Univ. Medizin Berlin (Germany) . . . . . [6094-09]

12:00 pm: **Absolute flow velocity components in laser Doppler flowmetry,** I. Fredriksson, M. Larsson, T. Strömberg, Linköpings Univ. (Sweden) . [6094-10]

12:20 pm: **Effect of the lower body negative pressure (LBNP) test on the microcirculation of healthy volunteers and patients with coronary artery disease,** Y. I. Gurfinkel, Central Clinical Hospital (Russia); V. M. Mikhailov, B. B. Ushakov, Institute for Biomedical Problems (Russia) . . . . . [6094-11]

Lunch Break . . . . . 12:40 to 1:50 pm

SESSION 3

Room: Conv. Ctr. C1 . . . . . Wed. 1:50 to 3:30 pm

Diagnostic and Sensing Systems Based on Absorption, Scattering and Fluorescence Detection

Chair: **Jürgen Lademann**, Charité-Univ. Medizin Berlin (Germany)

1:50 pm: **Near infrared spectroscopy (NIRS) measurements in weightless conditions,** R. R. Ansari, NASA Glenn Research Ctr.; K. I. Suh, Ohio Aerospace Institute; J. F. King, NASA Glenn Research Ctr.; J. B. Clark, NASA Johnson Space Ctr. . . . . [6094-12]

2:10 pm: **Comparison of optical systems to measure photosensitizer concentration and pharmacokinetics,** A. Johansson, J. Svensson, Lunds Institute of Technology (Sweden); N. Bendsøe, K. Svanberg, Lunds Univ. Hospital (Sweden); S. Andersson-Engels, Lunds Institute of Technology (Sweden);
I. J. Bigio, Boston Univ.; S. Gräfe, Biolitec AG (Germany); T. Trebst, CeramOptec Systems GmbH (Germany); E. Alexandratou, M. Kyriazi, D. M. Yova, National Technical Univ. of Athens (Greece) . . . . . [6094-13]

2:30 pm: **Optical spectroscopy of human blood serum albumin transformation,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6094-14]

2:50 pm: **Bacteria-clay interactions investigated by light scattering and microscopy,** A. N. Alimova, K. Block, E. Rudolph, A. Katz, J. C. Steiner, P. Gottlieb, R. R. Alfano, City College/CUNY . . . . . [6094-15]

3:10 pm: **Enhanced light-target interaction using a novel anti-resonant waveguide concept,** O. Schmidt, Palo Alto Research Ctr. Inc. and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); P. Kiesel, Palo Alto Research Ctr. Inc.; G. H. Döhler, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [6094-16]

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6095

Nano/Biophotonics and Biomedical Applications III

Conference Chairs: **Alexander N. Cartwright**, SUNY/Univ. at Buffalo; **Dan V. Nicolau**, Swinburne Univ. of Technology (Australia)

Cochairs: **Uwe R. Muller**, Nanosphere, Inc.; **Igor Medintz**, Naval Research Lab.

Program Committee: **Igal Brener**, Sandia National Labs.; **Philippe M. Fauchet**, Univ. of Rochester; **Piotr Grodzinski**, Los Alamos National Lab.; **Brian McGraith**, Dublin City Univ. (Ireland); **Ammasi Periasamy**, Univ. of Virginia; **Paras N. Prasad**, SUNY/Univ. at Buffalo; **Weihong Tan**, Univ. of Florida

Monday 23 January

SESSION 1

Conv. Ctr. A1 . . . . . Mon. 8:50 to 10:00 am

Nano/Biophotonics I

Chair: **Alexander N. Cartwright**, SUNY/Univ. at Buffalo

8:50 am: **Nanocontrol of excitation and dynamics for nanobiophotonics** *(Invited Paper),* P. N. Prasad, SUNY/Univ. at Buffalo . . . . . [6095-01]

9:20 am: **Near-field Raman nano-imaging and analysis of DNA molecules,** T. Ichimura, Y. Inouye, S. Kawata, Osaka Univ. (Japan) . . . . . [6095-02]

9:40 am: **Application of antibody-conjugated gold nanoparticles for optical molecular imaging of epithelial carcinoma cells,** J. C. Kah, C. J. Sheppard, C. Lee, National Univ. of Singapore (Singapore); M. C. Olivo, National Cancer Ctr. of Singapore (Singapore) . . . . . [6095-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Conv. Ctr. A1 . . . . . Mon. 10:30 am to 12:10 pm

Nano/Biophotonics II

Chair: **Paras N. Prasad**, SUNY/Univ. at Buffalo

10:30 am: **In vivo optical detection of intranuclear biomarkers using gold nanoparticles,** S. Kumar, The Univ. of Texas at Austin; R. Richards-Kortum, Rice Univ.; K. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. [6095-05]

10:50 am: **Magnetic resonance temperature imaging of nanoshell photothermal therapy,** P. D. O'Neal, Nanospectra Bioscience, Inc.; R. J. Stafford, J. D. Hazle, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6095-06]

11:10 am: **Detection of superparamagnetic iron oxide nanoparticles using focused magnetic field excitation and optical coherence tomography,** J. H. Oh, C. G. Rylander, N. J. Kemp, The Univ. of Texas at Austin; J. Mancuso, M. Cilingiroglu, M. D. Feldman, The Univ. of Texas Health Science Ctr. at San Antonio; T. E. Milner, The Univ. of Texas at Austin . . . . . [6095-07]

11:30 am: **Fluorescence correlation spectroscopy to probe molecular confinement in live cell membranes,** P. Lenne, H. Rigneault, L. Wawrezinieck, Institut Fresnel (France); D. D. Marguet, Ctr. National de la Recherche Scientifique (France) . . . . . [6095-08]

11:50 am: **Plasmon induced heating effect in surface enhanced scattering,** K. W. Kho, National Cancer Ctr. of Singapore (Singapore); Z. X. Shen, Nanyang Technological Univ. (Singapore); F. Watt, National Univ. of Singapore (Singapore); K. C. Soo, M. C. Olivo, National Cancer Ctr. of Singapore (Singapore) [6095-09]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Ctr. A1 . . . . . Mon. 1:30 to 3:10 pm

Nanoscale Bioimaging and Manipulation I

Chair: **Ammasi Periasamy**, Univ. of Virginia

1:30 pm: **Portable optical microscope-on-a-chip,** X. Heng, X. Cui, California Institute of Technology; D. Erickson, Cornell Univ.; D. Psaltis, C. Yang, California Institute of Technology . . . . . [6095-10]

1:50 pm: **Microfluidic microwell and microcapillary biochips,** M. J. Minot, D. W. Stowe, MinoTech Engineering Inc.; M. A. Detarando, J. A. Krans, J. L. Kass, Incom Inc. . . . . [6095-11]

2:10 pm: **Biomedical imaging with a terahertz quantum cascade lasers,** S. M. Kim, F. Hatami, A. W. Kurian, J. M. Ford, J. S. Harris, Jr., Stanford Univ.; G. Scalari, M. Giovannini, N. Hoyler, J. Faist, Univ. of Neuchâtel (Switzerland); G. Harris, Univ. of California/Davis . . . . . [6095-12]

2:30 pm: **Mesoscopic light transport properties of a single cell: early detection of cancer,** P. Pradhan, Y. Liu, Y. L. Kim, X. Li, M. Kim, H. K. Roy, R. K. Wali, V. Backman, Northwestern Univ. . . . . [6095-13]

2:50 pm: **Live cell imaging of the endocytosis and the intracellular trafficking of multifunctional lipid nanoparticles,** T. Zhang, N. Danthi, J. Xie, National Institutes of Health; P. Lu, Pacific Northwest National Lab.; K. C. Li, National Institutes of Health . . . . . [6095-14]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 4

Conv. Ctr. A1 . . . . . Mon. 3:40 to 5:20 pm

Nanoscale Bioimaging and Manipulation II

Chair: **Weihong Tan**, Univ. of Florida

3:40 pm: **Location dependence for cell stimulation using a near-infrared femtosecond laser,** S. Iwanaga, N. I. Smith, K. Fujita, Osaka Univ. (Japan); S. Kawata, Osaka Univ. (Japan) and The Institute of Physical and Chemical Research (RIKEN) (Japan); O. Nakamura, Osaka Univ. (Japan) . . . . . [6095-15]

4:00 pm: **Optical micromanipulation of microscopic particles using axicon tipped fiber,** C. Liberale, Univ. degli Studi di Pavia (Italy); S. K. Mohanty, Ctr. for Advanced Technology (India); K. S. Mohanty, Maharaja Sayajirao Univ. of Baroda (India); V. Degiorgio, Univ. degli Studi di Pavia (Italy); S. Cabrini, A. Carpentiero, E. Ferrari, D. A. Cojoc, Istituto Nazionale per la Fisica della Materia (Italy); E. D. Fabrizio, Univ. degli studi Magna Græcia di Catanzaro (Italy) . . . [6095-16]

4:20 pm: **Nanoscopic optical imaging with optical tweezers and nonlinear optics,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6095-17]

4:40 pm: **Composite metal-semiconductor nanodots for medical imaging,** L. Bakueva, I. Gorelikov, J. A. Rowlands, Sunnybrook and Women's Health Sciences Ctr. (Canada); H. E. Ruda, A. Shik, Univ. of Toronto (Canada) [6095-18]

5:00 pm: **Delay of hydrophobic recovery of PDMS in nanoconfined spaces: an atomic force microscopy study,** T. Tsuzuki, P. J. Livingston, D. V. Nicolau, Swinburne Univ. of Technology (Australia) . . . . . [6095-30]

Tuesday 24 January

SESSION 5

Conv. Ctr. A1 . . . . . Tues. 8:50 to 10:00 am

Nanosensors I

Chair: **Dan V. Nicolau**, Swinburne Univ. of Technology (Australia)

8:50 am: **Resonant structures for biodetection using silicon photonic structures** *(Invited Paper),* P. M. Fauchet, Univ. of Rochester . . . . . [6095-19]

9:20 am: **GMR biosensor in monitoring hybridization of DNA,** T. Yang, J. Chang, National Central Univ. (Taiwan) . . . . . [6095-21]

9:40 am: **The phase-contrast BioCD: high-speed immunoassays at sub-picogram detection levels,** M. Zhao, L. Peng, D. D. Nolte, Purdue Univ. . . . . [6095-22]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Conv. Ctr. A1 . . . . . Tues. 10:30 am to 12:00 pm

Nanosensors II

Chair: **Philippe M. Fauchet**, Univ. of Rochester

10:30 am: **Locked nucleic acid molecular beacons for intracellular mRNA monitoring** *(Invited Paper),* L. Wang, C. Yang, C. Medley, S. A. Benner, W. Tan, Univ. of Florida . . . . . [6095-23]

11:00 am: **Integrated nanosensor using guided resonance in photonic crystal structures,** O. Levi, W. Suh, M. M. Lee, Stanford Univ.; J. Zhang, S. R. J. Brueck, The Univ. of New Mexico; S. Fan, J. S. Harris, Stanford Univ. . . . . [6095-24]

11:20 am: **CMOS-based biosensor system using integrated nanostructured recognition elements,** A. N. Cartwright, V. P. Chodavarapu, M. Davenport, A. H. Titus, R. M. Bukowski, F. V. Bright, SUNY/Univ. at Buffalo . . . . . [6095-25]

11:40 am: **Coupled waveguide-surface plasmon resonance biosensors constructed with sub-wavelength gratings,** S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6095-26]

✔ Posters-Tuesday

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✔ **Real-time fluorescence measurement of a tumor-targeted nanodevice by a two photon optical fiber fluorescence probe,** J. Y. Ye, T. Thomas, C. F. Zhong, A. Kotlyar, Z. Cao, J. R. Baker, Jr., T. B. Norris, Univ. of Michigan . . . . . [6095-03]

✔ **Near-field optical studies on protein-protein interaction between Cy3 labeled hIgG and Cy5 labeled anti-hIgG,** Y. Cho, A. Gokarna, Y. Kim, S. Hwang, B. Kwan, M. Lee, I. Kang, Chungbuk National Univ. (South Korea) . . . . . [6095-27]

✔ **Cytotoxical products formation on the nanoparticles heated by the pulsed laser radiation** *(Invited Paper),* B. Y. Kogan, Organic Intermediates and Dyes Institute (Russia); A. A. Titov, N.N. Semenov Institute of Chemical Physics (Russia); V. Rakitin, Institute of Plant Physiology (Russia); S. Y. Kuzmin, G. N. Vorozhtsov, Organic Intermediates and Dyes Institute (Russia) . . . . . [6095-28]

✔ **Biophotonics studies on lipid membranes using OI-RD ellipsometry,** R. F. Masina, Univ. of Nevada/Reno; A. Parikh, X. Zhu, Univ. of California/Davis . . . . . [6095-29]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Sunday-Tuesday 22-24 January 2006 • Proceedings of SPIE Vol. 6096

Colloidal Quantum Dots for Biomedical Applications

Conference Chairs: **Marek Osiński**, CHTM/Univ. of New Mexico; **Kenji Yamamoto**, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan); **Thomas M. Jovin**, Max-Planck-Institut für Biophysikalische Chemie (Germany)

Program Committee: **Antigoni Alexandrou**, Ecole Polytechnique (France); **Moungi G. Bawendi**, Massachusetts Institute of Technology; **Warren C. W. Chan**, Univ. of Toronto (Canada); **Alexander Eychmüller**, Technische Univ. Dresden (Germany); **Ming-Yong Han**, Institute of Materials Research and Engineering and National Univ. of Singapore (Singapore); **Victor I. Klimov**, Los Alamos National Lab.; **Carolyn A. Larabell**, Univ. of California/San Francisco and Lawrence Berkeley National Lab.; **Nicolas Lequeux**, Ecole Supérieure de Physique et de Chimie Industrielles (France); **Hedi Mattoussi**, Naval Research Lab.; **Paul Mulvaney**, The Univ. of Melbourne (Australia); **Shuming Nie**, Emory Univ. and Georgia Institute of Technology; **Arthur J. Nozik**, National Renewable Energy Lab.; **Paul O'Brien**, Univ. of Manchester (United Kingdom); **Sandra J. Rosenthal**, Vanderbilt Univ.; **Antoine Triller**, Ecole Normale Supérieure (France); **Shimon Weiss**, Univ. of California/Los Angeles; **Michael S. Wong**, Rice Univ.

Sunday 22 January

Opening Remarks

Conv. Ctr. C2 . . . . . Sun. 8:25 am

Chair: **Marek Osiński**, CHTM/Univ. of New Mexico

SESSION 1

Conv. Ctr. C2 . . . . . Sun. 8:30 to 10:10 am

Synthesis and Characterization of Nanocrystals for Biomedical Applications I

Chair: **Hedi Mattoussi**, Naval Research Lab.

8:30 am: **Cell growth and cell manipulation based on 2 and 3 dimensional organization of nanosized materials different morphology** *(Invited Paper),* M. Giersig, Ctr. of Advanced European Studies and Research Caesar (Germany) . . . . . [6096-01]

9:00 am: **Quantum dots: From greener synthetic methods to greener products** *(Invited Paper),* X. G. Peng, Univ. of Arkansas . . . . . [6096-02]

9:30 am: **Design criteria for quantum dots for biomedical imaging,** M. G. Bawendi, Massachusetts Institute of Technology . . . . . [6096-03]

9:50 am: **Developing quantum rods for biological imaging and detection,** A. H. Fu, Univ. of California/Berkeley; W. W. Gu, Univ. of California/San Francisco; B. Boussert, D. Gerion, L. Manna, Univ. of California/Berkeley; C. A. Larabell, Lawrence Berkeley National Lab.; A. P. Alivisatos, Univ. of California/Berkeley and Lawrence Berkeley National Laboratory . . . . . [6096-04]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Conv. Ctr. C2 . . . . . Sun. 10:30 am to 12:30 pm

Synthesis and Characterization of Nanocrystals for Biomedical Applications II

Chair: **Moungi G. Bawendi**, Massachusetts Institute of Technology

10:30 am: **Bright and stable fluorescent silica core-shell nanoparticles** *(Invited Paper),* U. Wiesner, Cornell Univ. . . . . [6096-05]

11:00 am: **Theoretical study of quantum dots fabricated with Si and C: from alkyl-terminated silicon dots to silicon-carbide dots** *(Invited Paper),* F. A. Reboredo, E. Schegler, G. A. Galli, L. Pizzagalli, Lawrence Livermore National Lab. . . . . [6096-06]

11:30 am: **The synthesis of silicon and germanium quantum dots for biomedical applications,** R. D. Tilley, J. H. Warner, Victoria Univ. of Wellington (New Zealand); A. Hoshino, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan); A. Shiohara, Research Institute of the International Medical Ctr. of Japan (Japan); K. Yamamoto, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine . . . . . [6096-07]

11:50 am: **Multiple exciton generation in quantum dots,** M. C. Beard, R. J. Ellingson, J. C. Johnson, J. E. Murphy, A. J. Nozik, National Renewable Energy Lab. . . . . [6096-08]

12:10 pm: **Mechanism of photoinduced fluorescence enhancement of thin films of CdSe nanoparticles,** Y. Yamaguchi, T. Uematsu, The Univ. of Tokyo (Japan) . . . . . [6096-09]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 3

Conv. Ctr. C2 . . . . . Sun. 1:30 to 3:10 pm

Synthesis and Characterization of Nanocrystals for Biomedical Applications III

Chair: **Arthur J. Nozik**, National Renewable Energy Lab.

1:30 pm: **Quantum dots synthesized on DNA for infrared biological imaging** *(Invited Paper),* E. H. Sargent, L. Levina, V. N. Sukhovatkin, S. Hinds, Univ. of Toronto (Canada) . . . . . [6096-10]

2:00 pm: **Near-infrared peptide-coated quantum dots for small animal imaging** *(Invited Paper),* G. Iyer, J. Q. Li, J. M. Tsay, L. Bentolila, F. Pinaud, X. Michalet, S. Weiss, Univ. of California/Los Angeles . . . . . [6096-11]

2:30 pm: **Synthesis of quantum dots and nanoshapes using heat transfer fluids,** S. Asokan, K. Krueger, V. Colvin, N. Mantzaris, M. S. Wong, Rice Univ. . . . . [6096-12]

2:50 pm: **Synthesis and characterization of InP and InN colloidal quantum dots,** M. Greenberg, J. C. Jones, G. A. Smolyakov, Y. Jiang, M. Osiński, The Univ. of New Mexico . . . . . [6096-13]

Coffee Break . . . . . 3:10 to 3:50 pm

SESSION 4

Conv. Ctr. C2 . . . . . Sun. 3:50 to 5:30 pm

Biofunctionalization of Colloidal Nanocrystals

Chair: **Antigoni Alexandrou**, École Polytechnique (France)

3:50 pm: **Biological applications and characterization of colloidal inorganic nanoparticles** *(Invited Paper),* W. J. Parak, Ludwig Maximilians Univ. Munich (Germany) . . . . . [6096-15]

4:20 pm: **Hybrid TiO2 nanoparticles: an approach for developing artificial restriction enzymes** *(Invited Paper),* J. Liu, Z. Saponjic, N. M. Dimitrijevic, T. Rajh, Argonne National Lab. . . . . [6096-16]

4:50 pm: **Optical characterization of single bio-conjugated nanocrystals using combined single molecule confocal and atomic force microscope,** D. Kim, J. Hwang, National Institute of Standards and Technology . . . [6096-17]

5:10 pm: **A highly luminescent ZnS/CdSe/ZnS nanocrystals-tetrapeptide biolabeling agent,** Y. Li, J. Feng, S. Daniels, N. L. Pickett, P. O'Brien, Univ. of Manchester (United Kingdom) . . . . . [6096-18]

Monday 23 January

SESSION 5

Conv. Ctr. C2 . . . . . Mon. 8:40 to 10:00 am

FRET-Based Nanosensing

Chair: **Paul O'Brien**, Univ. of Manchester (United Kingdom)

8:40 am: **Quantum dot-based FRET multiplexing: applications for biosensing,** A. R. Clapp, I. L. Medintz, H. Mattoussi, Naval Research Lab. . . . . [6096-20]

9:00 am: **Luminescent lanthanide-ion doped oxide nanoparticles for FRET single-molecule applications,** D. Casanova, D. Giaume, École Polytechnique (France); T. Amirtha, Ecole Polytechnique (France); T. Gacoin, J. Boilot, A. Alexandrou, École Polytechnique (France) . . . . . [6096-21]

9:20 am: **Fluorescence resonance energy transfer-based qd-bioconjugate sensors for detecting enzymatic proteolytic activity,** I. L. Medintz, E. R. Goldman, Naval Research Lab.; P. E. Dawson, Scripps Research Institute; A. R. Clapp, H. Mattoussi, Naval Research Lab. . . . . [6096-22]

9:40 am: **Probing the effects of spectral overlap on quantum-dot-based FRET: Ensemble and single molecule studies,** T. Pons, I. L. Medintz, H. T. Uyeda, H. Mattoussi, Naval Research Lab. . . . . [6096-23]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Conv. Ctr. C2 . . . . . Mon. 10:30 am to 12:10 pm

Molecular-Level Sensing and Imaging with Nanoparticles

Chair: **Carolyn A. Larabell**, Lawrence Berkeley National Lab.

10:30 am: **Nanocrystals for molecular imaging in cell biology,** O. T. Bruns, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); M. Nikolic, Univ. Hamburg (Germany); L. Rellin, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); H. Weller, N. Gaponik, Univ. Hamburg (Germany); U. Beisiegel, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); A. Eychmüller, Technical Univ. of Dresden (Germany) . . . . . [6096-24]

10:50 am: **Probing antigen recognition by T cells using self-assembled quantum dot bioconjugates,** N. Anikeeva, Thomas Jefferson Univ.; A. R. Clapp, E. R. Goldman, Naval Research Lab.; Y. Sykulev, Thomas Jefferson Univ.; H. Mattoussi, Naval Research Lab. . . . . [6096-25]

11:10 am: **Labeling of subcellular redox potential with dopamine-conjugated quantum dots,** J. L. Nadeau, S. Clarke, McGill Univ. (Canada); S. E. Bradforth, D. Suffern, Univ. of Southern California; Z. Zhang, C. A. Hollmann, McGill Univ. (Canada) . . . . . [6096-26]

11:30 am: **Size, stability and biocompatibility comparison of nanodots and quantum dots,** D. J. Arndt-Jovin, Max-Planck-Institut für biophysikalische Chemie (Germany); M. A. Lopez-Quintela, Univ. de Santiago de Compestela (Spain); D. S. Lidke, Max-Planck-Institut für biophysikalische Chemie (Germany); F. Martinez Santos, Univ. de Santiago de Compostela (Spain); T. M. Jovin, Max-Planck-Institut für biophysikalische Chemie (Germany) . . . . . [6096-27]

11:50 am: **Nanometal interrogation of biochemical processes and its application in optical bio-sensing,** G. F. Strouse, T. L. Jennings, J. Kogot, Florida State Univ. . . . . [6096-28]

Lunch Break . . . . . 12:10 to 1:50 pm

SESSION 7

Conv. Ctr. C2 . . . . . Mon. 1:50 to 3:20 pm

Applications of Quantum Dots in Cell Biology

Chair: **Janet Oliver**, The Univ. of New Mexico

1:50 pm: **Applications of quantum dots in cell biology** *(Invited Paper),* M. Barroso, Albany Medical Ctr.; R. Mehdibeigi, Albany Medical College; L. J. Brogan, Evident Technologies, Inc. . . . . [6096-29]

2:20 pm: **Novel assays for cellular behavior using multicolor quantum dot labels,** H. J. Liu, R. L. Ornberg, Quantum Dot Corp. . . . . [6096-30]

2:40 pm: **Interrogating the signaling dynamics of T-cell activation with quantum dot probes,** M. Warnement, S. L. Faley, J. Wikswo, Jr., S. J. Rosenthal, Vanderbilt Univ. . . . . [6096-31]

3:00 pm: **Core/shell structured nanoparticles for combined fluorescence and MR imaging,** S. Z. Wang, Univ. of California; S. M. Kauzlarich, A. Y. Louie, Univ. of California/Davis . . . . . [6096-32]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 8

Conv. Ctr. C2 . . . . . Mon. 3:50 to 5:50 pm

Live Cell Tracking and Imaging with Quantum Dots

Chair: **Thomas M. Jovin**, Max-Planck-Institut für biophysikalische Chemie (Germany)

3:50 pm: **Quantum dots for cell tracking, tissue engineering, and in vivo imaging** *(Invited Paper),* B. T. Ballou, L. A. Ernst, Carnegie Mellon Univ.; T. Harper, J. A. Treadway, M. P. Bruchez, Jr., Quantum Dot Corp.; G. W. Fisher, J. Smith, P. Campbell, A. S. Waggoner, Carnegie Mellon Univ. . . . . [6096-33]

4:20 pm: **Single quantum dot imaging in live cells: Towards a cellular GPS** *(Invited Paper),* S. Courty, C. Luccardini, C. Bouzigues, M. V. Ehrensperger, S. Bonneau, M. Dahan, École Normale Supérieure (France) . . . . . [6096-34]

4:50 pm: **Surface modification of Qdots renders reversible decaging and specific delivery via small molecules for imaging in living cells,** E. A. Jares-Erijman, C. Spagnuolo, S. Miskoski, L. Giordano, Univ. de Buenos Aires (Argentina); E. Papoucheva, M. Rossner, M. Wehr, Max-Planck-Institute fur Experimentelle Medizin (Germany); T. M. Jovin, Max-Planck-Institut für biophysikalische Chemie (Germany); G. Bunt, Max-Planck-Institute fur Experimentelle Medizin (Germany) . . . . . [6096-35]

5:10 pm: **Nontargeted quantum dots accumulate in cultured human embryonic kidney cells,** V. B. Knight, E. E. Serrano, New Mexico State Univ. . . . . [6096-36]

5:30 pm: **Automated four color CD4/CD8 analysis of leukocytes by scanning fluorescence microscopy using quantum dots,** J. Bocsi, D. Lenz, A. Mittag, Univ. Leipzig (Germany); V. S. Varga, B. Molnár, Semmelweis Univ. (Hungary); U. Sack, Univ. Leipzig (Germany); Z. Tulassay, Semmelweis Univ. (Hungary); A. Tárnok, Univ. Leipzig (Germany) . . . . . [6096-37]

Tuesday 24 January

SESSION 9

Conv. Ctr. C2 . . . . . Tues. 8:30 to 10:20 am

Applications of Colloidal Quantum Dots in Medical Diagnostics and Therapy

Chair: **Sanford M. Simon**, Rockefeller Univ.

8:30 am: **Current and prospective in vivo applications of luminescent and magnetic nanoparticles** *(Invited Paper),* M. Tréguer-Delapierre, E. Duguet, S. Mornet, S. Vasseur, ICMCB/CNRS (France) . . . . . [6096-38]

9:00 am: **Detection of viral infections using colloidal quantum dots** *(Invited Paper),* E. L. Bentzen, J. E. Crowe, D. Wright, Vanderbilt Univ. [6096-39]

9:30 am: **Tracing myeloperoxidase antibody labeled with nanocrystal quantum dots recognizes activation of neutrophils in glomerulonephritis** *(Invited Paper),* K. Suzuki, National Institute of Infectious Diseases (Japan); A. Hoshino, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan) and National Institute of Infectious Diseases (Japan); K. Yamamoto, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan) . . . . . [6096-40]

10:00 am: **Immune cells tracing using quantum dots,** A. Hoshino, Research Institute of the Interational Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan) and National Institute of Infectious Diseases (Japan); K. Fujioka, Research Institute of the International Medical Ctr. of Japan (Japan); Y. I. Kawamura, Research Institute of the International Medical Ctr of Japan (Japan) and GS platZ Corp. (Japan); N. Toyama-Sorimachi, Research Institute of the International Medical Ctr. of Japan (Japan); M. Yasuhara, Tokyo Medical and Dental Univ. (Japan); T. Dohi, Research Institute of the International Medical Ctr. of Japan (Japan); K. Yamamoto, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan) . . . . . [6096-41]

Coffee Break . . . . . 10:20 to 11:00 am

SESSION 10

Conv. Ctr. C2 . . . . . Tues. 10:40 am to 12:10 pm

Applications of Colloidal Quantum Dots in Neuroscience

Chair: **Elba E. Serrano**, New Mexico State Univ.

10:40 am: **Development of multiplex immunohistochemistry and in situ hybridization using colloidal quantum dots for automated neuronal expression mapping in brain** *(Invited Paper),* P. Chan, T. Yuen, Mount Sinai School of Medicine; G. Lin, B. Roysam, Rensselaer Polytechnic Institute; S. C. Sealfon, Mount Sinai School of Medicine . . . . . [6096-42]

11:10 am: **Targeting quantum dots to proteins with biotin ligase, and application to neuronal protein trafficking** *(Invited Paper),* M. Howarth, I. Chen, D. Chinnapen, A. Y. Ting, Massachusetts Institute of Technology . . . . . [6096-43]

11:40 am: **Single molecule, CdSe/ZnS quantum dots and gold nanoparticle tracking in live neurons** *(Invited Paper),* L. Cognet, Univ. Bordeaux I (France); S. Berciaud, D. Lasne, G. A. Blab, Univ. Bordeaux 1 (France); L. Groc, M. Heine, C. Daniel, Univ. Victor Segalen Bordeaux 2 (France); B. Lounis, Univ. Bordeaux 1 (France) . . . . . [6096-44]

Lunch/Exhibition Break . . . . . 12:10 to 1:20 pm

SESSION 11

Conv. Ctr. C2 . . . . . Tues. 1:20 to 3:20 pm

Applications of Colloidal Quantum Dots in Cancer Diagnostics and Therapy

Chair: **Kenji Yamamoto**, Research Institute of the International Medical Ctr. of Japan (Japan)

1:20 pm: **Cancer biomarker detection based on photoluminescence of semiconductor quantum dots and SERS of metal nanostructures** *(Invited Paper),* J. Z. Zhang, A. M. Schwartzberg, T. Oshiro, L. Seballos, A. Wolcott, Univ. of California/Santa Cruz; C. E. Talley, T. R. Huser, Lawrence Livermore National Lab.; R. Sutphen, Univ. of South Florida . . . . . [6096-45]

1:50 pm: **New insights into the metastasis of tumor cells using quantum dots** *(Invited Paper),* E. B. Voura, J. K. Jaiswal, S. M. Simon, Rockefeller Univ. . . . . [6096-46]

2:20 pm: **Synthesis of biofunctionalized nanoparticles for cancer cell imaging,** B. A. Hernandez, T. N. Lambert, Sandia National Labs.; N. L. Andrews, The Univ. of New Mexico; T. J. Boyle, Sandia National Labs. . . . . [6096-47]

2:40 pm: **Studies of quantum dot based resonance energy transfer with potential applications in photodynamic therapy,** S. Dayal, C. Burda, Case Western Reserve Univ. . . . . [6096-48]

3:00 pm: **Application of colloidal semiconductor quantum dots as fluorescent labels for diagnosis of brain cancer,** P. M. de Farias, B. S. Santos, F. D. Menezes, R. C. Ferreira, Univ. Federal de Pernambuco (Brazil); L. Romao, V. Moura Neto, J. F. Amaral, Univ. Federal do Rio de Janeiro (Brazil); A. Fontes, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6096-49]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 12

Conv. Ctr. C2 . . . . . Tues. 3:50 to 5:20 pm

Applications of Colloidal Quantum Dots in Drug Delivery

Chair: **Ulrich Wiesner**, Cornell Univ.

3:50 pm: **Luminescent QDs for molecular profiling, imaging and drug delivery** *(Invited Paper),* X. Gao, Univ. of Washington/Seattle . . . . . [6096-50]

4:20 pm: **Uniform core-shell (eggshell) silica: a new class of nanoparticles for biomedical applications,** Q. Huo, J. Liu, Sandia National Labs. . [6096-51]

4:40 pm: **The measurement of the concentration of the quantum dot conjugated medicine inside the rat body,** N. Manabe, Research Institute of the International Medical Ctr. of Japan (Japan); A. Hoshino, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan); Y. Liang, T. Goto, N. Kato, Research Institute of the International Medical Ctr. of Japan (Japan); K. Yamamoto, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan) . . . . . [6096-52]

5:00 pm: **Colloidal quantum dots produce current bursts in lipid bilayers,** S. Ramachandran, R. H. Blick, D. W. van der Weide, Univ. of Wisconsin/ Madison . . . . . [6096-53]

✔ Posters-Tuesday

Posters will be placed on display after 10:00 am on Tuesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm. Light refreshments will be served.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

✔ **Hydrodynamic sizes of hydrophilic functional quantum dots,** T. Pons, Naval Research Lab. and Chemical & Biomolecular Eng Dept, Johns Hopkins University, Baltimore, MD; H. T. Uyeda, H. Mattoussi, Naval Research Lab. . . . . [6096-54]

✔ **Novel surface processing with sulfonic acid for quantum dot and its characteristics,** A. Shiohara, N. Manabe, Research Institute of the International Medical Ctr. of Japan (Japan); K. Yamamoto, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine . . . . . [6096-19]

✔ **Application of colloidal quantum dots to visualization of transparent vitreous of the eye at clinical situation,** S. Yamamoto, Yokohama Sakae Kyousai Hospital (Japan); N. Manabe, A. Hoshino, K. Yamamoto, Research Institute of the International Medical Ctr. of Japan (Japan) . . . . . [6096-55]

✔ **Lectin functionalized quantum dots for recognition of mammary tumors,** B. S. Santos, P. M. A. Farias, F. D. Menezes, R. C. Ferreira, S. Alves, Jr., S. P. Nova, E. H. Menezes, Univ. Federal de Pernambuco (Brazil); E. I. Beltrão, Univ. Federal de Pernambuco (Brazil) and Lab. de Imunopatologia Keizo Asami (Brazil) . . . . . [6096-56]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Sunday 22 January 2006 • Proceedings of SPIE Vol. 6097

Optical Molecular Probes for Biomedical Applications

Conference Chairs: **Samuel Achilefu**, Washington Univ.; **Darryl J. Bornhop**, Vanderbilt Univ.; **Ramesh Raghavachari**, U.S. Food and Drug Administration

Program Committee: **Richard B. Dorshow**, Tyco Healthcare; **Gabor Patonay**, Georgia State Univ.

Sunday 22 January

SESSION 1

Conv. Ctr. K . . . . . Sun. 8:50 to 10:20 am

Molecular Imaging

Chair: **Samuel I. Achilefu**, Washington Univ. in St. Louis

Keynote Presentation

8:50 am: **Molecular imaging of photodynamic therapy efficacy** *(Invited Paper),* T. Hasan, Massachusetts General Hospital . . . . . [6097-01]

9:40 am: **High-resolution in vivo nanoparticle imaging using magnetomotive optical coherence tomography,** A. L. Oldenburg, W. Luo, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6097-03]

10:00 am: **Synthesis, receptor binding, and biodistribution of a radiolabeled somatostatin analog for multimodal imaging of the somatostatin receptor,** W. B. Edwards, Washington Univ. in St. Louis; W. P. Li, Merck and Company; C. J. Anderson, K. Liang, S. Achilefu, Washington Univ. in St. Louis . . [6097-04]

Coffee Break . . . . . 10:20 to 10:40 am

SESSION 2

Conv. Ctr. K . . . . . Sun. 10:40 am to 12:40 pm

Synthesis and Biological Studies

Chair: **Darryl J. Bornhop**, Vanderbilt Univ.

10:40 am: **Modulation of nuclear internalization of Tat peptides by fluorescent probes,** D. Shen, K. Liang, E. Tetteh, Y. Ye, B. Xu, S. Achilefu, Washington Univ. in St. Louis . . . . . [6097-06]

11:00 am: **Potential sensitive dyes: nonlinear optical properties and solvatochromism,** H. Li, G. Mao, K. D. Singer, Case Western Reserve Univ. . . . . [6097-07]

11:20 am: **Molecular differentiation of leishmania protozoarium using CDS quantum dots as biolabels,** B. S. Santos, P. M. A. de Farias, F. D. Menezes, R. Ferreira, Univ. Federal de Pernambuco (Brazil); S. Giorgio, M. Cegatti, D. Copi, A. Fontes, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . [6097-08]

11:40 am: **Synthesis and evaluation of a small library of novel carbocyanine-labeled cyclic disulfide RGD peptide analogs for tumor targeting,** Y. Ye, S. Bloch, B. Xu, S. Achilefu, Washington Univ. in St. Louis . . . . . [6097-09]

12:00 pm: **Chlorin p6 as a fluorescent probe for the investigation of surfactant-cyclodextrin interactions,** P. P. Mishra, R. Adhikary, P. Lahiri, A. Datta, Indian Institute of Technology Bombay (India) . . . . . [6097-10]

12:20 pm: **New fluorogenic substrates for imaging b-galactosidase activity in living subjects,** M. Goutayer, CEA Grenoble (France); V. Josserand, INSERM (France); V. Robert, CEA Grenoble (France); A. Imberty, CERMAV-CNRS (France); J. Coll, INSERM (France); I. F. Texier Nogues, CEA Grenoble (France) . . . . . [6097-11]

Lunch Break . . . . . 12:40 to 1:40 pm

SESSION 3

Conv. Ctr. K . . . . . Sun. 1:40 to 4:50 pm

Near Infrared and other Reporters and Sensors

Chairs: **Ramesh Raghavachari**, U.S. Food and Drug Administration; **Gabor Patonay**, Georgia State Univ.

Keynote Presentation

1:40 pm: **Near-infrared probes: design and applications,** G. Patonay, L. Strekowski, A. Raszkiewicz, K. J. Seok, Georgia State Univ. . . . [6097-12]

2:10 pm: **Design, synthesis and evaluation of near-infrared fluorescent pH indicators at physiological range,** Z. Zhang, K. Liang, S. Achilefu, Washington Univ. in St. Louis . . . . . [6097-13]

2:30 pm: **New derivatives of cyclohexanon and piperidone compounds for bioluminous sensing,** B. H. Peterson, S. S. Sarkisov, Alabama A&M Univ.; V. N. Nesterov, New Mexico Highlands Univ.; M. J. Curley, Alabama A&M Univ.; P. A. Fleitz, Air Force Research Lab.; J. W. Perry, M. Rumi, Georgia Institute of Techology; J. Wang, Alabama A&M Univ. . . . . [6097-14]

2:50 pm: **8-hydroxyquinoline derivatives as fluorescent sensors for magnesium in living cells,** L. Prodi, M. Montalti, N. Zaccheroni, G. Farruggia, S. Iotti, Univ. degli Studi di Bologna (Italy); F. I. Wolf, Univ. Cattolica del Sacro Cuore (Italy); P. B. Savage, Brigham Young Univ. . . . . [6097-15]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Enhancement of europium luminescence in tetracycline-europium complexes in the presence of urea hydrogen peroxide,** L. C. Courrol, Faculdade de Tecnologia de São (Brazil); F. R. d. O. Silva, R. D. Mansano, Univ. de São Paulo (Brazil) . . . . . [6097-17]

3:50 pm: **Phthalocyanine dye as an extremely photostable and highly fluorescent near-infrared labeling reagent,** X. Peng, D. R. Draney, W. M. Volcheck, G. R. Bashford, D. T. Lamb, D. L. Grone, LI-COR Biosciences; Y. Zhang, C. M. Johnson, LI-COR, Inc. . . . . [6097-19]

4:10 pm: **Quenched near-infrared fluorescent peptide substrate for HIV-1 protease assay,** X. Peng, D. R. Draney, W. M. Volcheck, LI-COR Biosciences . . . . . [6097-20]

4:30 pm: **Internalization of peptide conjugates of near-infrared fluorescent probes occurs via different integrin receptor subtypes in different cell lines,** S. Bloch, S. Achilefu, Washington Univ. in St. Louis . . . . . [6097-05]

Tuesday 24 January

✔ Posters-Tuesday

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✔ **Construction of multifunctional optical probes based on siderophores,** Y. Ye, B. Xu, S. Achilefu, Washington Univ. in St. Louis . . . . . [6097-18]

Technical Group Meeting

IBOS—International Biomedical Optics Society

7:30 to 9:00 pm · Fairmont Hotel: Glen Ellen Room

Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona; **Lihong Wang,** Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Tuesday 24 January 2006 • Proceedings of SPIE Vol. 6098

Genetically Engineered Probes for Biomedical Applications

Conference Chair: **Alexander P. Savitsky**, Institute of Biochemistry (Russia)

Cochair: **Rebekka Wachter**, Arizona State Univ.

Program Committee: **Lubov Y. Brovko**, Univ. of Guelph (Canada); **Stefan W. Hell**, Max-Plank Institute for Biophysical Chemistry (Germany); **Robert M. Hoffman**, AntiCancer, Inc.; **Maria-Elisabeth Michel-Beyerle**, Technische Univ. München (Germany); **Atsushi Miyawaki**, The Institute of Physical and Chemical Research (R (Japan); **Anya Salih**, The Univ. of Sydney (Australia); **Alan S. Waggoner**, Carnegie Mellon Univ.; **Joerg Wiedenmann**, Univ. Ulm (Germany)

Tuesday 24 January

SESSION 1

Conv. Ctr. C3 . . . . . Tues. 8:30 to 11:50 am

Photophysics of Fluorescent Proteins

Chairs: **Alexander P. Savitsky III**, A.N. Bach Institute of Biochemistry (Russia); **Atsushi Miyawaki**, The Institute of Physical and Chemical Research (Japan)

Keynote Presentations

8:30 am: **Use of the photoconvertible GFP-like protein EosFP in live cell imaging** *(Invited Paper),* J. Wiedenmann, Univ. Ulm (Germany) . . [6098-01]

9:10 am: **Structural transitions in the kindling fluorescent protein: light and dark state structures,** S. J. Remington, N. Henderson, M. Quillin, Univ. of Oregon . . . . . [6098-02]

9:40 am: **Single molecule spectroscopic characterization of a far-red fluorescent protein (HcRed) from the Anthozoa coral Heteractis crispa,** M. Cotlet, J. H. Werner, J. E. Whittier, Los Alamos National Lab.; J. Hofkens, F. C. De Schryver, Katholieke Univ. Leuven (Belgium); P. M. Goodwin, Los Alamos National Lab. . . . . [6098-03]

10:00 am: **Femtosecond study of light induced fluorescence increase of the dark chromoprotein asFP595,** M. E. Michel-Beyerle, Technische Univ. München (Germany) . . . . . [6098-04]

Coffee Break . . . . . 10:20 to 10:50 am

10:50 am: **Ultrafast and low-barrier motions in the photoreactions of the green fluorescent protein,** J. J. van Thor, Univ. of Oxford (United Kingdom) . . . . . [6098-05]

11:10 am: **Mapping the refractive index sensing range of the GFP fluorescence decay with FLIM,** K. Suhling, C. Jones, King's College London (United Kingdom) . . . . . [6098-06]

11:30 am: **Internet-based education on the structure, function, and imaging of fluorescent proteins,** M. W. Davidson, N. S. Claxton, S. G. Olenych, Florida State Univ. . . . . [6098-07]

Lunch Break . . . . . 11:50 am to 12:50 pm

SESSION 2

Conv. Ctr. C3 . . . . . Tues. 12:50 to 2:30 pm

Biochemistry of Fluorescent Proteins

Chairs: **Rebekka M. Wachter**, Arizona State Univ.; **Joerg Wiedenmann**, Univ. Ulm (Germany)

Keynote Presentation

12:50 pm: **Mechanistic aspects of GFP chromophore biogenesis** *(Invited Paper),* R. M. Wachter, Arizona State Univ. . . . . [6098-08]

1:30 pm: **A conserved GAF domain tyrosine directs bilin chromophore protonation and efficient photochemistry in plant and cyanobacterial phytochromes,** J. C. Lagarias, A. J. Fischer, N. C. Rockwell, A. H. Jang, Univ. of California/Davis; L. A. Ernst, A. S. Waggoner, Carnegie Mellon Univ.; Y. Duan, H. Lei, Univ. of California/Davis . . . . . [6098-09]

1:50 pm: **Key residues responsible for red fluorescence in a GFP-like protein,** S. Gundel, S. V. Ivanchenko, G. U. Nienhaus, J. Wiedenmann, Univ. Ulm (Germany) . . . . . [6098-10]

2:10 pm: **Photoinduced activation of GFP-like proteins in tissues of reef corals,** A. Salih, The Univ. of Sydney (Australia) . . . . . [6098-26]

SESSION 3

Conv. Ctr. C3 . . . . . Tues. 2:30 to 2:50 pm

Instrumentation for In Vivo Imaging

Chairs: **Stefan W. Hell**, Deutsches Krebsforschungszentrum (Germany); **Maria-Elisabeth Michel-Beyerle**, Technische Univ. München (Germany)

2:30 pm: **Frequency domain fluorescence diffuse tomography of small animals with DsRed2-expressed tumors,** I. V. Turchin, V. I. Plehanov, A. G. Orlova, E. A. Sergeeva, V. A. Kamensky, Institute of Applied Physics (Russia); M. V. Shirmanova, Nizhny Novgorod State Medical Academy (Russia); A. P. Savitsky, A.N. Bach Institute of Biochemistry (Russia) . . . . . [6098-12]

SESSION 4

Conv. Ctr. C3 . . . . . Tues. 2:50 to 4:20 pm

In vivo imaging

Chairs: **Robert M. Hoffman**, AntiCancer, Inc.; **Anya Salih**, The Univ. of Sydney (Australia)

2:50 pm: **Multicolor imaging with fluorescent proteins in mice,** R. M. Hoffman, AntiCancer, Inc. . . . . [6098-14]

Coffee Break . . . . . 3:10 to 3:40 pm

3:40 pm: **Bioimaging of DsRed fluorescence in the transgenic rat liver,** Y. Arao, Y. Hakamata, Y. Igarashi, Y. Sato, T. Murakami, E. Kobayashi, Jichi Medical School (Japan) . . . . . [6098-15]

4:00 pm: **Prolongation of GFP-expressed skin graft after intrathymic injection of GFP positive splenocytes in adult rats,** Y. Hakamata, Y. Igarashi, T. Murakami, E. Kobayashi, Jichi Medical School (Japan) . . . . . [6098-16]

SESSION 5

Conv. Ctr. C3 . . . . . Tues. 4:20 to 5:00 pm

Bioluminescence

Chairs: **Lubov Y. Brovko**, Univ. of Guelph (Canada);
Alan S. Waggoner, Carnegie Mellon Univ.

4:20 pm: **A transgenic rat with ubiquitous expression of firefly luciferase gene,** Y. Hakamata, T. Murakami, E. Kobayashi, Jichi Medical School (Japan) . . . . . [6098-17]

4:40 pm: **Genetically engineered luminescent proteins in biosensing,** S. Daunert, S. K. Deo, L. Rowe, E. Dikici, X. Qu, Univ. of Kentucky . . [6098-18]

✔ Posters-Tuesday

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✔ **SOS-RFP bioassay for antigentoxicity of plant extract,** A. J. Bartolome, Univ. of Maryland/Baltimore County and Univ. of Santo Tomas (Philippines); K. Mandap, K. J. David, Univ. of Santo Tomas (Philippines); J. Villanueva, Univ. of the Philippines (Philippines); F. Sevilla III, Univ. of Santo Tomas (Philippines) . . . . . [6098-20]

✔ **Quantitative antioxidant assay using genetically engineered bioluminescent,** A. J. Bartolome, Univ. of Maryland/Baltimore County and Univ. of Santo Tomas (Philippines); B. Macalino, I. L. Pastoral, F. Sevilla III, Univ. of Santo Tomas (Philippines) . . . . . [6098-21]

✔ **A luminescent nisin biosensor,** N. Immonen, M. T. Karp, Tampereen Teknillinen Yliopisto (Finland) . . . . . [6098-22]

✔ **Fluorescence resonance energy transfer (FRET): sensor for glucose,** L. Smalls-Mantey, A. J. Bartolome, G. Rao, L. Tolosa, Univ. of Maryland/Baltimore County . . . . . [6098-23]

✔ **Transgenic rats with red florescent liver,** Y. Sato, Y. Hakamata, T. Murakami, E. Kobayashi, Jichi Medical School (Japan) . . . . . [6098-24]

✔ **Multipopulation desaggregation behavior of zFP538 upon dilution,** V. A. Korolenko, E. Evtushenko, N. N. Zubova, I. N. Kurochkin, M.V. Lomonosov Moscow State Univ. (Russia); A. P. Savitsky III, A.N. Bach Institute of Biochemistry (Russia) . . . . . [6098-25]

Technical Group Meeting

IBOS—International Biomedical Optics Society

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Chairs: **Jennifer Kehlet Barton,** The Univ. of Arizona;
Lihong Wang, Texas A&M Univ.

IBOS refreshments sponsored by **Adimec**

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6099

Plasmonics in Biology and Medicine III

Conference Chairs: **Tuan Vo-Dinh**, Oak Ridge National Lab.; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Zygmunt Gryczynski**, Univ. of Maryland/Baltimore

Program Committee: **Albert C. Boccara**, École Supérieure de Physique et de Chimie Industri (France); **Bruce S. Dunn**, Univ. of California/Los Angeles; **Chris D. Geddes**, Univ. of Maryland/Baltimore; **Naomi J. Halas**, Rice Univ.; **Boris Mizaikoff**, Georgia Institute of Technology; **Shuming Nie**, Emory Univ.; **Ali Serpengüzel**, Koç Univ. (Turkey); **Weihong Tan**, Univ. of Florida; **Andrew Taton**, Univ. of Minnesota; **Richard P. Van Duyne**, Northwestern Univ.; **Jeffrey I. Zink**, Univ. of California/Los Angeles

Monday 23 January

SESSION 1

Conv. Ctr. A2 . . . . . Mon. 9:10 am to 12:20 pm

Plasmonics and Surface-Enhanced Raman

Chair: **Tuan Vo-Dinh**, Oak Ridge National Lab.

9:10 am: **Surface enhanced Raman spectroscopy from a molecule adsorbed on a nanoparticle silver cluster in a holographic plate,** L. E. Jusinski, Sandia National Labs.; R. Bahuguna, K. Arya, San José State Univ. . . . . [6099-01]

9:30 am: **SERS platforms for high-density chemical probe arrays,** L. F. Cohen, M. Green, F. Liu, P. Kollensperger, A. E. Cass, Imperial College London (United Kingdom) . . . . . [6099-02]

9:50 am: **Plasmonics SERS molecular sentinels nanoprobes,** T. Vo-Dinh, M. B. Wabuyele, Oak Ridge National Lab. . . . . [6099-03]

10:10 am: **SERS substrates produced by tailormade metal nanoparticles using laser irradiation,** D. Blázquez Sánchez, Univ. Kassel (Germany); L. Gallasch, H. G. Schmidt, H. Kronfeldt, Technische Univ. Berlin (Germany); F. Hubenthal, F. Träger, Univ. Kassel (Germany) . . . . . [6099-04]

Coffee Break . . . . . 10:30 to 11:00 am

11:00 am: **Surface enhanced Raman spectroscopy (SERS) for the detection of intracellular constituents using gold nanoshells,** M. H. Chowdury, Texas A&M Univ.; C. Campbell, Univ. of Edinburgh (United Kingdom); E. Theofanidou, Univ. of Edinburgh; S. J. Lee, A. M. Baldwin, Texas A&M Univ.; G. Sing, Univ. of Edinburgh (United Kingdom); A. T. Yeh, Texas A&M Univ.; J. Crain, P. Ghazal, Univ. of Edinburgh (United Kingdom); G. L. Coté, Texas A&M Univ. . . [6099-05]

11:20 am: **An investigation into the influence of secondary structures for DNA hybridization using surface plasmon resonance and surface-enhanced Raman scattering,** S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6099-06]

11:40 am: **Systematic measurement of the anti-Stokes/Stokes ratio over a wide temperature range to separate the influence of heating from resonance effects in SERS,** L. F. Cohen, R. C. Maher, Imperial College London (United Kingdom); J. C. Gallop, R. J. Brown, M. J. Milton, National Physical Lab. (United Kingdom); E. C. Le Ru, P. G. Etchegoin, Victoria Univ. of Wellington (New Zealand) . . . . . [6099-07]

12:00 pm: **Resonance contributions to anti-Stokes/Stokes ratios under surface enhanced Raman scattering (SERS) conditions,** L. F. Cohen, R. C. Maher, Imperial College London (United Kingdom); R. J. Brown, M. J. Milton, National Physical Lab. (United Kingdom); P. G. Etchegoin, E. C. Le Ru, Victoria Univ. of Wellington (New Zealand); F. Liu, M. Green, Imperial College London (United Kingdom) . . . . . [6099-08]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 2

Conv. Ctr. A2 . . . . . Mon. 1:40 to 3:30 pm

Plasmonics and Surface-Enhanced Fluorescence

Chair: **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore

Keynote Presentation

1:40 pm: **Plasmon-controlled fluorescence: a new detection technology,** J. R. Lakowicz, Univ. of Maryland/Baltimore . . . . . [6099-33]

2:10 pm: **Nanophotonics using multifluorophore encoded nanoparticles,** L. Wang, W. Tan, Univ. of Florida . . . . . [6099-10]

2:30 pm: **Fluorescent nanoparticles having a silver core and a multilayered fluorescent shell,** M. Montalti, Univ. degli Studi di Bologna (Italy) . . . [6099-11]

2:50 pm: **Engineering fluorescence properties for bio-imaging applications,** E. Le Moal, E. Fort, École Supérieure de Physique et de Chimie Industrielles (France); S. Lévêque-Fort, M. Fontaine-Aupart, Univ. Paris-Sud II (France); C. Ricolleau, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6099-12]

3:10 pm: **Plasmon-enhanced fluorescence for biomedical diagnostics,** O. Stranik, R. Nooney, T. Ruckstuhl, Dublin City Univ. (Ireland); J. Enderlein, Forschungszentrum Jülich (Germany); C. M. McDonagh, B. D. Maccraith, Dublin City Univ. (Ireland) . . . . . [6099-13]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 3

Conv. Ctr. A2 . . . . . Mon. 4:00 to 5:20 pm

Surface Plasmon Resonance (SPR) Systems

Chair: **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

4:00 pm: **SPR surface enhanced fluorescence with a gold-coated corrugated sensor chip,** M. T. Reilly, Sr., P. A. Nessing, Ciencia, Inc.; M. A. Lynes, Univ. of Connecticut; E. F. Guignon, S. M. Fernandez, Ciencia, Inc. . . . . [6099-14]

4:20 pm: **Surface-plasmon-resonance with infrared excitation: a tool for real-time sensing of variations in membrane biochemical composition,** V. G. Lirtsman, D. Davidov, The Hebrew Univ. of Jerusalem (Israel) . . . [6099-16]

4:40 pm: **SPR dispersion compensation for a gold-coated corrugated surface,** M. T. Reilly, Sr., M. Jorgolli, P. A. Nessing, E. F. Guignon, S. M. Fernandez, Ciencia, Inc. . . . . [6099-18]

5:00 pm: **Combination of SPR and PM-IRRAS for characterization and detection of biosensor arrays,** V. Sablinskas, Vilnius Univ. (Lithuania) and Technische Univ. Dresden (Germany); G. Steiner, R. Salzer, Technische Univ. Dresden (Germany) . . . . . [6099-19]

Tuesday 24 January

SESSION 4

Conv. Ctr. A2 . . . . . Tues. 8:50 to 10:10 am

Plasmonics Nanoparticles and Nanowires

Chair: **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

8:50 am: **Sensitive plasmonic biosensor using gold nanoparticles on a nano fiber tip,** P. Wei, Y. Chang, C. Lee, Research Ctr. for Applied Sciences (Taiwan) . . . . . [6099-20]

9:10 am: **Gold nanoparticles for scattering-based molecular detection of disease: Optical imaging of growth factor receptor mediated carcinogenesis,** J. S. Aaron, The Univ. of Texas at Austin; K. Travis, Univ. Leipzig (Germany); T. G. Collier, The Univ. of Texas at Austin; A. Malpica, M. Follen, L. Coghlan, The Univ. of Texas M.D. Anderson Cancer Ctr.; R. R. Richards-Kortum, Rice Univ.; K. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6099-22]

9:30 am: **Polarization-sensitive optical properties of metallic and semiconducting nanowires,** A. Shik, H. E. Ruda, Univ. of Toronto (Canada) . . . . . [6099-23]

9:50 am: **The nanohybrids of metallic and semiconducting nanomaterials upon biological and polymeric conjugation: plasmon- exciton interaction, fluorescence enhancement, and their sensing application,** J. Lee, Univ. of Michigan; A. O. Govorov, Univ. of Michigan and Ohio Univ.; N. A. Kotov, Univ. of Michigan . . . . . [6099-24]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 5

Conv. Ctr. A2 . . . . . Tues. 10:40 to 11:40 am

Plasmonics Nanosystems I

Chair: **Tuan Vo-Dinh**, Oak Ridge National Lab.

10:40 am: **Three-dimensional nanometric resolution imagery using multiple local probes,** G. Moneron, A. Dubois, A. C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6099-25]

11:00 am: **Single molecule detection enhancement in subwavelength apertures,** J. Wenger, P. Lenne, Institut Fresnel (France); J. Dintinger, Univ. Louis Pasteur (France); E. K. Popov, Institut Fresnel (France); T. W. Ebbesen, Univ. Louis Pasteur (France); H. Rigneault, Institut Fresnel (France) . . . . . [6099-26]

11:20 am: **Plasmon enhanced microarray substrates,** H. Szmacinski, W. Moore, Microcosm, Inc.; J. O'Connor, Univ. of Maryland/College Park [6099-27]

Lunch/Exhibition Break . . . . . 11:40 am to 1:40 pm

SESSION 6

Conv. Ctr. A2 . . . . . Tues. 1:40 to 3:00 pm

Plasmonics Nanosystems II

Chair: **Zygmunt K. Gryczynski**, Univ. of Maryland/Baltimore

1:40 pm: **Biophotonic sensor applications based on photonic atoms,** A. Serpengüzel, U. K. Ayaz, A. Kurt, Koç Univ. (Turkey) . . . . . [6099-29]

2:00 pm: **A bio-imaging biosenor chip design based on phase-stepping interferometry of surface plasmon resonance,** S. Wu, H. Ho, The Chinese Univ. of Hong Kong (Hong Kong China) . . . . . [6099-30]

2:20 pm: **A theoretical and experimental investigation into the enhancement of near electro-magnetic field via plasmon effects,** S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6099-31]

2:40 pm: **Effect of the nanowire cross-section on the sensitivity enhancement of localized surface plasmon resonance biosensors,** K. M. Byun, Seoul National Univ. (South Korea); D. Kim, Yonsei Univ. (South Korea); S. J. Kim, Seoul National Univ. (South Korea) . . . . . [6099-32]

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✔ **Investigation of an array type surface plasmon resonance biosensor using a reconfigurable optical switch,** K. Kim, T. Kang, S. Moon, D. Kim, Yonsei Univ. (South Korea) . . . . . [6099-17]

✔ **Investigation of metallic nanowire-based localized surface plasmon resonance optical biosensors using extinction spectra,** K. M. Byun, S. J. Kim, Seoul National Univ. (South Korea); D. Kim, Yonsei Univ. (South Korea) . . . . . [6099-21]

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Journal of Biomedical Optics

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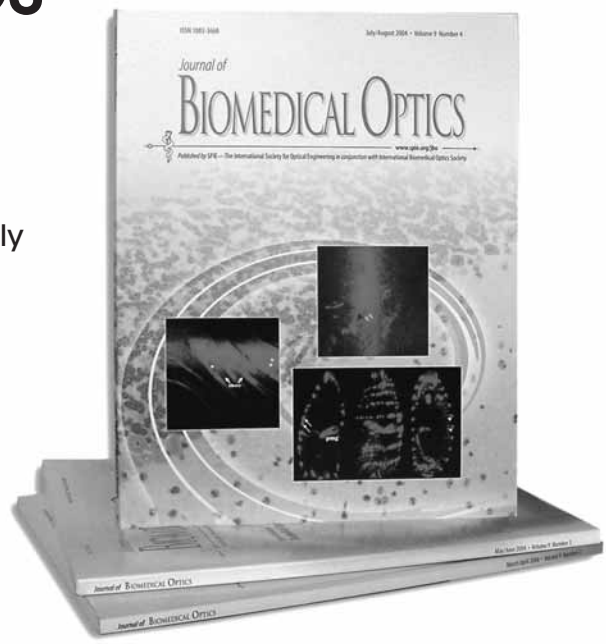

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Kunihiko Washio, Paradigm Laser Research Ltd. (Japan)
Mark S. Zediker, Nuvonyx Inc.

Daily Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	22 January	23 January	24 January	25 January	26 January

Program on

Laser Source Engineering

Program Track Chair: **Gregory Quarles,** VLOC

6101B **8th International Workshop on Laser Beam and Optics Characterization** *(Giesen, Nickel)* p. 120

6100 **Solid State Lasers XV: Technology and Devices** *(Hoffman, Shori)* p. 114

6101C **High Energy/ Average Power Lasers and Intense Beam Applications** *(Davis, Heaven, Schriempf)* p. 121

6101A **Laser Resonators and Beam Control IX** *(Kudryashov, Paxton, Ilchenko)* p. 118

6102 **Best Student Presentation Award** 5:40 to 6:00 pm, p. 122

6102 **Fiber Lasers III: Technology, Systems, and Applications** *(Brown, Nilsson)* p. 122

Program on

Nonlinear Optics

Program Track Chair: **Peter Powers,** University of Dayton

6103 **Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications V** *(Powers)* p. 127

Program on

Semiconductor Lasers and LEDs

Program Track Chair: **Daniel Johnstone,** Virginia Commonwealth University

6104 **High-Power Diode Laser Technology and Applications IV** *(Zediker)* p. 130

6132 **Vertical-Cavity Surface-Emitting Lasers X** *(Lei, Choquette)* p. 200

6133 **Novel In-Plane Semiconductor Lasers V** *(Mermelstein, Bour)* p. 202

6134 **Light-Emitting Diodes: Research, Manufacturing, and Applications X** *(Streubel, Yao, Schubert)* p. 205

Program on

Laser Communication and Propagation

Program Track Chair: **G. Stephen Mecherle,** Innocept Inc.

6105 **Free-Space Laser Communication Technologies XVIII** *(Mecherle)* p. 132

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	22 January	23 January	24 January	25 January	26 January

Program on

Laser Micro-/Nanoengineering and Applications

Program Track Chairs: **Henry Helvajian,** The Aerospace Corp.;
James S. Horwitz, U.S. Department of Energy

6106A **Laser Applications in Microelectronic and Optoelectronic Manufacturing XI** *(Okada, Arnold, Meunier, Holmes)* p. 134

6106B **Synthesis and Photonics of Nanoscale Materials IV** *(Geohegan, Träger, Dubowski)* p. 137

6107 **Laser-Based Micropackaging** *(Bachmann, Hoving, Lu, Washio)* p. 138

6108 **Commercial and Biomedical Applications of Ultrafast Lasers VI** *(Neev, Nolte, Heisterkamp, Schaffer)* p. 140

LASE Special Events

Panel Discussion: **Quantifying High-Power Diode Laser Lifetime**
6:00 to 7:30 pm, p.16

Technical Group Meeting: **Laser Communications**
7:30 to 9:00 pm, p.15
Sponsored by
fiberguide industries

PLENARY SESSION
10:30 am to 12:30 am, p. 14

10:30 am: *Welcome and Introduction*

10:40 am: *Laser Frequency Combs*

11:20 am: *Ways to a Brighter Future with Lasers*

11:50 am: *Taking Technology to the Marketplace*

12:20 pm: *Closing Remarks*

Best Student Presentation Award: **Fiber Lasers III: Technology, Systems and Applications**
5:50 pm, p. 16
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Monday-Thursday 23-26 January 2006 • Proceedings of SPIE Vol. 6100

Solid State Lasers XV: Technology and Devices

Conference Chairs: **Hanna J. Hoffman**, Spectra-Physics; **Ramesh K. Shori**, Univ. of California/Los Angeles

Program Committee: **Henry R. Aldag**, Physical Sciences Inc.; **Michael A. Bass**, College of Optics and Photonics/Univ. of Central F; **|eter Günter**, ETH Zürich (Switzerland); **Norman Hodgson**, Coherent, Inc.; **Dieter Hoffmann**, Fraunhofer-Institut für Lasertechnik (Germany); **Floyd E. Hovis**, Fibertek, Inc.; **Helena Jelínkova**, Czech Technical Univ. in Prague (Czech Republic); **Iain T. McKinnie**, Coherent Technologies, Inc.; **Klaus Petermann**, Technische Univ. Berlin (Germany); **Alan B. Petersen**, Spectra-Physics; **Stephen G. Post**, Air Force Research Lab.; **Narasimha S. Prasad**, NASA Langley Research Ctr.; **Gregory J. Quarles**, VLOC; **Peter G. Schunemann**, BAE Systems plc; **David H. Titterton**, Defence Science and Technology Lab. (United Kingdom)

Monday 23 January

Introductory Remarks

Conv. Ctr. Room J1 . . . . . Mon. 9:00 am

Chairs: **Hanna J. Hoffman**, Spectra-Physics;
Ramesh K. Shori, Univ. of California/Los Angeles

SESSION 1

Conv. Ctr. Room J1 . . . . . Mon. 9:05 to 10:20 am

Compact and Microchip Lasers I

Chair: **Peter Günter**, ETH Zürich (Switzerland)

9:05 am: **Size-scaling of TEM_{00} mode optically-pumped semiconductor lasers** *(Invited Paper),* L. E. Hunziker, C. Ihli, D. S. Steingrube, E. J. Reed, N. Hodgson, Coherent, Inc. . . . . [6100-01]

9:40 am: **Optically pumped semiconductor lasers at 505-nm in the power range above 100 mW,** W. R. Seelert, Coherent Luebeck (Germany); S. Kubasiak, Coherent Luebeck; J. Negendank, Coherent Luebeck (Germany); J. Chilla, H. Zhou, E. S. Weiss, Coherent, Inc. . . . . [6100-02]

10:00 am: **Continuous-wave visible laser by intracavity-doubled fiber laser,** T. Shinozaki, Y. Kaneda, Y. Urata, S. Wada, Megaopto RIKEN (Japan) [6100-03]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

Conv. Ctr. Room J1 . . . . . Mon. 10:50 am to 12:30 pm

Compact and Microchip Lasers II

Chair: **Norman Hodgson**, Coherent, Inc.

10:50 am: **Ceramic Yb:YAG microchip laser,** E. P. Ostby, J. Huie, Raytheon Space and Airborne Systems; R. L. Gentilman, R. A. Ackerman, Raytheon Co. . . . . [6100-04]

11:10 am: **Microchip laser operating at 1338-nm,** J. Sulc, H. Jelinkova, Czech Technical Univ. in Prague (Czech Republic); K. Nejezchleb, V. Skoda, Crytur, Ltd. (Czech Republic) . . . . . [6100-05]

11:30 am: **Subnanosecond tunable dye laser pumped by a Nd:YAG microchip laser,** A. M. Jones, O. F. Swenson, North Dakota State Univ.[6100-06]

11:50 am: **Highly efficient ultra-low threshold microchip cerium fluoride lasers generating sub-nanosecond pulses at 287-nm and 310-nm,** H. Liu, D. Spence, D. Coutts, Macquarie Univ. (Australia) . . . . . [6100-07]

12:10 pm: **Low-cost 355-nm CW milliWatt-scale diode-pumped intra-cavity frequency tripled microchip assembly,** T. Georges, A. Nicolas, C. Chauzat, OXXIUS (France); P. Féron, École Nationale Supérieure des Sciences Appliquées et de Technologie (France) . . . . . [6100-08]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 3

Conv. Ctr. Room J2 . . . . . Mon. 1:30 to 3:20 pm

Joint session with conference 6102.

Lasers in the Eye-Safe Window

Chairs: **Hanna J. Hoffman**, Spectra-Physics;
Johan Nilsson, Univ. of Southampton (United Kingdom)

1:30 pm: **Recent progress in eye-safe solid-state laser with resonant, ultra-low- photon-defect, diode pumping,** M. A. Dubinskii, Army Research Lab. . . . . [6100-09]

1:50 pm: **High-power fiber-bulk hybrid lasers** *(Invited Paper),* W. A. Clarkson, D. Y. Shen, J. K. Sahu, Univ. of Southampton (United Kingdom) . . . . . [6100-10]

2:20 pm: **New development in high power eye-safe LMA fibers,** K. Tankala, B. N. Samson, A. L. Carter, J. Farroni, D. P. Machewirth, N. Jacobson, Nufern; A. Galvanauskas, Univ. of Michigan; W. E. Torruellas, Fibertek, Inc. . . [6102-06]

2:40 pm: **High pulse energy extraction with high peak power from short-pulse, eye safe all-fiber laser system,** M. P. Savage-Leuchs, E. C. Eisenberg, A. Liu, J. Henrie, M. S. Bowers, Aculight Corp. . . . . [6102-07]

3:00 pm: **100-megawatt power Q-switched Er:glass laser,** J. Taboada, J. M. Taboada, Taboada Researsch Instruments, Inc.; D. J. Stolarski, J. Zohner, L. Chavey, Northrop Grumman Corp. . . . . [6100-11]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 4

Conv. Ctr. Room J2 . . . . . Mon. 3:40 to 5:50 pm

Joint session with conference 6102.

Mid-Infrared Lasers and New Materials

Chairs: **Ramesh K. Shori**, Univ. of California/Los Angeles;
Kanishka Tankala, Nufern

3:40 pm: **Progress in hybrid fiber/bulk solid state lasers** *(Invited Paper),* P. F. Moulton, A. Y. Dergachev, Q-Peak, Inc. . . . . [6100-12]

4:10 pm: **Power scalable and efficient 790-nm pumped Tm^{3+}-doped fiber lasers** *(Invited Paper),* G. P. Frith, D. G. Lancaster, Defence Science and Technology Organisation (Australia) . . . . . [6102-08]

4:40 pm: **Multi-component glass fiber lasers,** S. Jiang, NP Photonics, Inc. . . . . [6102-09]

5:00 pm: **3.9-4.8 μm gain-switched lasing of Fe:ZnSe at room temperature,** V. V. Fedorov, J. Kernal, A. Gallian, The Univ. of Alabama at Birmingham; V. V. Badikov, Kuban State Univ.; S. B. Mirov, The Univ. of Alabama at Birmingham . . . . . [6100-13]

5:20 pm: **Mid-IR supercontinuum generation in non-silica glass fibers** *(Invited Paper),* J. H. V. Price, Univ. of Southampton (United Kingdom); T. M. Monro, H. Ebendorff-Heidepriem, The Univ. of Adelaide (Australia); J. Y. Leong, P. Petropoulos, G. Brambilla, V. Finazzi, X. Feng, D. J. Richardson, Univ. of Southampton (United Kingdom) . . . . . [6102-10]

Tuesday 24 January

SESSION 5

Conv. Ctr. Room J1 . . . . . Tues. 8:00 to 10:10 am

Mode Locked and ULF Lasers

Chair: **Hans-Dieter Hoffmann**, Fraunhofer-Institut für Lasertechnik (Germany)

8:00 am: **Future trends and applications of ultrafast laser technology** *(Invited Paper),* J. M. Eichenholz, M. Li, I. A. Read, S. Marzenell, P. Feru, Spectra-Physics; R. D. Boggy, Spectra Physics; J. D. Kafka, Spectra-Physics . . . . . [6100-14]

8:30 am: **High energy, 40 fs compact diode-pumped femtosecond laser for nanostructuring applications,** C. Hoenninger, R. Bello Doua, E. P. Mottay, Amplitude Systemes (France); F. Salin, Univ. Bordeaux 1 (France) . . . [6100-15]

8:50 am: **Diode-pumped Yb3+:CaGdAlO4 femtosecond laser,** Y. Zaouter, Univ. Paris-Sud II (France) and Amplitude Systemes (France); F. P. Druon, P. M. Georges, Univ. Paris-Sud II (France); J. Petit, P. Golner, B. Viana, École Nationale Supérieure de Chimie de Paris (France) . . . . . [6100-16]

9:10 am: **Generation of 13.5-fs pulses from a diode-pumped Kerr-lens mode-locked prismless Cr:LiSGaF laser,** P. Russbueldt, D. Hoffmann, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6100-17]

9:30 am: **Cryogenically cooled Ti:sapphire amplifiers,** A. Fry, Coherent, Inc; S. Fournier, J. Heritier, S. Edstrom, J. MacKay, Coherent, Inc. . . . . [6100-18]

9:50 am: **Temporal characterization of ultrashort laser pulses based on the third-order cross-correlation function,** A. J. Carson, C. C. Barnes, Del Mar Photonics, Inc.; B. R. Campbell, The Pennsylvania State Univ.; N. V. Didenko, S. E. Egorov, A. V. Konyashchenko, Del Mar Photonics, Inc. . . . . [6100-19]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

Conv. Ctr. Room J1 . . . . . Tues. 10:30 am to 12:20 pm

Tunable Lasers

Chair: **Alan B. Petersen**, Spectra-Physics

10:30 am: **High performance, widely tunable Ti:Sapphire laser with nanosecond pulses,** B. Jungbluth, J. Wueppen, J. Geiger, B. Bach-Zelewski, D. Hoffmann, P. Loosen, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6100-20]

11:00 am: **Power scaling and extended tunability of mode-locked Titanium doped sapphire lasers,** S. Marzenell, R. Boggy, I. A. Read, D. E. Spence, J. D. Kafka, Spectra-Physics . . . . . [6100-72]

11:20 am: **High efficiency CW green pumped Alexandrite lasers,** J. W. Kuper, D. C. Brown, Snake Creek Lasers, LLC . . . . . [6100-21]

11:40 am: **Characterization of cobalt doped ZnSe and ZnS crystals as saturable absorbers for alexandrite lasers,** R. A. Sims, J. Kernal, V. V. Fedorov, S. B. Mirov, The Univ. of Alabama at Birmingham . . . . . [6100-22]

12:00 pm: **Construction and characterization of a Ti:Sapphire CW laser system with kHz linewidth,** S. Hadrich, P. Jauernik, Sirah Laser und Plasmatechnik GmbH (Germany); S. Schmid, G. Sommerer, Spectra-Physics GmbH (Germany); L. McCrumb, Spectra-Physics Lasers . . . . . [6100-23]

Lunch/Exhibition Break . . . . . 12:20 to 1:40 pm

SESSION 7

Conv. Ctr. Room J1 . . . . . Tues. 1:40 to 3:10 pm

Laser Materials and Components I

Chair: **Peter G. Schunemann**, BAE Systems plc

1:40 pm: **Fluoride laser crystals: old and new** *(Invited Paper),* H. P. Jenssen, College of Optics and Photonics/Univ. of Central Florida and AC Materials, Inc.; A. Cassanho, AC Materials, Inc. . . . . [6100-24]

2:10 pm: **Modeling of time-dependent thermal effects in Cr2+-doped zinc selenide thin disks,** P. A. Berry, K. L. Schepler, Air Force Research Lab. . . . . [6100-25]

2:30 pm: **Middle-infrared electroluminescence of n-type Cr doped ZnSe crystals,** L. Luke, V. V. Fedorov, I. S. Moskalev, A. Gallian, S. B. Mirov, The Univ. of Alabama at Birmingham . . . . . [6100-26]

2:50 pm: **Mid-infrared (3-5 um) emission from rare earth doped KPb2Br5,** U. Hommerich, E. Nyein, P. Amedzake, Hampton Univ.; S. B. Trivedi, Brimrose Corp. of America; J. M. Zavada, U.S. Army Research Office . . . . . [6100-27]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 8

Conv. Ctr. Room J1 . . . . . Tues. 3:30 to 5:20 pm

Laser Materials and Components II

Chair: **Yehoshua Y. Kalisky**, Nuclear Research Ctr. Negev (Israel)

3:30 pm: **Spatial mapping of fluorescence and Raman spectra across grain boundaries in a transparent Nd-YAG ceramic laser material,** V. Gopalan, W. B. White, J. P. Stitt, G. L. Messing, The Pennsylvania State Univ. . [6100-28]

3:50 pm: **Development of Neodymium doped ceramic Yttria,** N. S. Prasad, NASA Langley Research Ctr.; S. B. Trivedi, S. Kutcher, C. Wang, G. V. Jagannathan, Brimrose Corp. of America; U. Hommerich, Hampton Univ.; V. Shukla, R. Sadangi, B. Kear, Rutgers Univ. . . . . [6100-29]

4:10 pm: **Laser properties of mixed Nd:YxGd1-x VO4 crystals with different crystal compositions,** Y. Tang, X. Wang, S. Tang, Crystal Research, Inc.; N. C. Fernelius, Air Force Research Lab. . . . . [6100-30]

4:30 pm: **Compositional influence on spectroscopy properties of Yb3+ doped tellurite glasses,** M. A. Alencar, R. F. Souza, M. V. Vermelho, M. T. de Araujo, J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil); L. R. Kassab, R. Kobayashi, Univ. Estadula de Sao Paulo (Brazil) . . . . [6100-31]

4:50 pm: **From 20 Hz to hundreds of electron volts: rare Earth materials for high-bandwidth optical signal processing, lasers, and phosphors** *(Invited Paper),* R. L. Cone, C. W. Thiel, P. B. Sellin, Montana State Univ./ Bozeman; T. Böttger, Univ. of San Francisco; Y. Sun, Montana State Univ./ Bozeman; R. M. Macfarlane, IBM Almaden Research Ctr. . . . . [6100-32]

LASE Seminar and Panel Discussion

Quantifying High-Power Diode Laser Lifetime

Tues. 6:00 to 7:30 pm · Convention Center: Room J3

See page 16 for details.

Wednesday 25 January

SESSION 9

Conv. Ctr. Room J1 . . . . . Wed. 7:50 to 9:00 am

High Power Lasers

Chair: **Floyd E. Hovis**, Fibertek, Inc.

7:50 am: **MOPA with kW average power and multi MW peak power: experimental results, theoretical modeling and scaling limits** *(Invited Paper),* K. Nicklaus, M. Hoefer, H. D. Hoffmann, J. Luttmann, R. Wester, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6100-33]

8:15 am: **Power-scaling in re-imaging waveguide lasers** *(Invited Paper),* I. T. McKinnie, Coherent Technologies, Inc.; B. Callicoatt, National Institute of Standards and Technology; C. S. Wood, J. Koroshetz, J. R. Unternahrer, M. Tartaglia, S. Christensen, O. Koski, M. Hinckley, M. J. Bellanca, E. Schneider, D. D. Smith, Coherent Technologies, Inc. . . . . [6100-34]

8:40 am: **Improving the beam quality of a high power Yb:YAG rod laser,** D. G. Harris, F. Patel, C. Turner, Jr., The Boeing Co. . . . . [6100-35]

SESSION 10

Conv. Ctr. Room J1 . . . . . Wed. 9:00 to 10:10 am

Harmonic Power Scaling

Chair: **Iain T. McKinnie**, Coherent Technologies, Inc.

9:00 am: **High power Q-switched TEM_{00} mode diode-pumped solid state lasers with > 30W output power at 355-nm** *(Invited Paper),* C. X. Wang, G. Y. Wang, A. V. Hicks, D. R. Dudley, Y. H. Pang, N. Hodgson, Coherent, Inc. . . . . [6100-36]

9:25 am: **High power second and third harmonics generation of a two stage partially diode end-pumped Nd:YAG INNOSLAB MOPA System,** M. Höfer, J. Löhring, S. Röhrig, J. Luttmann, K. Nicklaus, R. Wester, D. Hoffmann, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6100-37]

9:45 am: **Advances in high power harmonic generation** *(Invited Paper),* L. A. Eyres, J. Gregg, J. Morehead, D. J. Richard, W. M. Grossman, JDS Uniphase Corp. . . . . [6100-38]

Coffee Break . . . . . 10:10 to 10:30 am

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:10 pm

SESSION 11

Conv. Ctr. Room J1 . . . . . Wed. 1:10 to 3:40 pm

Joint session with conference 6103.

Frequency Converted Lasers

Chairs: **Peter E. Powers**, Univ. of Dayton; **Hanna J. Hoffman**, Spectra-Physics; **Gregory J. Quarles**, VLOC Inc.

1:10 pm: **Generation of THz and IR Radiation in DAST crystals** *(Invited Paper),* P. Günter, ETH Zürich (Switzerland) . . . . . [6100-39]

1:40 pm: **100 Terawatt laser based on optical parametric amplification in DKDP crystal,** E. A. Khazanov, V. V. Lozhkarev, V. Ginzburg, E. Katin, A. Kirsanov, G. Luchinin, A. Mal'shakov, M. Martyanov, O. V. Palashov, A. K. Poteomkin, A. M. Sergeev, G. I. Freidman, A. Shaikin, I. V. Yakovlev, Institute of Applied Physics (Russia) . . . . . [6100-40]

2:00 pm: **Frequency conversion concepts for the efficient generation of high power 935-nm - 942-nm laser radiation,** H. Rhee, T. Riesbeck, F. Kallmeyer, S. Strohmaier, H. J. Eichler, Technische Univ. Berlin (Germany); A. A. Kaminskii, Institute of Crystallography (Russia); K. Petermann, Univ. Hamburg (Germany) . . . . . [6103-08]

2:20 pm: **High efficient generation of tunable visible light by means of DFG in self-controlled conversion processes,** J. Wueppen, B. Jungbluth, M. Vierkoetter, D. Hoffmann, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6103-09]

2:40 pm: **New wavelengths generated by BaWO4 or KGW intracavity Raman laser,** H. Jelínkova, J. _ulc, M. Nemec, Czech Technical Univ. in Prague (Czech Republic); J. K. Jabczynski, W. Zendzian, Wojskowa Akademia Techniczna (Poland) . . . . . [6100-41]

3:00 pm: **Blue light generation using a broad-area diode-laser in two passively coupled ring-resonators,** D. Skoczowsky, V. Raab, R. Menzel, Univ. Potsdam (Germany) . . . . . [6103-07]

3:20 pm: **Characterization of RTP crystals for electro-optic and non-linear applications,** H. Albrecht, M. A. Herrmann, D. Lupinski, Cristal Laser SA (France) . . . . . [6100-42]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Modeling a diode pumped Nd: YAG rod laser,** H. Shu, Y. Chen, M. A. Bass, College of Optics and Photonics/Univ. of Central Florida; M. A. Acharekar, Sensors World, Inc. . . . . [6100-56]

✔ **Cryogenic Faraday isolator for high average power lasers,** D. S. Zheleznov, I. B. Mukhin, O. V. Palashov, A. V. Voitovich, E. A. Khazanov, Institute of Applied Physics (Russia) . . . . . [6100-59]

✔ **Diode-end-pumped actively and passively Q-switched Nd:GdVO4 lasers at 1.34 mm,** C. Du, S. Ruan, Y. Yu, Shenzhen Univ. (China) . . . . . [6100-60]

✔ **Novel laser range finding algorithms,** J. Chen, Chung-Hua Univ. (Taiwan) . . . . . [6100-61]

✔ **Improvement of output power dynamic range of unsymmetric Nd:YAG laser with unstable laser mirror configuration,** H. S. Kim III, Chosun Univ. (South Korea) . . . . . [6100-62]

✔ **Investigation of the characteristic of InGaAs single quantum well semiconductor saturable absorber mirror for passive mode-locking for Yb:YAG laser,** H. S. Kim, J. Kim, J. Park, Chosun Univ. (South Korea) . . . . . [6100-63]

✔ **Side-pumped Neodymium slab lasers Q-switched by V:YAG on 1.3 μm,** J. K. Jabczyski, W. Zendzian, J. Kwiatkowski, Wojskowa Akademia Techniczna (Poland); J. Sulc, M. Nemec, H. Jelínkov, Czech Technical Univ. in Prague (Czech Republic) . . . . . [6100-64]

✔ **Lasing properties of new Nd³⁺-doped tungstate, molybdate, and fluoride materials under selective optical pumping,** J. _ulc, H. Jelínkov, Czech Technical Univ. in Prague (Czech Republic); T. T. Basiev, M. E. Doroschenko, L. I. Ivleva, V. V. Osiko, P. G. Zverev, General Physics Institute (Russia) . . . . . [6100-65]

✔ **Experimental method research on kHz, ns pulsed Nd:YAG laser with diode-end-pumped, acousto-optic and Cr:YAG passive Q-switched,** H. Zhao, The North China Research Institute of Electro-Optics (China) . . . . . [6100-66]

✔ **Enhancement of blue thulium emission on Nd:Yb:Tm doped YLF crystals,** L. C. Courrol, Faculdade de Tecnologia de São Paulo (Brazil); I. M. Ranieri, L. Gomes, S. L. Baldochi, N. D. Vieira, Jr., Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [6100-67]

✔ **Acousto-optically Q-switched and mode locked diode pumped Nd:YVO4 laser,** J. K. Jabczynski, W. Zendzian, J. Kwiatkowski, Wojskowa Akademia Techniczna (Poland) . . . . . [6100-68]

✔ **Mode locked Nd:YVO4 laser with intracavity synchronously pumped optical parametric oscillator,** A. Zavadilova, V. Kubecek, M. Cech, P. Hirsl, H. Jelinkova, Czech Technical Univ. in Prague (Czech Republic); J. M. Diels, The Univ. of New Mexico . . . . . [6100-69]

✔ **Optimization of a femtosecond Ti:Sapphire amplifier using an acousto-optic programmable dispersive filter, SPIDER and a genetic algorithm,** O. Korovyanko, R. Rey-de-Castro, C. Elles, Y. Li, R. A. Crowell, Argonne National Lab. . . . . [6100-75]

✔ **Power scaling 1617-nm Er:YAG operation using narrow bandwidth output coupler,** V. Leyva, K. Spariosu, Raytheon Co. . . . . [6100-76]

Thursday 26 January

Sessions 12 and 13 run concurrent with Session 14

SESSION 12

Conv. Ctr. Room J1 . . . . . Thurs. 8:00 to 10:25 am

Special Session: Space Qualifyied Laser Components and Systems I

Chair: **Ramesh K. Shori**, Univ. of California/Los Angeles

Opening Remarks . . . . . 8:00 to 8:05 am

8:05 am: **Review of solid-state lasers for space applications** *(Tutorial),* R. S. Afzal, Spectra Systems Corp. . . . . [6100-43]

8:35 am: **Qualification and issues with space flight laser systems and components** *(Invited Paper),* M. N. Ott, D. B. Coyle, NASA Goddard Space Flight Ctr.; J. S. Canham, Swales Aerospace; H. W. Leidecker, Jr., NASA Goddard Space Flight Ctr. . . . . [6100-70]

8:55 am: **Space qualification issues in AcoustoOptic Tunable Filter (AOTF) based spectrometers** *(Invited Paper),* S. B. Trivedi, J. I. Soos, F. Jin, S. Kutcher, Brimrose Corp. of America; N. S. Prasad, NASA Langley Research Ctr. [6100-45]

9:25 am: **Qualification of the laser transmitter for the CALIPSO aerosol lidar mission** *(Invited Paper),* F. E. Hovis, Fibertek, Inc. . . . . [6100-46]

9:55 am: **Qualification of fiber lasers for space applications** *(Invited Paper),* S. T. Hendow, S. E. Falvey, B. E. Nelson, Northrop Grumman Corp. . . . . [6100-73]

Coffee Break . . . . . 10:25 to 10:50 am

SESSION 13

Conv. Ctr. Room J1 . . . . . Thurs. 10:50 am to 12:50 pm

Special Session: Space Qualified Laser Components and Systems II

Chair: **Narasimha S. Prasad**, NASA Langley Research Ctr.

10:50 am: **Stable, tunable solid-state laser sources for airborne and space-based laser radar applications** *(Invited Paper),* C. P. Hale, J. W. Hobbs, E. C. Andrews, M. W. Phillips, Coherent Technologies, Inc. . . . . [6100-48]

11:20 am: **Performance of the GLAS laser transmitter** *(Invited Paper),* R. S. Afzal, Spectra Systems Corp. . . . . [6100-49]

11:50 am: **High efficiency, passively Q-switched Nd:YAG MOPA for spaceborne laser-altimetry** *(Invited Paper),* D. Kracht, S. Hahn, J. Neumann, R. Wilhelm, M. Frede, Laser Zentrum Hannover eV (Germany); P. Peuser, European Aeronautic Defence and Space Co. (Germany) . . . . . [6100-71]

12:20 pm: **Flight hardening of laser systems** *(Invited Paper),* K. Dinndorff, BAE Systems . . . . . [6100-50]

SESSION 14

Conv. Ctr. Room F1 . . . . . Thurs. 8:30 to 11:40 am

Laser Systems Designs, Modeling, and Applications

Chair: **Helena Jelínkova**, Czech Technical Univ. in Prague (Czech Republic)

8:30 am: **High-power solid-state sodium laser guidestar for the Gemini North Observatory** *(Invited Paper),* A. J. Tracy, A. K. Hankla, C. A. Lopez, D. C. Sadighi, I. T. McKinnie, Coherent Technologies, Inc.; C. d'Orgeville, M. P. Sheehan, Gemini Observatory; D. J. Bamford, Physical Sciences, Inc.; S. J. Sharpe, D. J. Cook, Physical Sciences Inc. . . . . [6100-51]

9:00 am: **Optical extraction from Nd:YAG lasers with ASE gain depumping losses,** D. A. Copeland, The Boeing Co. . . . . [6100-52]

9:20 am: **Comparative performance of passively Q-switched diode-pumped Yb:GGG, Yb:YAG, and Yb-doped tungstates lasers using Cr4+ -doped garnets,** Y. Y. Kalisky, Nuclear Research Ctr. Negev (Israel); G. Boulon, Univ. Claude Bernard Lyon 1 (France); O. Kalisky, Jerusalem College of Technology (Israel) . . . . . [6100-53]

9:40 am: **Saturable absorbed Er:YAG Q-switched laser with short pulse,** V. Leyva, K. Spariosu, R. D. Stultz, Raytheon Co. . . . . [6100-77]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **High-power Q-switched rotary disk lasers,** S. Basu, Sparkle Optics Corp. . . . . [6100-54]

10:50 am: **Tailoring the performance of solid state lasers: why and how,** S. Geiger, Bavarian Photonics GmbH (Germany) . . . . . [6100-55]

11:10 am: **Diode pumped pulsed solid state MOPA-systems with high brilliance for remote sensing applications** *(Invited Paper),* M. Ostermeyer, Univ. Potsdam (Germany) . . . . . [6100-74]

Wednesday-Thursday 25-26 January 2006 • Part of Proceedings of SPIE Vol. 6101

Laser Resonators and Beam Control IX

Conference Chairs: **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia) and Adopt Ltd. (Russia); **Alan H. Paxton**, Air Force Research Lab.; **Vladimir S. Ilchenko**, OEwaves, Inc.

Program Committee: **Jean-Claude M. Diels**, The Univ. of New Mexico; **Hans J. Eichler**, Technische Univ. Berlin (Germany); **Pierre Galarneau**, Institut National d'Optique (Canada); **Thomas Graf**, Univ. Stuttgart (Germany); **James R. Leger**, Univ. of Minnesota; **Vittorio C. Magni**, Politecnico di Milano (Italy); **Andrey B. Matsko**, Jet Propulsion Lab.; **Horst Weber**, Technische Univ. Berlin (Germany); **Koji Yasui**, Mitsubishi Electric Corp. (Japan); **Luis E. Zapata**, Raytheon Co.

Wednesday 25 January

Welcome and Opening Remarks

Conv. Ctr. Room J3 . . . . . Wed. 8:00 am

Chair: **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia) and Adopt Ltd. (Russia)

SESSION 1

Conv. Ctr. Room J3 . . . . . Wed. 8:10 to 10:10 am

Opening Session

Chairs: **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia) and Adopt Ltd. (Russia); **Vladimir S. Ilchenko**, OEwaves, Inc.

8:10 am: **Study of dark line resonances with mode-locked lasers and its applications** *(Invited Paper),* L. Arissian, J. M. Diels, The Univ. of New Mexico . . . . . [6101A-01]

8:40 am: **Optical manipulation using extended light fields** *(Invited Paper),* P. Reece, V. G. Garcés-Chávez, M. P. MacDonald, K. Dholakia, Univ. of St. Andrews (United Kingdom) . . . . . [6101A-78]

9:10 am: **Spinning-disk lasers, computer simulation,** A. H. Paxton, Air Force Research Lab. . . . . [6101A-10]

9:30 am: **Three-mirror laser resonators: revisited,** J. R. Leger, Z. Yang, Univ. of Minnesota . . . . . [6101A-14]

9:50 am: **About some new possibilities of increasing the intrinsic output power of the photon beam: for definite laser active media,** C. I. Isarie, I. V. Isarie, State Univ. of Sibiu (Romania); A. M. Voineag, Inspectoratul de Invatamant (Romania); D. V. Muntean, SC. Satroagro SRL Bucuresti (Romania) . . . . . [6101A-04]

Coffee Break . . . . . 10:10 to 10:30 am

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:20 pm

SESSION 2

Conv. Ctr. Room J3 . . . . . Wed. 1:20 to 3:10 pm

Laser Design and Beam Improvement

Chairs: **Alan H. Paxton**, Air Force Research Lab.; **James R. Leger**, Univ. of Minnesota

1:20 pm: **Progress on the national ignition facility** *(Invited Paper),* E. I. Moses, Lawrence Livermore National Lab. . . . . [6101A-79]

1:50 pm: **Adaptive systems for single pulse lasers,** A. V. Kudryashov, Moscow State Open Univ. (Russia) and Adopt Ltd. (Russia); A. Alexandrov, V. V. Samarkin, Moscow State Open Univ. (Russia) . . . . . [6101A-80]

2:10 pm: **Recent developments in real-time, intracavity, adaptive correction of a multi-kilowatt, solid-state, heat-capacity laser,** K. N. LaFortune, R. L. Hurd, S. S. Olivier, J. M. Brase, R. M. Yamamoto, Lawrence Livermore National Lab. . . . . [6101A-08]

2:30 pm: **Assigning error to an ISO 11146 M2 measurement,** T. S. Ross, Air Force Research Lab. . . . . [6101A-06]

2:50 pm: **Dispersion compensation in optical parametric chirped-pulse amplification systems,** C. Wang, Y. Leng, X. Liang, B. Zhao, Z. Xu, Shanghai Institute of Optics and Fine Mechanics (China) . . . . . [6101A-05]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 3

Conv. Ctr. Room J3 . . . . . Wed. 3:30 to 5:10 pm

Adaptive Optics and Beam Control

Chair: **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia) and Adopt Ltd. (Russia)

3:30 pm: **Adaptive wavelets applied to distortion correction in laser diode arrays,** K. J. Jones, Rice Univ. . . . . [6101A-13]

3:50 pm: **Thermo-optically driven adaptive mirror,** F. Reinert, W. A. Lüthy, Univ. Bern (Switzerland) . . . . . [6101A-07]

4:10 pm: **Correction of the radiation of 1 kW CW diode pumped glass laser,** J. V. Sheldakova, V. V. Samarkin, Moscow State Open Univ. (Russia) [6101A-81]

4:30 pm: **Intracavity self-frequency conversion in periodically poled active nonlinear Nd:Mg:LiNbO3 crystal,** A. A. Novikov, G. D. Laptev, I. V. Shutov, |M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6101A-11]

4:50 pm: **Aberration correction in a telescope with a membrane primary mirror,** S. A. Dimakov, S.I. Vavilov State Optical Institute (Russia) . . [6101A-86]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Modern laser technologies used for cutting textile materials,** C. I. Isarie, A. Dragan, State Univ. of Sibiu (Romania); L. G. Isarie, SC SibDress SA (Romania) . . . . . [6101A-15]

✔ **Noise reduction of violet laser diodes by selection of feedback light polarization,** H. Konishi, W. Sasaki, H. Yashiro, K. Takegami, Doshisha Univ. (Japan); A. Ikeda, Y. Kamioka, K. Nagashima, Funai Electric Co., Ltd. (Japan) . . . . . [6101A-16]

✔ **Spatial structure of radiation at self-frequency conversion in active nonlinear crystals,** A. A. Novikov, G. D. Laptev, A. S. Chirkin, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6101A-18]

✔ **Modal analysis of 'non-Gaussian' Gaussian laser beams,** T. S. Ross, Air Force Research Lab. . . . . [6101A-19]

✔ **Development of a lamp-pumped Cr:LiSAF laser operating at 20Hz for a Terawatt CPA system,** R. E. Samad, G. E. C. Nogueira, S. L. Baldochi, N. D. Vieira, Jr., Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [6101A-20]

✔ **Fano resonance in transmission spectra of a tapered optical fiber coupled with a microsphere,** H. Fujiwara, A. Chiba, J. Hotta, S. Takeuchi, K. Sasaki, Hokkaido Univ. (Japan) . . . . . [6101A-73]

✔ **Photorefractivity in WGM resonators,** A. B. Matsko, Jet Propulsion Lab. . . . . [6101A-74]

✔ **Axial systems of small contrast,** A. A. Savchenkov, Jet Propulsion Lab. . . . . [6101A-75]

Thursday 26 January

SESSION 4

Conv. Ctr. Room J3 . . . . . Thurs. 8:00 to 8:40 am

CO_2 Lasers

Chairs: **Alan H. Paxton**, Air Force Research Lab.; **Jean-Claude M. Diels**, The Univ. of New Mexico

8:00 am: **One-color operation of the RF pulse excited slab-waveguide CO_2 laser,** E. F. Plinski, J. S. Witkowski, D. A. Wojaczek, Politechnika Wroclawska (Poland) . . . . . [6101A-02]

8:20 am: **Laser Doppler velocimetry using photoacoustic effect of RF-excited CO_2 laser,** J. Choi, Honam Univ. (South Korea) . . . . . [6101A-09]

SESSION 5

Conv. Ctr. Room J3 . . . . . Thurs. 8:40 to 10:00 am

Fiber Lasers and Gratings

Chairs: **Pierre Galarneau**, Institut National d'Optique (Canada); **Vladimir S. Ilchenko**, OEwaves, Inc.

8:40 am: **Bending insensitive, highly Yb-Doped LMA triple-clad fiber for nearly diffraction-limited laser output,** A. Croteau, C. Paré, H. Zheng, P. Laperle, Y. Taillon, Institut National d'Optique (Canada) . . . . . [6101A-82]

9:00 am: **Generation mechansims of white light laser radiation in tapered fibers** *(Invited Paper),* R. Zhang, J. Teipel, D. Tuerke, H. W. Giessen, Univ. Bonn (Germany) . . . . . [6101A-83]

9:20 am: **Hybrid ECL/DBR wavelength and spectrum stabilized lasers demonstrate high power and narrow spectral linewidth,** S. Rudder, Innovative Photonic Solutions; G. J. Steckman, Ondax, Inc. . . . . [6101A-03]

9:40 am: **Method of fabrication of 1D and 2D gratings,** D. Stepanov, S. Surve, Bandwidth Foundry Pty Ltd. (Australia) . . . . . [6101A-84]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Conv. Ctr. Room J3 . . . . . Thurs. 10:30 am to 1:00 pm

Micro Resonators: Part I

Chairs: **Andrey B. Matsko**, Jet Propulsion Lab.; **James R. Leger**, Univ. of Minnesota

10:30 am: **Silicon microspheres** *(Invited Paper),* A. Serpengüzel, Koç Univ. (Turkey) . . . . . [6101A-67]

11:00 am: **Whispering gallery modes excitation in borosilicate glass microspheres by K+ ion-exchanged channel waveguide coupler,** K. Grujic, Univ. of Tromso (Norway); J. P. Hole, Univ. of Southampton (United Kingdom); O. G. Helleso, Univ. of Tromso (Norway); J. S. Wilkinson, Univ. of Southampton (United Kingdom) . . . . . [6101A-64]

11:20 am: **Laser resonators formed by two nanoparticles,** X. Wu, W. Fang, A. Yamilov, A. A. Chabanov, H. Cao, Northwestern Univ. . . . . [6101A-12]

11:40 am: **Radiation-pressure-driven micro-mechanical oscillator** *(Invited Paper),* K. J. Vahala, California Institute of Technology . . . . . [6101A-61]

12:10 pm: **Heavy photon states in photonic chains of resonantly coupled size-matched microsphres** *(Invited Paper),* M. Kuwata-Gonokami, The Univ. of Tokyo (Japan) . . . . . [6101A-62]

12:40 pm: **Crystalline micro-resonators: status and applications,** I. S. Grudinin, California Institute of Technology . . . . . [6101A-70]

Lunch/Exhibition Break . . . . . 1:00 to 2:00 pm

SESSION 16

Conv. Ctr. Room J3 . . . . . Thurs. 2:00 to 5:30 pm

Micro Resonators: Part II

Chair: **Vladimir S. Ilchenko**, OEwaves, Inc.

2:00 pm: **Calligraphic poling for WGM resonators** *(Invited Paper),* M. Mohageg, Jet Propulsion Lab. . . . . [6101A-69]

2:30 pm: **Ultra-low threshold quantum dot microdisk laser,** Z. G. Xie, S. Goetzinger, Stanford Univ.; W. Fang, Northwestern Univ.; Y. Yamamoto, Stanford Univ.; H. Cao, Northwestern Univ.; G. S. Solomon, Stanford Univ. . . . . [6101A-63]

2:50 pm: **Recent advances in organic electro-optic materials for ring micro-resonators and optical modulation,** A. Akelaitis, L. R. Dalton, Univ. of Washington . . . . . [6101A-72]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Nonlinear optics in ray-chaotic resonators,** E. E. Narimanov, J. Zubin, Princeton Univ. . . . . [6101A-85]

3:50 pm: **Influence of a controllable scatterer on the high-Q modes of a microsphere resonator,** A. Mazzei, H. Krauter, L. de Souza Menezes, S. Götzinger, Humboldt-Univ. zu Berlin (Germany); V. Sandoghdar, ETH Zürich (Switzerland); O. Benson, Humboldt-Univ. zu Berlin (Germany) . . . . . [6101A-76]

4:10 pm: **Edge roughness in microresonators: optimum design strategies,** J. E. Heebner, E. Chang, J. S. Kallman, T. C. Bond, M. E. Lowry, Lawrence Livermore National Lab. . . . . [6101A-66]

4:30 pm: **Silica polygonal micropillar resonators: Fano lineshapes tuning by using a Mach-Zehnder interferometer,** K. Y. Hon, A. W. Poon, The Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6101A-65]

4:50 pm: **Spontaneous emission lifetime modification using high quality factor oxide apertured micropillars,** N. Stoltz, M. Rakher, S. Strauf, A. Badolato, Univ. of California/Santa Barbara; D. D. Lofgreen, Raytheon Vision Systems; P. M. Petroff, L. A. Coldren, D. Bouwmeester, Univ. of California/Santa Barbara . . . . . [6101A-68]

5:10 pm: **Geometric optics of whispering gallery modes,** M. L. Gorodetsky, A. E. Fomin, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6101A-71]

Sunday 22 January 2006 • Part of Proceedings of SPIE Vol. 6101

8th International Workshop on
Laser Beam and Optics Characterization

Conference Chairs: **Adolf Giesen**, Univ. Stuttgart (Germany); **Detlef Nickel**, Univ. Stuttgart (Germany)

Program Committee: **Jean M. Bennett**, Naval Air Warfare Ctr.; **Alexander S. Dement'ev**, Institute of Physics (Lithuania); **Angela Duparré**, Fraunhofer-Institut für Optik und Feinmechanik (Germany); **Pedro M. Mejias**, Univ. Complutense de Madrid (Spain); **George Nemes**, Astigmat; **Detlev Ristau**, Laser Zentrum Hannover e.V. (Germany); **Horst Weber**, Technische Univ. Berlin (Germany)

Sunday 22 January

Welcome and Opening Remarks

Conv. Ctr. Room F1 . . . . . Sun. 9:00 am

Chair: **Adolf Giesen**, Univ. Stuttgart (Germany)

SESSION 8

Conv. Ctr. Room F1 . . . . . Sun. 9:10 am to 12:00 pm

Beam Characterization

Chair: **Adolf Giesen**, Univ. Stuttgart (Germany)

9:10 am: **Measuring the chirp of an ultrashort laser pulse at the noise floor,** D. Bender, M. P. Hasselbeck, M. Sheik-Bahae, The Univ. of New Mexico . . . . . [6101B-22]

9:30 am: **Characterization of general astigmatic beams,** A. Letsch, A. Giesen, Univ. Stuttgart (Germany) . . . . . [6101B-23]

9:50 am: **Correlation between geometrical and intrinsic classification of general astigmatic laser beams,** G. Nemes, ASTiGMAT . . . . . [6101B-24]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Comparison of laser beams quality criteria,** E. A. Khazanov, E. Perevezentsev, A. K. Poteomkin, Institute of Applied Physics (Russia) . . . . . [6101B-25]

11:00 am: **Comparison of different beam diameter definitions to characterise thermal damage of the eye,** K. Schulmeister, R. Gilber, F. Edthofer, B. Seiser, Austrian Research Ctrs. GmbH - Seibersdorf (Austria) . . . . . [6101B-26]

11:20 am: **Characterization device for measuring beam parameter product and beam quality of collimated and uncollimated diode lasers,** M. Roehner, C. Scholz, K. M. Boucke, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6101B-27]

11:40 am: **ETALONs for pure and composite transversal modes,** M. R. Duparré, B. Luedge, Friedrich-Schiller-Univ. Jena (Germany); S. Schroeter, Institut für Physikalische Hochtechnologie e.V. (Germany) . . . . . [6101B-28]

Lunch Break . . . . . 12:00 to 1:40 pm

SESSION 9

Conv. Ctr. Room F1 . . . . . Sun. 1:40 to 4:00 pm

Optics Characterization

Chair: **Detlev Ristau**, Laser Zentrum Hannover e.V. (Germany)

1:40 pm: **Spot size dependence of LIDT in the ns regime,** M. Jupé, L. S. Jensen, K. Starke, D. Ristau, Laser Zentrum Hannover e.V. (Germany); Y. Lien, D. Wernham, European Space Agency (Netherlands) . . . . . [6101B-29]

2:00 pm: **Scattering analysis of optical components in the DUV,** S. Schröder, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany); S. Gliech, A. Duparré, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6101B-30]

2:20 pm: **Two-dimensional optical thickness mapping technique based on nonlinear phase modulation of a focused laser beam,** N. V. Tabiryan, S. R. Nersisyan, BEAM Engineering for Advanced Measurements Co. [6101B-33]

2:40 pm: **Automated test station for laser-induced damage threshold measurements according ISO 11254-2 standard,** A. Melninkaitis, D. Miksys, T. Balciunas, T. Rakickas, R. Grigonis, V. Sirutkaitis, Vilnius Univ. (Lithuania) . . . . . [6101B-34]

Coffee Break . . . . . 3:00 to 3:20 pm

3:20 pm: **Absorptance and scattering losses measurements in IR range by high average power tunable radiation of optical parametric oscillator based on a periodically poled lithium niobate,** O. Balachninaite, M. Maciulevicius, A. Melninkaitis, M. Sinkevicius, R. Grigonis, V. Sirutkaitis, Vilnius Univ. (Lithuania); R. Eckardt, Cleveland Crystals Inc. . . . . [6101B-35]

3:40 pm: **Detection of laser optic damage using gradient direction sensitive matching,** B. Chen, J. Tzeng, L. M. Kegelmeyer, J. Liebman, S. Azevedo, D. W. Paglieroni, Lawrence Livermore National Lab. . . . . [6101B-36]

Wednesday 25 January

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

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✔ **On the characterization of the rotation of the irradiance profile of partially coherent beams,** R. Martínez-Herrero, P. M. Mejías, Univ. Complutense de Madrid (Spain) . . . . . [6101B-37]

✔ **Characterization of non-uniformly totally polarized beams,** R. Martinez-Herrero, P. M. Mejías, G. Piquero, Univ. Complutense de Madrid (Spain) . . . . . [6101B-38]

✔ **Spatial characterization of laser beams modified by interferences,** J. Serna, Univ. Complutense de Madrid (Spain) . . . . . [6101B-39]

Monday 23 January 2006 • Part of Proceedings of SPIE Vol. 6101

High Energy/Average Power Lasers and Intense Beam Applications

Conference Chairs: **Steven J. Davis**, Physical Sciences Inc.; **Michael C. Heaven**, Emory Univ.; **J. Thomas Schriempf**, EOC Penn State

Monday 23 January

Opening Remarks

Conv. Ctr. Room F1 . . . . . Mon. 8:15 am

SESSION 11

Conv. Ctr. Room F1 . . . . . Mon. 8:20 to 9:40 am

Electrically-Pumped Laser Systems

8:20 am: **Electra: repetitively pulsed 700 J, 100 ns electron beam pumped KrF laser,** M. F. Wolford, Science Applications International Corp.; M. C. Myers, J. L. Giuliani, Jr., J. D. Sethian, Naval Research Lab.; F. Hegeler, Commonwealth Technology Inc. . . . . [6101C-40]

8:40 am: **High power and short pulse RF-excited CO2 laser MOPA system for LLP EUV light source,** T. Ariga, H. Hoshino, T. Miura, A. Endo, Extreme Ultraviolet Lithography System Development Association (Japan) . . [6101C-41]

9:00 am: **Super power avalanches discharge and its application for the excitation of gas lasers,** V. F. Tarasenko, Institute of High Current Electronics (Russia); S. I. Yakovlenko, General Physics Institute (Russia) . . . . . [6101C-42]

9:20 am: **Non-chain HF and DF lasers pumping self-sustained discharge,** V. F. Tarasenko, A. N. Panchenko, V. M. Orlovskii, Institute of High Current Electronics (Russia) . . . . . [6101C-43]

SESSION 12

Conv. Ctr. Room F1 . . . . . Mon. 9:40 to 10:20 am

Solid State Lasers

9:40 am: **Development of thermally controlled diode-pumped solid-state laser,** O. Matsumoto, R. Yasuhara, T. Kurita, Osaka Univ. (Japan) and Hamamatsu Photonics K.K. (Japan); T. Ikegawa, Osaka Univ. (Japan) and Hamamatsu Photonics K.K. (Kenya); T. Sekine, T. Kawashima, Osaka Univ. (Japan) and Hamamatsu Photonics K.K. (Japan); J. Kawanaka, T. Norimatsu, N. Miyanaga, Y. Izawa, M. Nakatsuka, Osaka Univ. (Japan); M. Miyamoto, H. Kan, Hamamatsu Photonics K.K. (Japan); H. Furukawa, S. Motokoshi, Osaka Univ. (Japan) . . . . . [6101C-44]

10:00 am: **A 100-kHz thin disk Yb:YAG regenerative amplifier,** T. Miura, A. Endo, Extreme Ultraviolet Lithography System Development Association (Japan) . . . . . [6101C-46]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 13

Conv. Ctr. Room F1 . . . . . Mon. 10:50 to 11:50 am

Laser Applications

10:50 am: **Multiple applications for the 10kW fiber laser at the electro-optics center,** D. J. Sames, T. M. Lehecka, The Pennsylvania State Univ. . . . . [6101C-47]

11:10 am: **Concrete cutting using high-power fiber laser,** K. Tei, Tokai Univ. (Japan) . . . . . [6101C-48]

11:30 am: **Laser-driven acoustic waves in back-irradiated thin solid foils,** A. Zinovev, W. F. Calaway, Jr., J. F. Moore, M. J. Pellin, I. Veryovkin, Argonne National Lab. . . . . [6101C-49]

Lunch Break . . . . . 11:50 am to 1:10 pm

SESSION 14

Conv. Ctr. Room F1 . . . . . Mon. 1:10 to 5:20 pm

COIL, EOIL, and Optically Pumped Lasers

1:10 pm: **The electric oxygen-iodine laser: chemical kinetics of $O_2(a^1\Delta)$ production and $I(^2P_{1/2})$ excitation in microwave discharge systems** *(Invited Paper),* W. T. Rawlins, S. Lee, W. J. Kessler, D. B. Oakes, L. G. Piper, S. J. Davis, Physical Sciences Inc. . . . . [6101C-51]

1:40 pm: **Singlet delta oxygen production in self-sustained and non-self-sustained slab discharges** *(Invited Paper),* A. A. Ionin, M. P. Frolov, P.N. Lebedev Physical Institute (Russia); I. V. Kochetov, A. P. Napartovich, Troitsk Institute for Innovation and Fusion Research (Russia); V. N. Ochkin, Y. P. Podmar'kov, P.N. Lebedev Physical Institute (Russia); O. A. Rulev, Troitsk Institute for Innovation and Fusion Research (Russia); S. Y. Savinov, L. V. Seleznev, D. V. Sinitsyn, N. P. Vagin, N. N. Yuryshev, P.N. Lebedev Physical Institute (Russia) . . . . . [6101C-52]

2:10 pm: **Quenching $I(^2P_{1/2})$ by O3,** V. N. Azyazov, S. Ruffner, M. C. Heaven, Emory Univ. . . . . [6101C-53]

2:30 pm: **COIL power extraction enhanced by reducing/eliminating iodine clusters in a high mach number nozzle,** J. A. Marshall, K. P. Healey, B. Croker, Air Force Research Lab.; K. R. Kendrick, Air Force Research Lab; T. T. Yang, Advanced Photonic Sciences; Y. Hsia, The Boeing Co.; R. A. Dickerson, L. Forman, Consultant . . . . . [6101C-54]

2:50 pm: **The auto-decomposition of NCl3 as a source of NCl(a),** W. E. McDermott, Univ. of Denver; B. Nizamov, Directed Energy Solutions; R. D. Coombe, J. Gilbert, Univ. of Denver . . . . . [6101C-55]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Novel concepts for advanced iodine lasers,** W. J. Kessler, S. Lee, K. Galbally, W. T. Rawlins, D. B. Oakes, A. J. Bauer, S. J. Davis, Physical Sciences Inc. . . . . [6101C-56]

3:50 pm: **Highly efficient cesium vapor laser,** T. Ehrenreich, B. Zhdanov, R. J. Knize, U.S. Air Force Academy . . . . . [6101C-57]

4:10 pm: **Recent advances in German tactical COIL-efforts** *(Invited Paper),* W. L. Bohn, DLR (Germany) . . . . . [6101C-59]

4:40 pm: **Negative branch hybrid resonator for COIL** *(Invited Paper),* J. Handke, T. Hall, F. R. Duschek, K. M. Grünewald, DLR (Germany) [6101C-60]

5:00 pm: **Effects of mixing on post-discharge modeling of ElectricOIL experiments,** A. D. Palla, D. L. Carroll, J. T. Verdeyen, CU Aerospace LLC; W. C. Solomon, Univ. of Illinois at Urbana-Champaign . . . . . [6101C-77]

Monday-Thursday 23-26 January 2006 • Proceedings of SPIE Vol. 6102

Fiber Lasers III: Technology, Systems, and Applications

Conference Chairs: **Andrew J. W. Brown**, Aculight Corp.; **Johan Nilsson**, Univ. of Southampton (United Kingdom)

Cochairs: **Donald J. Harter**, IMRA America, Inc.; **Andreas Tünnermann**, Fraunhofer-Institut für Optik und Feinmechanik (Germany)

Program Committee: **Richard W. Berdine**, Air Force Research Lab.; **Jes Broeng**, Crystal Fibre (Denmark); **Jay W. Dawson**, Lawrence Livermore National Lab.; **L. N. Durvasula**, DARPA; **Almantas Galvanauskas**, University of Michigan; **Denis Gapontsev**, IPG Photonics Corp.; **Clifford Headley III**, OFS Labs.; **Dahv A. V. Kliner**, Sandia National Labs.; **Kyunghwan Oh**, Gwangju Institute of Science and Technology (South Korea); **Jasbinder S. Sanghera**, Naval Research Lab.; **Thomas Schreiber**, Friedrich-Schiller-Univ. Jena (Germany); **Kanishka Tankala**, Nufern; **Ken-ichi Ueda**, Univ. of Electro-Communications (Japan); **Robert G. Waarts**, Coherent Inc.; **Luis A. Zenteno**, Corning Inc.

Monday 23 January

Welcome and Opening Remarks

Conv. Ctr. Room J2 . . . . . Mon. 9:30 am

Chairs: **Andrew J. W. Brown**, Aculight Corp.;
Johan Nilsson, Univ. of Southampton (United Kingdom)

SESSION 1

Conv. Ctr. Room J2 . . . . . Mon. 9:35 to 10:15 am

Fiber Lasers in Applications

Chair: **Luis A. Zenteno**, Corning Inc.

9:35 am: **Ultrashort pulse micromachining with the 10-μJ FCPA fiber laser,** A. Y. Arai, J. Bovatsek, F. Yoshino, Y. Uehara, IMRA America, Inc. . . . [6102-01]

9:55 am: **Addressing challenging micro-processing applications and materials with fiber lasers,** A. P. Hoult, SPI Optics . . . . . [6102-02]

Coffee Break . . . . . 10:15 to 10:40 am

SESSION 2

Conv. Ctr. Room J2 . . . . . Mon. 10:40 am to 12:10 pm

High-Power Fiber Lasers I

Chair: **Dahv A. V. Kliner**, Sandia National Labs.

10:40 am: **New milestone in development of super high power fiber lasers** *(Invited Paper),* V. P. Gapontsev, IPG Laser GmbH (Germany) . . . . . [6102-03]

11:10 am: **Kilowatt fiber lasers and beyond** *(Invited Paper),* D. N. Payne, Univ. of Southampton (United Kingdom) . . . . . [6102-04]

11:40 am: **High power, narrow linewidth fiber lasers** *(Invited Paper),* D. T. Walton, S. Gray, J. Wang, M. Li, X. Chen, A. B. Ruffin, J. DeMeritt, L. A. Zenteno, Corning Inc. . . . . [6102-05]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Conv. Ctr. Room J2 . . . . . Mon. 1:30 to 3:20 pm

Joint session with conference 6100.

Lasers in the Eye-Safe Window

Chairs: **Hanna J. Hoffman**, Spectra-Physics;
Johan Nilsson, Univ. of Southampton (United Kingdom)

1:30 pm: **Recent progress in eye-safe solid-state laser with resonant, ultra-low- photon-defect, diode pumping,** M. A. Dubinskii, Army Research Lab. . . . . [6100-09]

1:50 pm: **High-power fiber-bulk hybrid lasers** *(Invited Paper),* W. A. Clarkson, D. Y. Shen, J. K. Sahu, Univ. of Southampton (United Kingdom) . . . . . [6100-10]

2:20 pm: **New development in high power eye-safe LMA fibers,** K. Tankala, B. N. Samson, A. L. Carter, J. Farroni, D. P. Machewirth, N. Jacobson, Nufern; A. Galvanauskas, Univ. of Michigan; W. E. Torruellas, Fibertek, Inc. . . [6102-06]

2:40 pm: **High pulse energy extraction with high peak power from short-pulse, eye safe all-fiber laser system,** M. P. Savage-Leuchs, E. C. Eisenberg, A. Liu, J. Henrie, M. S. Bowers, Aculight Corp. . . . . [6102-07]

3:00 pm: **100-megawatt power Q-switched Er:glass laser,** J. Taboada, J. M. Taboada, Taboada Researsch Instruments, Inc.; D. J. Stolarski, J. Zohner, L. Chavey, Northrop Grumman Corp. . . . . [6100-11]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 4

Conv. Ctr. Room J2 . . . . . Mon. 3:40 to 5:50 pm

Joint session with conference 6100.

Mid-Infrared Lasers and New Materials (Joint Session)

Chairs: **Ramesh K. Shori**, Univ. of California/Los Angeles;
Kanishka Tankala, Nufern

3:40 pm: **Progress in hybrid fiber/bulk solid state lasers** *(Invited Paper),* P. F. Moulton, A. Y. Dergachev, Q-Peak, Inc. . . . . [6100-12]

4:10 pm: **Power scalable and efficient 790-nm pumped Tm^{3+}-doped fiber lasers** *(Invited Paper),* G. P. Frith, D. G. Lancaster, Defence Science and Technology Organisation (Australia) . . . . . [6102-08]

4:40 pm: **Multi-component glass fiber lasers,** S. Jiang, NP Photonics, Inc. . . . . [6102-09]

5:00 pm: **3.9-4.8 μm gain-switched lasing of Fe:ZnSe at room temperature,** V. V. Fedorov, J. Kernal, A. Gallian, The Univ. of Alabama at Birmingham; V. V. Badikov, Kuban State Univ.; S. B. Mirov, The Univ. of Alabama at Birmingham . . . . . [6100-13]

5:20 pm: **Mid-IR supercontinuum generation in non-silica glass fibers** *(Invited Paper),* J. H. V. Price, Univ. of Southampton (United Kingdom); T. M. Monro, H. Ebendorff-Heidepriem, The Univ. of Adelaide (Australia); J. Y. Leong, P. Petropoulos, G. Brambilla, V. Finazzi, X. Feng, D. J. Richardson, Univ. of Southampton (United Kingdom) . . . . . [6102-10]

Tuesday 24 January

SESSION 5

Conv. Ctr. Room J2 . . . . . Tues. 8:00 to 10:20 am

Microstructured Fiber Lasers

Chair: **Jes Broeng**, Crystal Fibre A/S (Denmark)

8:00 am: **High-power photonic crystal fibers** *(Invited Paper),* K. P. Hansen, J. Broeng, A. Petersson, P. M. W. Skovgaard, M. D. Nielsen, C. Jakobsen, H. R. Simonsen, Crystal Fibre A/S (Denmark) . . . . . [6102-11]

8:30 am: **Design and high power operation of a stress-induced single-polarization single-transverse mode LMA Yb-doped photonic crystal fiber** *(Invited Paper),* T. Schreiber, F. Röser, O. Schmidt, J. Limpert, A. Tünnermann, R. Iliew, Friedrich-Schiller-Univ. Jena (Germany); A. Petersson, C. Jacobsen, K. P. Hansen, J. Broeng, Crystal Fibre A/S (Denmark) . . . . . [6102-12]

9:00 am: **Very-large-core, single-mode Yb-doped photonic crystal fiber for multi-MW peak power generation,** F. Di Teodoro, C. Brooks, Aculight Corp. . . . . [6102-13]

9:20 am: **Are hollow-core fibers attractive for high-power fiber lasers?,** K. Hougaard, J. Laegsgaard, Danmarks Tekniske Univ. (Denmark); J. Broeng, Crystal Fibre A/S (Denmark); A. O. Bjarklev, Danmarks Tekniske Univ. [6102-14]

9:40 am: **Amplification in doped hollow core photonic crystal fibers,** P. J. Roberts, Univ. of Bath (United Kingdom); K. P. Hansen, J. Broeng, Crystal Fibre A/S (Denmark) . . . . . [6102-15]

10:00 am: **Depressed clad hollow optical fiber with fundamental LP01 mode cut-off,** J. Kim, P. Dupriez, D. B. S. Soh, C. A. Codemard, S. Yoo, Y. Jeong, J. Nilsson, J. K. Sahu, Univ. of Southampton (United Kingdom) . . . . . [6102-16]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 6

Conv. Ctr. Room J2 . . . . . Tues. 10:50 am to 12:10 pm

Fiber Sources in Metrology and Imaging

Chair: **Kyunghwan Oh**,
Gwangju Institute of Science and Technology (South Korea)

10:50 am: **Super continuum generation for real time ultrahigh resolution optical coherence tomography** *(Invited Paper),* N. Nishizawa, Nagoya Univ. (Japan); A. D. Aguirre, J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6102-18]

11:20 am: **Fiber optic applications in biomedical metrology and microscopy** *(Invited Paper),* S. A. Yun, Harvard Medical School and Massachusetts General Hospital . . . . . [6102-19]

11:50 am: **Advances in femtosecond fiber lasers for THz applications,** G. D. Sucha, G. Imeshev, M. L. Stock, IMRA America, Inc. . . . . [6102-20]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7

Conv. Ctr. Room J2 . . . . . Tues. 1:30 to 3:00 pm

High Peak Power Nanosecond Fiber Sources

Chair: **Clifford Headley III**, OFS Fitel, LLC

1:30 pm: **MW peak-power, mJ pulse energy, multi-kHz repetition rate pulses from Yb-doped fiber amplifiers** *(Invited Paper),* F. Di Teodoro, C. Brooks, Aculight Corp. . . . . [6102-21]

2:00 pm: **High-peak-power (>1.2 MW) pulsed fiber amplifier,** R. L. Farrow, D. A. V. Kliner, A. Hoops, J. P. Koplow, Sandia National Labs. . . . . [6102-22]

2:20 pm: **Development of an efficient fiber-laser-produced plasma source of EUV radiation,** A. Mordovanaki, K. Hou, J. A. Nees, B. X. Hou, A. M. Maksimchuk, G. Mourou, A. Galvanauskas, Univ. of Michigan . [6102-23]

2:40 pm: **High peak power ytterbium doped fiber amplifiers,** W. E. Torruellas, Y. Chen, B. McIntosh, Fibertek, Inc.; J. Faroni, K. Tankala, Nufern; S. Webster, D. J. Hagan, M. J. Soileau, College of Optics and Photonics/Univ. of Central Florida . . . . . [6102-24]

Coffee Break . . . . . 3:00 to 3:20 pm

SESSION 8

Conv. Ctr. Room J2 . . . . . Tues. 3:20 to 4:40 pm

High Energy Fiber Lasers

Chair: **Jens Limpert**, Friedrich-Schiller-Univ. Jena (Germany)

3:20 pm: **10 mJ pulse energy and 200 W average power Yb-doped fiber laser,** S. Maryashin, A. O. Unt, V. P. Gapontsev, IPG Laser GmbH (Germany) . . . . . [6102-25]

3:40 pm: **Pulsed high peak power amplifiers in a monolithically integrated all-fiber configuration,** M. L. Jäger, S. Caplette, P. Verville, C. A. Delisle, A. Wetter, F. Séguin, F. Gonthier, ITF Optical Technologies, Inc. (Canada) . . . . . [6102-26]

4:00 pm: **High peak power, high rep rate pulsed fiber laser for marking applications,** M. Zervas, M. Durkin, K. Vysniauskas, A. Gillooly, F. Ghiringhelli, L. Hickey, P. Turner, B. Kao, Southampton Photonics, Inc. (United Kingdom); T. Hoult, Southampton Photonics, Inc. . . . . [6102-27]

4:20 pm: **Evaluation of a high power Q-switched Tm3+ doped silica fiber laser operating near 2um,** A. F. El-Sherif, Military Technical College (Egypt) . . . . . [6102-66]

Break . . . . . 4:40 to 4:50 pm

Late-breaking Developments

Conv. Ctr. Room J2 . . . . . Tues. 4:50 pm

Chairs: **Donald J. Harter**, IMRA America, Inc.;
Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

LASE Seminar and Panel Discussion

Quantifying High-Power Diode Laser Lifetime

Tues. 6:00 to 7:30 pm · Convention Center: Room J3

See page 16 for details.

Wednesday 25 January

SESSION 9

Conv. Ctr. Room J2 . . . . . Wed. 8:00 to 10:00 am

Beam Combination I

Chair: **Johan Nilsson**, Univ. of Southampton (United Kingdom)

8:00 am: **Scaling fiber lasers beyond kW power levels by spectral beam combining,** T. H. Loftus, C. E. Hamilton, P. R. Hoffman, A. Thomas, Aculight Corp. . . . . [6102-28]

8:20 am: **Spectral combining of fiber lasers,** F. Röser, A. Liem, T. Schreiber, S. Höfer, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); T. Peschel, R. Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)[6102-29]

8:40 am: **Coherently coupled high power fiber arrays** *(Invited Paper),* M. G. Wickham, Northrop Grumman Corp. . . . . [6102-30]

9:10 am: **Self-referenced locking of optical coherence by single-detector electronic-frequency tagging,** T. M. Shay, V. N. Benham, J. B. Spring, B. G. Ward, F. Ghebremichael, M. A. Culpepper, A. D. Sanchez, Air Force Research Lab.; J. T. Baker, The Boeing Co.; D. E. Pilkington, R. W. Berdine, Air Force Research Lab. . . . . [6102-31]

9:30 am: **Multi-core photonic crystal fibers for high power laser and amplifiers** *(Invited Paper),* L. F. Michaille, C. R. Bennett, D. M. Taylor, T. J. Shepherd, QinetiQ Ltd. (United Kingdom) . . . . . [6102-32]

Coffee Break . . . . . 10:00 to 10:30 am

LASE

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:10 pm

SESSION 10

Conv. Ctr. Room J2 . . . . . Wed. 1:10 to 3:10 pm

Joint session with conference 6108.

Fiber Amplifiers for Ultrafast Pulses

Chair: **James D. Kafka**, Spectra-Physics

1:10 pm: **Exploiting nonlinearity in femtosecond fiber amplifiers** *(Invited Paper),* F. W. Wise, L. Kuznetsova, A. Chong, S. Zhou, Cornell Univ. . . . . [6102-33]

1:40 pm: **Ultrafast high energy amplifiers beyond the B-integral limit** *(Invited Paper),* L. Shah, Z. Liu, I. Hartl, G. Imeshev, G. Cho, M. E. Fermann, IMRA America, Inc. . . . . [6102-34]

2:10 pm: **20 W, 50 fs pulses from a fiber laser system using nonlinear fiber compression,** F. Röser, T. Schreiber, A. Liem, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-35]

2:30 pm: **Compact μJ-level all-polarization maintaining femtosecond fiber source,** T. Schreiber, B. Ortac, C. K. Nielsen, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-36]

2:50 pm: **High average power and energy-scalable fiber CPA at 1558-nm using chirped volume Bragg grating pulse stretchers and compressors,** M. Cheng, Univ. of Michigan; V. I. Smirnov, E. Flecher, L. B. Glebov, College of Optics and Photonics/Univ. of Central Florida; A. Galvanauskas, Univ. of Michigan . . . . . [6102-37]

Coffee Break . . . . . 3:10 to 3:30 pm

Sessions 11 and 12 run concurrent with Session 13.

SESSION 11

Conv. Ctr. Room J2 . . . . . Wed. 3:30 to 4:40 pm

Joint session with conference 6108.

Applications of Ultrafast Fiber Sources

Chair: **Robert G. Waarts**, Coherent Inc.

3:30 pm: **Intense ultra-short fiber laser systems and their applications** *(Invited Paper),* J. Limpert, F. Röser, T. Schreiber, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-38]

4:00 pm: **High energy, short pulse fiber laser front end for kilo-Joule class CPA systems,** J. W. Dawson, S. Mitchell, R. J. Beach, M. J. Messerly, C. W. Siders, C. P. J. Barty, Lawrence Livermore National Lab. . . . . [6102-39]

4:20 pm: **Generation of terahertz radiation using a compact ultrashort pulse parabolic fiber laser amplifier at 1064-nm,** G. Matthaeus, Friedrich-Schiller-Univ. Jena (Germany); S. Haeffelin, Embry-Riddle Aeronautical Univ.; T. Schreiber, B. Ortac, J. Limpert, S. Nolte, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6108-38]

SESSION 12

Conv. Ctr. Room J2 . . . . . Wed. 4:40 to 6:20 pm

Joint session with conference 6108.

Ultrafast Fiber Lasers

Chair: **Frank W. Wise**, Cornell Univ.

4:40 pm: **Self-similar low-noise femtosecond ytterbium-doped double-clad fiber laser,** B. Ortac, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); A. Hideur, C. Chedot, M. Brunel, G. Martel, Univ. de Rouen (France) . [6102-40]

5:00 pm: **All-fiber, pigtailed, passively modelocked laser oscillator at 1.5μm with 2.2W average power and 160MHz repetition rate,** P. G. Polynkin, A. Polynkin, D. Panasenko, M. Mansuripur, J. V. Moloney, N. N. Peyghambarian, The Univ. of Arizona . . . . . [6102-41]

5:20 pm: **Single pulse and bound state operation of a self-starting self-similar all-PM Yb-doped fiber laser,** C. K. Nielsen, B. Ortac, T. Schreiber, J. Limpert, R. Hohmuth, W. Richter, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-42]

5:40 pm: **Wide and fast wavelength-tunable mode-locked fiber laser using dispersion tuning,** M. Asano, S. Yamashita, The Univ. of Tokyo (Japan) . . . . . [6102-43]

6:00 pm: **Polarization-maintaining picosecond oscillator based on quantum dots SESAM,** P. Crittenden, A. Starodumov, M. K. Reed, Coherent, Inc. . . . . [6102-44]

SESSION 13

Conv. Ctr. Room J1 . . . . . Wed. 4:00 to 5:50 pm

Beam Combination II

Chair: **Thomas M. Shay**, Air Force Research Lab.

4:00 pm: **Fundamentals of incoherent and coherent beam combining** *(Tutorial),* J. R. Leger, Univ. of Minnesota . . . . . [6102-45]

4:50 pm: **Coherent beam combining of fiber amplifier array output through spectral self-phase conjugation via SBS,** V. I. Kovalev, R. G. Harrison, Heriot-Watt Univ. (United Kingdom) . . . . . [6102-46]

5:10 pm: **Beam phasing multiple fiber amplifiers using a fiber phase conjugate mirror,** B. W. Grime, W. B. Roh, T. G. Alley, Air Force Institute of Technology . . . . . [6102-47]

5:30 pm: **The effect of macro-bending on phasing in 6 and 7 core large mode area photonic crystal fibers,** B. G. Ward, Air Force Research Lab. . . . . [6102-48]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Small signal intensity modulation of external cavity lasers,** N. Dogru, S. M. Ozyazici, Gaziantep Univ. (Turkey) . . . . . [6102-67]

✔ **Highly efficient double-clad Er/Yb co-doped single mode fiber lasers,** A. V. Kazakevitch, J. Lit, Univ. of Ontario Institute of Technology (Canada) . . . . . [6102-68]

✔ **A role of non-linearity in self-organization in fiber laser arrays,** A. P. Napartovich, N. N. Elkin, V. N. Troshchieva, D. V. Vysotsky, Troitsk Institute for Innovation and Fusion Research (Russia) . . . . . [6102-70]

✔ **Stimulated Raman scattering and broadband spectrum generation of nanosecond pulses from a directly modulated DFB laser,** R. Rojas-Laguna, Univ. de Guanajuato (Mexico); J. Gutiérrez-Gutiérrez, E. A. Kuzin, B. Ibarra-Escamilla, S. Mendoza-Vázquez, Instituto Nacional de Astrofísica, Optica y Electrónica (Mexico); J. M. Estudillo-Ayala, Univ. de Guanajuato (Mexico); J. W. Haus, Univ. of Dayton . . . . . [6102-72]

✔ **Generation of 560 fs soliton at 10 GHz from optically cross-gain-modulation mode-locked SOA fiber laser,** I. Chiu, G. Lin, National Chiao Tung Univ. (Taiwan) . . . . . [6102-73]

✔ **Noise characteristics of an FM mode-locked erbium fiber ring laser stabilized with a semiconductor optical amplifier in anomalous dispersion or normal dispersion region,** Y. J. Kim, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6102-74]

✔ **Wavelength switching in an actively mode-locked FPLD coupled with a high dispersive external cavity,** Y. J. Kim, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6102-75]

✔ **All-fiber supercontinuum generation based on a low noise femtosecond fiber laser and highly nonlinear dispersion shifted fiber,** H. Song, Y. J. Kim, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6102-76]

✔ **0.5 kW, 10μJ linearly polarized fiber laser operating at 977-nm,** V. Khitrov, B. N. Samson, D. P. Machewirth, K. Tankala, Nufern . . . [6102-77]

✔ **Product design issues relating to erbium doped fiber ring lasers and super fluorescence sources,** J. M. Sousa, J. R. Salcedo, M. Melo, M. O. Berendt, Multiwave Photonics, S.A. (Portugal) . . . . . [6102-78]

✔ **High-peak-power, linearly-polarized, diffraction-limited pulses from a large-core Yb-doped photonic crystal fiber,** F. Di Teodoro, C. Brooks, Aculight Corp. . . . . [6102-79]

✔ **High repetition rate high power femtosecond fiber laser,** B. Ortac, Friedrich-Schiller-Univ. Jena (Germany); A. Hideur, M. Brunel, G. Martel, Univ. de Rouen (France) . . . . . [6102-80]

Thursday 26 January

SESSION 14

Conv. Ctr. Room J2 . . . . . Thurs. 8:00 to 10:00 am

Joint session with conference 6103.

Fiber Nonlinearities and Wavelength Conversion

Chairs: **Andrew J. W. Brown**, Aculight Corp.; **Peter E. Powers**, Univ. of Dayton

8:00 am: **Pulsed fiber laser with 20W output power at 532-nm,** A. V. Babushkin, D. V. Gapontsev, N. S. Platonov, V. P. Gapontsev, IPG Photonics Corp. . . . . [6102-49]

8:20 am: **Multi-watt 589-nm fiber laser source,** J. W. Dawson, A. D. Drobshoff, R. J. Beach, M. J. Messerly, S. A. Payne, D. M. Pennington, A. Brown, Lawrence Livermore National Lab. . . . . [6102-50]

8:40 am: **1 W average power at 589-nm from a frequency doubled pulsed Raman fiber MOPA system,** P. Dupriez, C. Farrell, M. Ibsen, J. K. Sahu, J. Kim, C. A. Codemard, Y. Jeong, D. J. Richardson, J. Nilsson, Univ. of Southampton (United Kingdom) . . . . . [6102-51]

9:00 am: **Nonlinear effects in optical fibers and their applications** *(Tutorial),* G. P. Agrawal, Univ. of Rochester . . . . . [6102-52]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 15

Conv. Ctr. Room J2 . . . . . Thurs. 10:30 am to 12:40 pm

Joint session with conference 6103.

Fiber-based Nonlinear Wavelength Conversion

Chair: **Robert L. Byer**, Stanford Univ.

10:30 am: **Multiple-pump fiber parametric devices** *(Invited Paper),* S. Radic, Univ. of California/San Diego . . . . . [6102-53]

11:00 am: **Supercontinuum in silica nanowires,** R. R. Gattass, G. T. Svacha, E. Mazur, Harvard Univ. . . . . [6103-31]

11:20 am: **Tunable fiber optical parametric wavelength converter with 900 mW of CW output power at 1665-nm,** M. E. Marhic, Opal Labs.; G. M. Williams, L. Goldberg, J. P. Delavaux, Keopsys Inc. . . . . [6103-32]

11:40 am: **Supercontinuum generation with femtosecond dual pumping,** T. V. Andersen, T. Schreiber, D. Schimpf, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6103-33]

12:00 pm: **Wide-band supercontinuum generation for sub-micron-resolution OCT by using a laser-diode-seeded amplified pulse source,** S. Moon, D. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6103-34]

12:20 pm: **Dispersion varying fibers for optical signal processing,** A. A. Sysoliatin, V. F. Khopin, General Physics Institute (Russia) . . . . . [6102-54]

Lunch/Exhibition Break . . . . . 12:40 to 1:50 pm

SESSION 16

Conv. Ctr. Room J2 . . . . . Thurs. 1:50 to 3:40 pm

Components and Building Blocks

Chair: **Fabio Di Teodoro**, Aculight Corp.

1:50 pm: **Q-switching of Yb-doped double-clad fiber laser using micro-optical waveguide on micro-actuating platform modulator for marking applications,** Y. Jeong, Gwangju Institute of Science and Technology (South Korea); A. Liem, Friedrich-Schiller-Univ. Jena (Germany); K. Moerl, Institut für Physikalische Hochtechnologie e.V. (Germany); S. Höfer, Friedrich-Schiller-Univ. Jena (Germany); Y. Kim, Gwangju Institute of Science and Technology (South Korea); A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany); K. Oh, Gwangju Institute of Science and Technology (South Korea) . . . . . [6102-55]

2:10 pm: **Progress in all fiber components** *(Invited Paper),* D. J. DiGiovanni, OFS Fitel, LLC . . . . . [6102-56]

2:40 pm: **Latest advances in LMA fiber based high power fiber laser and amplifier modules,** M. O'Connor, Nufern . . . . . [6102-57]

3:00 pm: **Tapered fused bundle coupler package for reliable high optical power dissipation,** F. Seguin, A. Wetter, ITF Optical Technologies, Inc. (Canada) . . . . . [6102-58]

3:20 pm: **Qualification of fiber lasers and fiber optic components for space applications,** S. Hendow, S. Falvey, B. Nelson, Northrop Grumman Corp. . . . . [6102-59]

Coffee Break . . . . . 3:40 to 4:10 pm

SESSION 17

Conv. Ctr. Room J2 . . . . . Thurs. 4:10 to 5:50 pm

High Power Fiber Lasers II

Chair: **Denis V. Gapontsev**, IPG Photonics Corp.

4:10 pm: **Power scaling of high power fiber lasers for micromachining and materials processing applications,** S. Norman, A. Appleyard, P. Skull, D. Walker, I. Crowe, F. Ghiringhelli, L. Hickey, P. Turner, Southampton Photonics, Inc. (United Kingdom); T. Hoult, Southampton Photonics, Inc. . . . . [6102-60]

4:30 pm: **300W single-frequency, single-mode, all-fiber format ytterbium amplifier operating at 1060-1070-nm wavelength range,** O. Shkurikhin, N. S. Platonov, D. V. Gapontsev, R. Yagodkin, IPG Photonics Corp.; V. P. Gapontsev, IPG Laser GmbH (Germany) . . . . . [6102-61]

4:50 pm: **Novel SBS suppression scheme for high power fiber amplifiers,** A. Liu, Aculight Corp. . . . . [6102-62]

5:10 pm: **Bent-waveguide modeling of large-mode-area, double-clad fibers for high-power lasers,** G. R. Hadley, A. V. Smith, R. L. Farrow, Sandia National Labs. . . . . [6102-63]

5:30 pm: **High order modes suppression in large mode area active fibers by controlling the radial distribution of the rare earth dopant,** M. Hotoleanu, M. J. Söderlund, Liekki Oy (Finland); D. A. Kliner, J. P. Koplow, Sandia National Labs.; S. K. Tammela, V. Philipov, Liekki Oy (Finland) . . . . . [6102-64]

Closing Remarks

Conv. Ctr. Room J2 . . . . . Thurs. 5:50 pm

Chairs: **Donald J. Harter**, IMRA America, Inc.;
Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

Student Award . . . . . Thurs. 5:50 to 6:00 pm

Best Student Presentation Award

Donated by

We are pleased to announce that a prize in the amount of $1,000 US will be awarded to the best student oral presentation in the conference on Fiber Lasers III: Technology, Systems, and Applications at SPIE's Photonics West Symposium taking place next January in San Jose, California. This year's prize money has been donated by Aculight Corporation (**www.Aculight.com**) and the award will be presented by Dr. Andrew Brown, Director of Business Development at Aculight and Co-Chair of the Fiber Lasers III conference.

Qualifying student presentations will be evaluated by a conference steering committee headed by last year's student prize winner, Thomas Schreiber from Friedrich-Schiller University, Jena. To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral presentation. The prize will be awarded based on the quality of the presentation and not on the content of the submitted abstract. Any student papers presented in the Late Breaking Developments session will also be eligible for this award. The winner of the Best Student Presentation Award will be announced during the Student Award Session scheduled to take place on Thursday afternoon.

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Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications V

Conference Chair: **Peter E. Powers**, Univ. of Dayton

Program Committee: **Mark S. Bowers**, Aculight Corp.; **Robert C. Eckardt**, Cleveland Crystals Inc.; **Abraham Englander**, Soreq Nuclear Research Ctr. (Israel); **Richard Hammond**, U.S. Army Research Office; **Yehoshua Y. Kalisky**, Nuclear Research Ctr. Negev (Israel); **Thomas J. Kulp**, Sandia National Labs.; **Fredrik Laurell**, Kungliga Tekniska Högskolan (Sweden); **Jeffrey W. Pierce**, JP Innovations, LLC; **Kenneth L. Schepler**, Air Force Research Lab.; **Peter G. Schunemann**, BAE Systems plc; **Ramesh K. Shori**, Univ. of California/Los Angeles; **Arlee V. Smith**, Sandia National Labs.

Wednesday 25 January

SESSION 1

Conv. Ctr. Room F2 . . . . . Wed. 8:10 to 10:10 am

Nonlinear Optical Materials and Characterization

Chair: **Peter E. Powers**, Univ. of Dayton

8:10 am: **New organic NLO material for blue-green laser generation,** S. Dhanuskodi, J. J. Ramajothi, Bharathidasan Univ. (India) . . . . . [6103-01]

8:30 am: **Periodically poled vapor transport equilibrated lithium niobate for visible light generation,** R. V. Roussev, R. K. Route, J. Schaar, K. E. Urbanek, M. M. Fejer, Stanford Univ.; D. H. Jundt, C. Kajiyama, Crystal Technology, Inc. . . . . [6103-02]

8:50 am: **Growth of new quaternary nonlinear optical crystals for 1-micron-pumped mid-IR generation,** P. G. Schunemann, BAE Systems plc . . [6103-03]

9:10 am: **Thermal poling and high efficiency second harmonic generation in sulfide glasses,** F. Smektala, M. Guignard, V. Nazabal, J. Troles, Univ. of Rennes I (France); H. Zeghlache, Y. Quiquempois, A. Kudlinski, G. Martinelli, Univ. des Sciences et Technologies de Lille (France) . . . . . [6103-04]

9:30 am: **Laser-induced defect reactions governing damage performance in KDP and DKDP crystals,** P. P. DeMange, R. A. Negres, H. B. Radousky, S. G. Demos, Lawrence Livermore National Lab. . . . . [6103-05]

9:50 am: **Large spatial self-phase modulation in castor oil enhanced by gold nanoparticles,** M. A. R. C. Alencar, C. M. Nascimento, M. G. A. da Silva, M. R. Meneghetti, J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil) . . . . . [6103-06]

Coffee Break . . . . . 10:10 to 10:30 am

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:10 pm

SESSION 2

Conv. Ctr. Room J1 . . . . . Wed. 1:10 to 3:40 pm

Joint session with conference 6100.

Frequency Converted Lasers

Chairs: **Peter E. Powers**, Univ. of Dayton; **Hanna J. Hoffman**, Spectra-Physics; **Gregory J. Quarles**, VLOC Inc.

1:10 pm: **Generation of THz and IR Radiation in DAST crystals** *(Invited Paper),* P. Günter, ETH Zürich (Switzerland) . . . . . [6100-39]

1:40 pm: **100 Terawatt laser based on optical parametric amplification in DKDP crystal,** E. A. Khazanov, V. V. Lozhkarev, V. Ginzburg, E. Katin, A. Kirsanov, G. Luchinin, A. Mal'shakov, M. Martyanov, O. V. Palashov, A. K. Poteomkin, A. M. Sergeev, G. I. Freidman, A. Shaikin, I. V. Yakovlev, Institute of Applied Physics (Russia) . . . . . [6100-40]

2:00 pm: **Frequency conversion concepts for the efficient generation of high power 935-nm - 942-nm laser radiation,** H. Rhee, T. Riesbeck, F. Kallmeyer, S. Strohmaier, H. J. Eichler, Technische Univ. Berlin (Germany); A. A. Kaminskii, Institute of Crystallography (Russia); K. Petermann, Univ. Hamburg (Germany) . . . . . [6103-08]

2:20 pm: **High efficient generation of tunable visible light by means of DFG in self-controlled conversion processes,** J. Wueppen, B. Jungbluth, M. Vierkoetter, D. Hoffmann, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6103-09]

2:40 pm: **New wavelengths generated by BaWO4 or KGW intracavity Raman laser,** H. Jelínkova, J. _ulc, M. Nemec, Czech Technical Univ. in Prague (Czech Republic); J. K. Jabczynski, W. Zendzian, Wojskowa Akademia Techniczna (Poland) . . . . . [6100-41]

3:00 pm: **Blue light generation using a broad-area diode-laser in two passively coupled ring-resonators,** D. Skoczowsky, V. Raab, R. Menzel, Univ. Potsdam (Germany) . . . . . [6103-07]

3:20 pm: **Characterization of RTP crystals for electro-optic and non-linear applications,** H. Albrecht, M. A. Herrmann, D. Lupinski, Cristal Laser SA (France) . . . . . [6100-42]

Coffee Break . . . . . 3:40 to 4:00 pm

SESSION 3

Conv. Ctr. Room F2 . . . . . Wed. 4:00 to 6:20 pm

Nonlinear Optical Devices I

Chair: **Mark S. Bowers**, Aculight Corp.

4:00 pm: **Random frequency accessible broad tunable THz-wave source using phase-matched DAST crystal DFG** *(Invited Paper),* K. Suizu, A. Nawahara, Tohoku Univ. (Japan); T. Yamashita, Tohoku Univ. (Japan) and Advantest Lab. (Japan); H. Ito, Tohoku Univ. (Japan) and The Institute of Physical and Chemical Research (Japan) . . . . . [6103-10]

4:30 pm: **Backward parametric interactions** *(Invited Paper),* Y. J. Ding, Lehigh Univ. . . . . [6103-11]

5:00 pm: **High-efficiency high-energy wavelength-doubling optical parametric oscillator,** D. J. Armstrong, A. V. Smith, Sandia National Labs. . . . . [6103-12]

5:20 pm: **High quality efficient intracavity UV, IR generation in image rotated KTP OPO,** S. Wu, California Institute of Technology . . . . . [6103-13]

5:40 pm: **Optical performance monotoring using a A poled lithium-niobate (PP-LNO3),** M. B. Tayahi, Univ. of Nevada/Reno . . . . . [6103-14]

6:00 pm: **Polarization properties of nonlinear optical loop mirror with twisted fiber and birefringence bias in the loop,** B. Ibarra-Escamilla, E. A. Kuzin, P. Zaca-Moran, R. Grajales-Coutiño, F. Mendez-Martinez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); O. Pottiez, Faculté Polytechnique de Mons (Belgium); J. W. Haus, Univ. of Dayton; R. Rojas-Laguna, Univ. de Guanajuato (Mexico) . . . . . [6103-15]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Nonlinear optical properties of triphenylmethane (malachite green and methyl green) dyes as studied by Z-scan using low power He-Ne laser,** P. Palanisamy, R. Madhana Sundari, Anna Univ. (India) . . . . . [6103-35]

✔ **Optical data atorage in acid red dye-doped thin films,** P. Palanisamy, D. Sankar, Anna Univ. (India) . . . . . [6103-36]

✔ **Studies on third order nonlinearity of oxazine dye using Z-scan technique,** P. Palanisamy, M. A. H. Qusay, Anna Univ. (India) . . . . . [6103-37]

✔ **Intervalence band solitons in semiconductor quantum wells,** F. Biancalana, Tyndall National Institute (Ireland) . . . . . [6103-39]

✔ **Semiorganic nonlinear optical material for frequency doubling: Sodium p-Nitrophenolate,** S. Dhanuskodi, R. Pricilla Jeyakumari, Bharathidasan Univ. (India) . . . . . [6103-40]

✔ **Sellmeier and thermo-optic dispersion formula for AgGa(S1-xSex)2 with application in mid-IR generation,** S. Banerjee, Chitose Institute of Science and Technology (Japan); N. Umemura, Japan Defense Agency (Japan); K. Kato, Chitose Institute of Science and Technology (Japan) . . . . [6103-41]

✔ **Light field transformation by intracavity four-wave mixing,** O. G. Romanov, O. A. Ormachea, A. L. Tolstik, Belarusian State Univ. (Belarus); J. L. Arce Diego, D. Pereda Cubián, F. Fanjul Vélez, Univ. de Cantabria (Spain) . . . . . [6103-42]

✔ **Wide-band wavelength conversion using a dispersion-flattened nonlinear PCF,** Y. Yu, S. Ruan, C. Du, J. Zhao, J. Zeng, Shenzhen Univ. (China) . . . . . [6103-43]

✔ **Performance comparison of advanced optical modulation formats in wavelength division multiplexing (WDM) systems employing G.655 fibers,** I. Neokosmidis, T. Kamalakis, T. Sphicopoulos, D. Syvridis, Univ. of Athens (Greece) . . . . . [6103-44]

✔ **Experimental observations of diffraction of ultrashort,** H. Zhang, Univ. of Nebraska/Lincoln . . . . . [6103-45]

Thursday 26 January

Session 4 runs concurrent with Session 7a.

SESSION 4

Conv. Ctr. Room F2 . . . . . Thurs. 8:40 to 10:00 am

Nonlinear Optical Devices II

Chair: **Robert C. Eckardt**, Cleveland Crystals Inc.

8:40 am: **Picosecond mid-IR generation by means of MHz-rate optical parametric amplification of white-light continuum,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6103-16]

9:00 am: **Ultrafast parametric amplifier pumped by a fiber laser system,** C. Aguergaray, F. Röser, T. Schreiber, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); E. Cormier, Univ. Bordeaux 1 (France); A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6103-17]

9:20 am: **Applying sum frequency generation vibrational spectroscopy to deduce detailed structural information from complicated chemical and biological surfaces,** Z. Chen, Univ. of Michigan . . . . . [6103-18]

9:40 am: **Propagation of ultrashort solitons in the presence of nonlinear gain,** M. F. Ferreira, S. C. V. Latas, Univ. de Aveiro (Portugal) . . . . . [6103-19]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 7a

Conv. Ctr. Room J2 . . . . . Thurs. 8:00 to 10:00 am

Joint session with conference 6102.

Fiber Nonlinearities and Wavelength Conversion

Chairs: **Andrew J. W. Brown**, Aculight Corp.; **Peter E. Powers**, Univ. of Dayton

8:00 am: **Pulsed fiber laser with 20W output power at 532-nm,** A. V. Babushkin, D. V. Gapontsev, N. S. Platonov, V. P. Gapontsev, IPG Photonics Corp. . . . . [6102-49]

8:20 am: **Multi-watt 589-nm fiber laser source,** J. W. Dawson, A. D. Drobshoff, R. J. Beach, M. J. Messerly, S. A. Payne, D. M. Pennington, A. Brown, Lawrence Livermore National Lab. . . . . [6102-50]

8:40 am: **1 W average power at 589-nm from a frequency doubled pulsed Raman fiber MOPA system,** P. Dupriez, C. Farrell, M. Ibsen, J. K. Sahu, J. Kim, C. A. Codemard, Y. Jeong, D. J. Richardson, J. Nilsson, Univ. of Southampton (United Kingdom) . . . . . [6102-51]

9:00 am: **Nonlinear effects in optical fibers and their applications** *(Tutorial),* G. P. Agrawal, Univ. of Rochester . . . . . [6102-52]

Coffee Break . . . . . 10:00 to 10:30 am

Session 5 runs concurrent with Session 7b.

SESSION 5

Conv. Ctr. Room F2 . . . . . Thurs. 10:20 am to 12:40 pm

Engineered Nonlinear Optics

Chair: **Kenneth L. Schepler**, Air Force Research Lab.

10:20 am: **Thermal dephasing and control of second harmonic generation in periodically poled LiNbO3 and LiTaO3 crystals,** O. A. Louchev, National Institute for Materials Science (Japan); N. E. Yu, Gwangju Institute of Science and Technology (South Korea); S. Kurimura, K. Kitamura, National Institute for Materials Science (Japan) . . . . . [6103-20]

10:40 am: **Measurement of the nonlinear coefficient profile of quasi-phase-matched gratings using iterative error-reduction algorithms,** A. Ozcan, M. J. F. Digonnet, G. S. Kino, Stanford Univ. . . . . [6103-21]

11:00 am: **Engineered ferroelectrics and hybrid semiconductor-silica fibers for tunable optical devices** *(Invited Paper),* V. Gopalan, L. Tian, The Pennsylvania State Univ.; D. A. Scrymgeour, Sandia National Labs.; D. J. Won, The Pennsylvania State Univ.; K. L. Schepler, Air Force Research Lab. [6103-22]

11:40 am: **Second harmonic generation in quasi-phase matched AlGaAs waveguides with low loss pumped at 1.55um,** X. Yu, L. Scaccabarozzi, P. S. Kuo, J. Fu, M. M. Fejer, J. S. Harris, Jr., Stanford Univ. . . . . [6103-23]

12:00 pm: **Efficient broadband difference frequency generation in a direct-bonded periodically poled lithium niobate ridge waveguide and the bundle observation of carbon monoxide isotopomer absorption from 2300-nm to 2450-nm,** T. Yanagawa, O. Tadanaga, Y. Nishida, NTT Photonics Labs. (Japan); H. Miyazawa, NTT Electronics Corp. (Japan); K. Magari, M. Asobe, H. Suzuki, NTT Photonics Labs. (Japan) . . . . . [6103-24]

12:20 pm: **Material improvement of LiTaO3 single crystals for QPM applications,** Y. Furukawa, O. Nakamura, M. Matsukura, OXIDE Corp. (Japan); Y. Liu, S. Takekawa, K. Kitamura, National Institute for Materials Science (Japan) . . . . . [6103-25]

Lunch/Exhibition Break . . . . . 12:40 to 2:00 pm

SESSION 6

Conv. Ctr. Room F2 . . . . . Thurs. 2:00 to 3:40 pm

Higher Order Nonlinear Interactions

Chair: **Jeffrey W. Pierce**, JP Innovations, LLC

2:00 pm: **Microresonator-enhanced four-wave mixing,** K. Zheng, S. Blair, Univ. of Utah . . . . . [6103-26]

2:20 pm: **Coherent Raman solitons in hollow-core photonic crystal fibers,** F. Biancalana, Tyndall National Institute (Ireland) . . . . . [6103-27]

2:40 pm: **Gain optimization of Raman-mediated fiber optical parametric amplifier,** K. K. Wong, N. Wong, The Univ. of Hong Kong (Hong Kong China) . . . . . [6103-28]

3:00 pm: **Generation of phase-conjugate wavefront from dye-doped thin films using He-Ne laser,** P. Palanisamy, T. Geethakrishnan, Anna Univ. (India) . . . . . [6103-29]

3:20 pm: **Enhancement optical phase conjugation reflectivity in doped III-V semi-conducting in a magnetic field,** M. N. Singh, P. Aghamkar, Guru Jambheshwar Univ. (India) . . . . . [6103-30]

SESSION 7b

Conv. Ctr. Room J2 . . . . . Thurs. 10:30 am to 12:40 pm

Joint session with conference 6102.

Fiber-based Nonlinear Wavelength Conversion

Chair: **Robert L. Byer**, Stanford Univ.

10:30 am: **Multiple-pump fiber parametric devices** *(Invited Paper),* S. Radic, Univ. of California/San Diego . . . . . [6102-53]

11:00 am: **Supercontinuum in silica nanowires,** R. R. Gattass, G. T. Svacha, E. Mazur, Harvard Univ. . . . . [6103-31]

11:20 am: **Tunable fiber optical parametric wavelength converter with 900 mW of CW output power at 1665-nm,** M. E. Marhic, Opal Labs.; G. M. Williams, L. Goldberg, J. P. Delavaux, Keopsys Inc. . . . . [6103-32]

11:40 am: **Supercontinuum generation with femtosecond dual pumping,** T. V. Andersen, T. Schreiber, D. Schimpf, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6103-33]

12:00 pm: **Wide-band supercontinuum generation for sub-micron-resolution OCT by using a laser-diode-seeded amplified pulse source,** S. Moon, D. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6103-34]

12:20 pm: **Dispersion varying fibers for optical signal processing,** A. A. Sysoliatin, V. F. Khopin, General Physics Institute (Russia) . . . . . [6102-54]

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High-Power Diode Laser Technology and Applications IV

Conference Chair: **Mark S. Zediker**, Nuvonyx Inc.

Program Committee: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany); **Jason Farmer**, nLight Photonics; **Stefan W. Heinemann**, Fraunhofer USA Inc.; **Volker K. Krause**, Laserline GmbH (Germany); **Erik P. Zucker**, JDSU

Monday 23 January

SESSION 1

Conv. Ctr. Room J3 . . . . . Mon. 9:30 to 11:50 am

High Power Laser Mounting and Cooling

Chair: **Stefan W. Heinemann**, Fraunhofer USA Inc.

9:30 am: **Non corrosive micro coolers with matched CTE** *(Invited Paper),* T. Ebert, ProLas Produktionslaser GmbH (Germany) . . . . . [6104-01]

10:10 am: **Reliable high power diode lasers: thermomechanical fatigue aspects,** G. Klumel, Y. Gridish, I. Szafranek, Y. Karni, SCD-Semi Conductor Devices (Israel) . . . . . [6104-02]

Coffee Break . . . . . 10:30 to 10:50 am

10:50 am: **Expansion-matched passively-cooled heatsinks with low thermal resistance for high-power diode laser bars,** M. Leers, C. Scholz, K. Boucke, R. Poprawe, Fraunhofer Institut für Lasertechnik (Germany) . . . . . [6104-03]

11:30 am: **Comparative performance studies of indium and gold-tin packaged diode laser bars,** D. Lorenzen, Jenoptik Laserdiode GmbH (Germany); M. Schröder, Jenoptik LaserDiode GmbH (Germany); J. Meusel, P. Hennig, Jenoptik Laserdiode GmbH (Germany); H. König, M. Philippens, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6104-05]

Lunch Break . . . . . 11:50 am to 1:00 pm

SESSION 2

Conv. Ctr. Room J3 . . . . . Mon. 1:00 to 3:40 pm

High Power Laser Diode Bar Performance Improvements I

Chair: **Erik P. Zucker**, JDS Uniphase Corp.

1:00 pm: **An overview of DARPA's SHEDS and ADHELS programs** *(Invited Paper),* C. M. Stickley, Defense Advanced Research Projects Agency . . . . . [6104-06]

1:40 pm: **Ongoing development of high-efficiency and high-reliability 9xx-nm bars and fiber-coupled devices at Coherent,** H. Zhou, K. Kennedy, E. Weiss, J. Du, P. Reichert, J. Li, Coherent, Inc. . . . . [6104-07]

2:00 pm: **Highly reliable high-power broad area laser diodes,** V. V. Rossin, M. G. Peters, E. P. Zucker, B. Acklin, JDS Uniphase Corp. . . . . [6104-08]

2:20 pm: **High-power, reliable 808-nm laser bars for QCW and CW applications,** M. Mondry, M. Fouksman, H. Zou, J. Li, J. Haapamaa, Coherent, Inc. . . . . [6104-09]

2:40 pm: **Diode laser efficiency increases enable >400-W peak power from 1-cm bar and shows clear path to peak powers in excess of 1kW,** P. A. Crump, J. Wang, S. Patterson, D. Wise, A. Basauri, M. DeFranza, S. Elim, W. Dong, S. Zhang, M. Bougher, J. Patterson, S. Das, M. Grimshaw, J. Farmer, M. A. DeVito, R. Martinsen, nLight Photonics . . . . . [6104-10]

3:00 pm: **High-performance, high-reliability 880-nm diode laser bars and fiber-array packages,** M. Fouksman, S. Lehconen, J. Haapamaa, K. W. Kennedy, J. Li, Coherent, Inc. . . . . [6104-11]

3:20 pm: **Effect of compressive and tensile strain on the performance of 808-nm QW high power laser diodes,** M. Levy, B. Yuri, Y. Karni, SemiConductor Devices (Israel) . . . . . [6104-12]

Coffee Break . . . . . 3:40 to 4:00 pm

SESSION 3

Conv. Ctr. Room J3 . . . . . Mon. 4:00 to 5:40 pm

High Brightness Devices I

Chair: **Jason Farmer**, nLight Photonics

4:00 pm: **8 W high-efficiency high-brightness tapered diode lasers at 976-nm** *(Invited Paper),* M. T. Kelemen, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); J. Weber, G. Kaufel, R. Moritz, M. Mikulla, G. Weimann, Fraunhofer Institut für Angewandte Festkörperphysik (Germany) . . . . . [6104-13]

4:40 pm: **High brightness laser diode bars,** N. Lichtenstein, Y. Manz, J. Müller, S. Pawlik, A. Thies, J. Troger, S. Weiss, C. Harder, Bookham AG (Switzerland) . . . . . [6104-14]

5:00 pm: **Very high power operation of 980-nm single-mode InGaAs/AlGaAs pump lasers,** M. A. Bettiati, C. Starck, F. Laruelle, V. Cargemel, P. Pagnod-Rossiaux, P. Garabedian, D. Keller, G. Ughetto, J. Bertreux, L. Raymond, G. Gelly, R. Capella, Avanex France s.a. (France) . . . . . [6104-15]

5:20 pm: **Comparison between 50 W tapered laser arrays and tapered single emitters,** C. Scholz, K. Boucke, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany); M. T. Keleman, J. Weber, M. Mikulla, G. Weimann, Fraunhofer Institut für Angewandte Festkörperphysik (Germany) . . . . [6104-16]

Tuesday 24 January

SESSION 4

Conv. Ctr. Room J3 . . . . . Tues. 8:00 to 9:20 am

High Brightness Devices II

Chair: **Jason Farmer**, nLight Photonics

8:00 am: **Advances in high brightness semiconductor laser bars and arrays,** R. M. Lammert, S. W. Oh, M. L. Osowski, C. Panja, P. Rudy, T. S. Stakelon, J. E. Ungar, Quintessence Photonics Corp. . . . . [6104-17]

8:20 am: **9xx high power pump modules,** S. Pawlik, B. Sverdlov, R. Bättig, B. Schmidt, N. Lichtenstein, H. Pfeiffer, J. Müller, B. Valk, C. Harder, Bookham AG (Switzerland) . . . . . [6104-18]

8:40 am: **9xx-nm single emitter pumps for multi-kW systems,** A. Ovtchinnikov, V. Gapontsev, I. Berishev, G. Ellis, A. Komissarov, N. Moshegov, O. Raisky, P. Trubenko, V. Solodovnikov, IPG Photonics Corp. . . . . [6104-19]

9:00 am: **Monolithic integration of collimating fresnel lens for beam quality enhancement in tapered high power laser diode,** F. K. Lau, C. W. Tee, X. Zhao, A. Wonfer, K. Williams, R. Penty, I. White, Univ. of Cambridge (United Kingdom); M. Calligaro, M. Lecomte, O. Parillaud, N. Michel, M. Krakowski, Alcatel-Thales III-V Lab. (France) . . . . . [6104-20]

SESSION 5

Conv. Ctr. Room J3 . . . . . Tues. 9:20 am to 12:20 pm

High Power Diode Laser Systems

Chair: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany)

9:20 am: **Dense spatial multiplexing enables high brightness multi-kW diode laser systems** *(Invited Paper),* H. Schlueter, U. Bonna, G. Charache, J. Hostetler, T. Li, C. Miester, R. Roff, T. Vethake, TRUMPF Photonics Inc. . . . . [6104-21]

10:00 am: **Development of high power high brightness fiber coupled diode laser systems,** N. Ostrom, M. Gall, B. O. Faircloth, Nuvonyx Inc. . . . [6104-22]

10:20 am: **Dense wavelength multiplexing for a high power diode laser,** C. Wessling, M. Traub, H. D. Hoffmann, R. Poprawe, Fraunhofer Institute für Lasertechnik (Germany) . . . . . [6104-23]

Coffee Break . . . . . 10:40 to 11:00 am

11:00 am: **A compact high brilliance diode laser,** F. Bammer, B. Holzinger, Technische Univ. Wien (Austria) . . . . . [6104-24]

11:20 am: **Homogenization of high power diode lasers for pumping and direct applications,** M. Traub, D. Plum, D. Hoffmann, P. Loosen, R. Poprawe, Fraunhofer Institut für Lasertechnik (Germany) . . . . . [6104-25]

11:40 am: **Laser beam transformation technique for high-power laser diode linear arrays,** P. Grenier, Y. Taillon, M. Wang, P. A. Topart, D. Asselin, A. Parent, Institut National d'Optique (Canada) . . . . . [6104-26]

12:00 pm: **Stable coherent coupling of laser diodes by a volume Bragg grating in PTR glass,** G. B. Venus, A. Sevian, L. B. Glebov, College of Optics and Photonics/Univ. of Central Florida; V. I. Smirnov, OptiGrate . . . . . [6104-27]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 6

Conv. Ctr. Room J3 . . . . . Tues. 1:20 to 3:40 pm

External Cavity Lasers

Chair: **Volker K. Krause**, Laserline GmbH (Germany)

1:20 pm: **6.8 W cw-output power from a 976-nm external cavity diode laser with narrow linewidth and 40-nm tuning range** *(Invited Paper),* A. Jechow, V. Raab, R. Menzel, Univ. Potsdam (Germany) . . . . . [6104-28]

2:00 pm: **Effect of the threshold reduction on a catastrophic optical mirror damage in broad area semiconductor lasers with optical feedback,** Y. Takiguchi, T. Asatsuma, S. Hirata, Sony Corp. (Japan) . . . . . [6104-29]

2:20 pm: **m2k-laser GmbH (Germany),** J. Weber, M. T. Kelemen, S. Moritz, M. Mikulla, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6104-30]

2:40 pm: **V-shaped external cavity for tunable 1W diffraction limited cw-power at 976-nm,** V. Raab, A. Jechow, R. Menzel, Univ. Potsdam (Germany) . . . . . [6104-31]

3:00 pm: **Compact tunable diode laser with diffraction limited 1000 mW in Littman/Metcalf configuration for cavity ring down spectroscopy,** S. Stry, J. R. Sacher, Sacher Lasertechnik GmbH (Germany); S. Thelen, P. Hering, M. Mürtz, Heinrich-Heine-Univ. Düsseldorf (Germany) . . . . . [6104-32]

3:20 pm: **Wavelength tunable injection locking of high power super luminescent diode with 1.4 watt diffraction-limited output,** Y. Su, C. Lin, C. Tsai, National Taiwan Univ. (Taiwan) . . . . . [6104-33]

LASE Seminar and Panel Discussion

Quantifying High-Power Diode Laser Lifetime

Tues. 6:00 to 7:30 pm · Convention Center: Room J3

See page16 for details.

Wednesday 25 January

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Successive phase change and stability of near-field patterns for broad-area laser diodes,** T. Asatsuma, Y. Takiguchi, S. Frederico, A. Furukawa, S. Hirata, Sony Corp. (Japan) . . . . . [6104-34]

✔ **In-line implant and RTP process monitoring using the carrier illumination technique for 65-nm and beyond,** H. L. Chuang, P. Y. Y. Chen, C. I. Li, United Microelectronics Corp. . . . . [6104-35]

✔ **Properties and reliability of improved large acceptance optical fibers,** B. J. Skutnik, C. Smith, K. B. Moran, K. Bakhshpour, CeramOptec Industries, Inc. . . . . [6104-36]

✔ **Can superluminescent LEDs be more efficient than Fabry Perot lasers?,** O. A. Konoplev, S. Park, P. J. Heim, J. Wei, D. Bowler, Covega Corp.[6104-37]

✔ **Laser ignition of propellants,** M. S. Singh, M. K. Gupta, .. Rajkumar, L. Kumar, S. Bansal, V. S. Sethi, Government of India (India) . . . . . [6104-38]

✔ **Characteristics and reliability of high power multi-mode InGaAs strained quantum well single emitters with CW output powers of over 5W,** Y. Sin, J. Scarpulla, N. Presser, G. Stupian, S. C. Moss, The Aerospace Corp. . . . . [6104-39]

Tuesday-Wednesday 24-25 January 2006 • Proceedings of SPIE Vol. 6105

Free-Space Laser Communication Technologies XVIII

Conference Chair: **G. Stephen Mecherle**, Innocept Inc.

Program Committee: **David L. Begley**, Ball Aerospace & Technologies Corp.; **Don M. Boroson**, MIT Lincoln Lab.; **Robert T. Carlson**, fSONA Communications Corp. (Canada); **Florian X. David**, DLR (Germany); **Frederic M. Davidson**, Johns Hopkins Univ.; **Joseph D. Fargnoli**, Eastman Kodak Co.; **Wayne R. Fenner**, The Aerospace Corp.; **Hamid Hemmati**, Jet Propulsion Lab.; **Eric J. Korevaar**, MRV Communications; **Yoshisada Koyama**, National Institute of Information and Communicatio (Japan); **Robert Lange**, Tesat-Spacecom GmbH & Co. KG (Germany); **Donald J. Nicholson**, Air Force Research Lab.; **Vladimir V. Nikulin**, Binghamton Univ.; **Zoran Sodnik**, European Space Agency (Netherlands); **Morio Toyoshima**, National Institute of Information and Communicatio (Japan); **Shiro Yamakawa**, Japan Aerospace Exploration Agency (Japan)

Tuesday 24 January

Opening Remarks

Conv. Ctr. Room F1 . . . . . Tues. 8:30 am

Chair: **Steve Mecherle**, Innocept Inc.

SESSION 1

Conv. Ctr. Room F1 . . . . . Tues. 8:40 to 10:10 am

Invited Papers

8:40 am: **Optical phased arrays for laser communications** *(Invited Paper),* T. A. Dorschner, W. J. Miniscalco, I. W. Smith, K. L. Fisher, Raytheon Co. . . . . [6105-01]

9:10 am: **The Mars laser communication demonstration: what it would have been** *(Invited Paper),* D. M. Boroson, MIT Lincoln Lab.; A. Biswas, Jet Propulsion Lab.; B. L. Edwards, NASA Goddard Space Flight Ctr. . . . [6105-34]

9:40 am: **OICETS on-orbit laser communication experiments** *(Invited Paper),* T. Jono, Y. Takayama, K. Ohinata, N. Kura, Japan Aerospace Exploration Agency (Japan); Y. Koyama, Japan Aerospace Exploration Agency . . . . . [6105-36]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Conv. Ctr. Room F1 . . . . . Tues. 10:30 am to 12:50 pm

System Design

10:30 am: **Optimal GEO lasercomm terminal field of view for LEO link support,** B. Engberg, C. W. Hindman, K. Walchko, Air Force Research Lab. . . . . [6105-02]

10:50 am: **Simplified optical communication system architecture,** C. Chen, H. Hemmati, A. Biswas, G. G. Ortiz, W. H. Farr, Jet Propulsion Lab.; N. Pedreiro, Lockheed Martin Advanced Technology Ctr. . . . . [6105-03]

11:10 am: **Multilevel coding for FTTH and metro networks,** L. Hofmann, Technische Univ. Chemnitz (Germany); M. B. Tayahi, Univ. of Nevada/Reno; J. Carstens, Technische Univ. Chemnitz (Germany); S. Lanka, Univ. of Nevada/Reno . . . . . [6105-04]

11:30 am: **Development of optical antennas utilizing free form surface optics for the high speed laser communication systems,** K. Takahashi, Olympus Corp. (Japan); Y. Arimoto, National Institute of Information and Communications Technology (Japan) . . . . . [6105-05]

11:50 am: **Real-time combining of optical array signals,** V. A. Vilnrotter, C. Lau, K. Andrews, P. Vo, M. Srinivasan, D. Lee, Jet Propulsion Lab. [6105-06]

12:10 pm: **4-ary PAM signaling for increasing the capacity of metro light-wave systems,** S. Lanka, M. B. Tayahi, Univ. of Nevada/Reno; L. Hofmann, J. Cartsens, Technische Univ. Chemnitz (Germany) . . . . . [6105-07]

12:30 pm: **140 km free-space laser link verification based on homodyne BPSK,** B. Smutny, R. Lange, Tesat-Spacecom GmbH & Co. KG (Germany); R. H. Czichy, Synopta GmbH (Switzerland); B. Wandernoth, D. Giggenbach, DLR (Germany) . . . . . [6105-35]

Lunch/Exhibition Break . . . . . 12:50 to 1:50 pm

SESSION 3

Conv. Ctr. Room F1 . . . . . Tues. 1:50 to 3:10 pm

Pointing, Acquisition, and Tracking

1:50 pm: **Analysis of capacity and probability of outage for free-space optical channels with fading due to pointing and tracking error,** R. J. Barron, D. M. Boroson, MIT Lincoln Lab. . . . . [6105-08]

2:10 pm: **Performance of a laser communication system with acousto-optic tracking: an experimental study,** V. V. Nikulin, R. Khandekar, J. Sofka, Binghamton Univ. . . . . [6105-09]

2:30 pm: **Star-tracker-based tracking and pointing for deep-space communications,** G. G. Ortiz, S. Lee, Jet Propulsion Lab. . . . . [6105-10]

2:50 pm: **Centroiding accuracy estimate of the long wavelength infrared earth images,** S. Lee, Y. Chen, G. G. Ortiz, Jet Propulsion Lab. . . . . [6105-12]

SESSION 4

Conv. Ctr. Room F1 . . . . . Tues. 2:50 to 5:20 pm

Transmitter and Receiver Technologies

2:50 pm: **High performance single photon detector to enable next generation free space laser communication systems,** K. Linga, E. Godik, J. Krutov, Amplification Technologies, Inc. . . . . [6105-14]

3:10 pm: **Daytime use of astronomical telescopes for deep-space optical links,** G. G. Ortiz, W. T. Roberts, T. A. Boyd, Jet Propulsion Lab. . . . . [6105-15]

Coffee Break . . . . . 3:30 to 4:00 pm

4:00 pm: **A novel monolithic beam steering high power transmitter for low cost free space optical wireless links,** X. Zhao, F. K. Lau, C. W. Tee, A. Wonfer, R. Penty, I. White, Univ. of Cambridge (United Kingdom); M. Calligaro, M. Lecomte, O. Parillaud, N. Michel, M. Krakowski, Alcatel-Thales III-V Lab. (France) . . . . . [6105-18]

4:20 pm: **Non-polarization and non-absorbing beamsplitters for laser communications,** K. Zhang, A. Smajkiewicz, Barr Associates, Inc. . . [6105-19]

4:40 pm: **Progress toward experimental demonstration of quantum-optimum receiver,** J. Geremia, California Institute of Technology; S. J. Dolinar, C. Lau, V. A. Vilnrotter, Jet Propulsion Lab. . . . . [6105-17]

5:00 pm: **Expansion of receiver area by spherical mirror for optical free space communication,** T. Yazaki, M. Shibuya, M. Usami, KDDI R&D Labs. (Japan) . . . . . [6105-33]

LASE Seminar and Panel Discussion

Quantifying High-Power Diode Laser Lifetime

Tues. 6:00 to 7:30 pm · Convention Center: Room J3

See page 16 for details.

Technical Group Meeting

Laser Communications

Tues. 7:30 to 9:00 pm · Fairmont Hotel: Belvedere

Chair: **Steve Mecherle,** Innocept Inc.

See page 15 for details.

Wednesday 25 January

SESSION 5

Conv. Ctr. Room F1 . . . . . Wed. 8:20 to 10:00 am

Mitigation of Atmospheric Effects I

8:20 am: **Ultra-light weight telescope coupled with portable AO system for laser communications applications,** S. R. Restaino, J. Andrews, C. Wilcox, T. Martinez, Naval Research Lab.; D. Payne, Narrascape . . . . . [6105-20]

8:40 am: **FSO antenna with high speed tracking for improved atmospheric turbulence effects mitigation,** K. R. Kazaura, K. Omae, T. Suzuki, M. Matsumoto, T. Sato, Waseda Univ. (Japan); K. Asatani, Kogakuin Univ. (Japan); M. Hatori, Chuo Univ. (Japan); T. Murakami, Koito Industries Ltd. (Japan); K. Takahashi, Olympus Corp. (Japan); H. Matsumoto, Showa Electric Wire & Cable Co., Ltd. (Japan); K. Wakamori, Hamamatsu Photonics K.K. (Japan); Y. Arimoto, National Institute of Information and Communications Technology (Japan) . . . . . [6105-21]

9:00 am: **Wavefront correction of low-cost large apertures for optical communication receivers,** H. Hemmati, Y. Chen, Jet Propulsion Lab. [6105-22]

9:20 am: **Airborne laser communications and performance enhancement by equalization,** S. Lee, B. Hamzeh, M. Kavehrad, The Pennsylvania State Univ. . . . . [6105-23]

9:40 am: **Mitigation of dynamic wavefront distortions using a nematic liquid crystal spatial light modulator and simplex optimization,** R. M. Khandekar, V. V. Nikulin, Binghamton Univ. . . . . [6105-24]

Coffee Break . . . . . 10:00 to 10:30 am

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:20 pm

SESSION 6

Conv. Ctr. Room F1 . . . . . Wed. 1:20 to 3:00 pm

Mitigation of Atmospheric Effects II

1:20 pm: **Multichannel coherent optical receiver for PPM signals in the presence of atmospheric turbulence,** M. Muñoz Fernández, California Institute of Technology; V. A. Vilnrotter, Jet Propulsion Lab. . . . . [6105-25]

1:40 pm: **Atmospheric turbulence effects on a wavelength diversified ground-to-UAV FSO link,** A. Harris, J. J. Sluss, Jr., H. H. Refai, Univ. of Oklahoma; P. G. LoPresti, Univ. of Tulsa . . . . . [6105-26]

2:00 pm: **Adaptive techniques for reducing fade probability in LaserCom systems,** P. N. Crabtree, M. Goda, Air Force Institute of Technology . [6105-27]

2:20 pm: **The experimental determination of on-off keying laser communications probability models and a comparison with theory,** W. C. Brown, Colorado State Univ./Pueblo . . . . . [6105-28]

2:40 pm: **Control of the intensity fluctuations of random electromagnetic beams on propagation,** O. Korotkova, Univ. of Rochester and College of Optics and Photonics/Univ. of Central Florida . . . . . [6105-29]

✔ Posters-Wednesday

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✔ **Research on 1.06μm laser atmospheric propagation in low elevation,** Y. Liu, Shandong Institute of Business and Technology (China) . . . [6105-30]

Monday-Wednesday 23-25 January 2006 • Part of Proceedings of SPIE Vol. 6106

Laser Applications in Microelectronic and Optoelectronic Manufacturing XI

Conference Chairs: **Tatsuo Okada**, Kyushu Univ. (Japan); **Craig B. Arnold**, Princeton Univ.; **Michel Meunier**, École Polytechnique de Montréal (Canada); **Andrew S. Holmes**, Imperial College London (United Kingdom)

Program Committee: **Nadezhda M. Bulgakova**, Institute of Thermophysics (Russia); **Oscar D. Dubon**, Univ. of California/ Berkeley; **Corey M. Dunsky**, Coherent, Inc.; **Jim Fieret**, BOC plc (United Kingdom); **Daniel Fried**, Univ. of California/San Francisco; **Richard A. Haight**, IBM Thomas J. Watson Research Ctr.; **Alan J. Hunt**, Univ. of Michigan; **Denise M. Krol**, Univ. of California/Davis; **Tetsuya Makimura**, Univ. of Tsukuba (Japan); **Samuel S. Mao**, Lawrence Berkeley National Lab.; **Isamu Miyamoto**, Osaka Univ. (Japan); **William O'Neill**, Univ. of Cambridge (United Kingdom); **Timothy D. Sands**, Purdue Univ.; **Koji Sugioka**, The Institute of Physical and Chemical Research (R (Japan); **Richard F. Toftness**, Xsil USA

Monday 23 January

SESSION 1

Conv. Ctr. Room J4 . . . . . Mon. 9:30 to 10:20 am

Industrial I

Chair: **Craig B. Arnold**, Princeton Univ.

9:30 am: **Review: 40 years of laser-marking industrial applications** *(Invited Paper),* B. Gu, GSI Lumonics Inc. . . . . [6106A-02]

10:00 am: **Laser patterning of ITO in flat panel display manufacture,** S. Venkat, Coherent, Inc. . . . . [6106A-03]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

Conv. Ctr. Room J4 . . . . . Mon. 10:50 am to 12:10 pm

Industrial II

Chair: **Bo Gu**, GSI Lumonics Inc.

10:50 am: **Laser processing of advanced materials with high brightness solid-state lasers at 532nm,** T. Riesbeck, Technische Univ. Berlin (Germany); A. Binder, Laser- und Medizin-Technologie GmbH, Berlin (Germany); H. J. Eichler, Technische Univ. Berlin (Germany) . . . . . [6106A-04]

11:10 am: **High quality laser milling of ceramics, dielectrics and metals using nanosecond and picosecond lasers,** D. Karnakis, G. Rutterford, M. R. Knowles, Oxford Lasers Ltd. (United Kingdom); T. Dobrev, P. Petkov, S. S. Dimov, Cardiff Univ. (United Kingdom) . . . . . [6106A-05]

11:30 am: **Production excimer drilling process for producing micron exit holes in polyimide,** T. E. Lizotte, O. P. Ohar, Hitachi Via Mechanics USA, Inc. . . . . [6106A-07]

11:50 am: **High power excimer laser micromachining,** L. Herbst, R. Paetzel, Lambda Physik GmbH (Germany) . . . . . [6106A-08]

Lunch Break . . . . . 12:10 to 1:40 pm

SESSION 3

Conv. Ctr. Room J4 . . . . . Mon. 1:40 to 3:30 pm

Industrial III

Chair: **Michel Meunier**, École Polytechnique de Montréal (Canada)

1:40 pm: **A Neuro-Fuzzy Approach to Failure Detection and Diagnosis of Excimer Laser Ablation in Microvia Formation,** R. Setia, G. S. May, Georgia Institute of Technology . . . . . [6106A-09]

2:00 pm: **Developments in laser singulation to support higher integrated circuit density,** S. Venkat, Coherent, Inc. . . . . [6106A-10]

2:20 pm: **New advances in dry and steam laser cleaning of opaque and transparent critical substrates: with IR-lasers to new laser cleaning mechanisms,** S. D. Allen, S. Shukla, K. Lyon, S. I. Kudryashov, Arkansas State Univ. . . . . [6106A-11]

2:40 pm: **Laser Annealing of LTPS,** R. Paetzel, L. Herbst, F. Simon, Lambda Physik GmbH (Germany) . . . . . [6106A-12]

3:00 pm: **A hybrid SLS approach for obtaining orientation-controlled single-crystal Si regions on glass substrates** *(Invited Paper),* P. C. van der Wilt, B. A. Turk, A. B. Limanov, A. M. Chitu, J. S. Im, Columbia Univ. . . . . [6106A-13]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 4

Conv. Ctr. Room J4 . . . . . Mon. 4:00 to 5:40 pm

Direct Write

Chair: **Paul C. van der Wilt**, Columbia Univ.

4:00 pm: **High-spatial coherence excimer laser for production of fiber Bragg gratings,** R. F. Delmdahl, Lambda Physik AG (Germany) . . . . [6106A-14]

4:20 pm: **Laser-induced formation of an array of periodic submicron resistors in silicon covered by SiO2,** Y. Liao, J. Degorce, M. Meunier, École Polytechnique de Montréal (Canada) . . . . . [6106A-15]

4:40 pm: **Inkjet printed flexible electronics components fabrication by low temperature subtractive laser processing of functional nano-ink,** S. H. Ko, Univ. of California/Berkeley . . . . . [6106A-16]

5:00 pm: **Laser-induced oxidation of zinc film for direct-write grayscale photomask material,** G. H. Chapman, J. Wang, M. Chang, R. Y. Tu, C. Choo, D. K. Poon, J. Peng, Simon Fraser Univ. (Canada) . . . . . [6106A-17]

5:20 pm: **Real-time optical characterization of laser oxidation process in bimetallic direct write gray scale photomasks,** G. H. Chapman, D. K. Poon, M. Chang, J. Wang, C. Choo, R. Tu, Simon Fraser Univ. (Canada) . . [6106A-18]

Tuesday 24 January

SESSION 5

Conv. Ctr. Room A3 . . . . . Tues. 8:00 to 10:00 am

Joint session with conference 6108.

Femtosecond Laser Micromachining

Chair: **Constantine P. Grigoropoulos,** Univ. of California/Berkeley

8:00 am: **Femtosecond laser micromachining** *(Invited Paper),* E. Mazur, Harvard Univ. . . . . [6106A-19]

8:30 am: **Exploiting heat-accumulation effects in high-repetition rate ultrashort laser microprocessing** *(Invited Paper),* P. R. Herman, S. Eaton, H. Zhang, J. Li, Univ. of Toronto (Canada) . . . . . [6108-20]

9:00 am: **Investigation of femtosecond laser irradiation on fused silica etching selectivity,** Y. Bellouard, Technische Univ. Eindhoven (Netherlands); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland); A. A. Said, M. A. Dugan, P. Bado, Translume . . . . . [6108-21]

9:20 am: **Tailored excitation sequences for optimized laser induced modifications in bulk transparent materials exposed to sub-ps irradiation,** A. Mermillod-Blondin, Univ. Jean Monnet Saint-Etienne (France) and Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); R. Stoian, Univ. Jean Monnet Saint-Etienne (France); A. Rosenfeld, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); E. Audouard, Univ. Jean Monnet Saint-Etienne (France); I. V. Hertel, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [6106A-20]

9:40 am: **Unified model of femtosecond laser ionization in bulk dielectrics,** S. I. Kudryashov, Arkansas State Univ. . . . . [6108-22]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Conv. Ctr. Room A3 . . . . . Tues. 10:30 am to 12:10 pm

Joint session with conference 6108.

Femtosecond Laser Micromachining: Fundamentals

Chair: **Eric Mazur,** Harvard Univ.

10:30 am: **Laser nanoprocessing using near-field probes** *(Invited Paper),* C. P. Grigoropoulos, Univ. of California/Berkeley . . . . . [6106A-21]

11:00 am: **Time resolved studies of femtosecond laser ablation of silicon (100) with thermal oxide films via pump-probe imaging** *(Invited Paper, Presentation Only),* S. M. Yalisove, J. P. McDonald, Y. P. Picard, Univ. of Michigan . . . . . [6108-23]

11:30 am: **Dynamics of femtosecond laser-induced cluster emission from silicon,** A. V. Bulgakov, Institute of Thermophysics (Russia); I. Ozerov, W. I. Marine, Univ. de la Méditerranée (France) . . . . . [6106A-22]

11:50 am: **Suited simulations for optimal ultrafast laser processing of metals,** E. Audouard, J. Colombier, A. Mermillod Blondin, N. Huot, R. Stoian, Univ. Jean Monnet Saint-Etienne (France); H. Soder, Impulsion SAS (France) . . . . . [6106A-23]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 7

Conv. Ctr. RoomA3 . . . . . Tues. 1:10 to 3:10 pm

Joint session with conference 6108.

Femtosecond Laser Micromachining: Periodic and Internal Structuring

Chair: **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

1:10 pm: **Generation of new nanomaterials by interfering femtosecond laser processing and its applications** *(Invited Paper),* Y. Nakata, Kyushu Univ. (Japan) . . . . . [6106A-24]

1:40 pm: **Fabrication of periodic arrays of gathering titania-organic hybrid pillars derived from multi-beam laser interference technique,** H. Segawa, Tokyo Institute of Technology (Japan); H. Misawa, Hokkaido Univ. (Japan); T. Yano, Tokyo Insititute of Technology (Japan); S. Shibata, Tokyo Institute of Technology (Japan) . . . . . [6106A-25]

2:00 pm: **Femtosecond laser writing of Bragg gratings using a single-pulse processing,** I. Sohn, M. Lee, T. Kim, Information and Communications Univ. (South Korea); S. Lee, J. Chung, Phoco Co., Ltd. (South Korea) . . . . [6106A-26]

2:20 pm: **Waveguide writing in silica glass with a femtosecond fiber laser at the wavelength of 1560-nm,** W. Watanabe, T. Tamaki, K. Itoh, Osaka Univ. (Japan); H. Nagai, M. Yoshida, AISIN SEIKI CO., LTD. (Japan) . . . . . [6108-24]

2:40 pm: **Optimized precision micromachining using commercially-available, high-repetition rate, microjoule, femtosecond fiber lasers,** M. L. Stock, G. D. Sucha, A. Y. Arai, IMRA America, Inc. . . . . [6108-25]

3:00 pm: **Waveguide writing in bulk PMMA by femtosecond laser pulses,** W. Watanabe, S. Sowa, K. Itoh, Osaka Univ. (Japan) . . . . . [6108-26]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION A

Conv. Ctr. Room A3 . . . . . Tues. 3:50 to 5:40 pm

Joint session with conference 6108.

Femtosecond Laser Micromachining: Fabricating Photonic Devices

Chair: **Peter R. Herman,** Univ. of Toronto (Canada)

3:50 pm: **Crossed beam irradiation for femtosecond laser micro and nanomachining with three-dimensionally isotropic spatial resolution** *(Invited Paper),* K. Sugioka, K. Midorikawa, The Institute of Physical and Chemical Research (Japan) . . . . . [6108-27]

4:20 pm: **Femtosecond-laser microstructuring of silicon for novel photovoltaic devices,** B. R. Tull, J. E. Carey III, M. T. Winkler, E. Mazur, Harvard Univ. . . . . [6108-28]

4:40 pm: **Laser-based fabrication of a displacement sensor with an integrated high-accuracy position sensor,** P. Bado, M. A. Dugan, A. A. Said, Translume; Y. Bellouard, Technische Univ. Eindhoven (Netherlands) . . [6108-29]

5:00 pm: **Discrete spatial soliton formation in a two-dimensional fs laser written waveguide array in fused silica,** A. Szameit, D. Blömer, J. Burghoff, T. Pertsch, S. Nolte, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6108-30]

5:20 pm: **3D photonic devices at telecom wavelengths fabricated by a femtosecond oscillator,** V. A. Maselli, R. Osellame, N. Chiodo, G. Cerullo, P. Laporta, Politecnico di Milano (Italy); P. Ferraro II, S. M. De Nicola, A. Finizio, Consiglio Nazionale delle Ricerche (Italy) . . . . . [6108-31]

Wednesday 25 January

SESSION 8

Conv. Ctr. Room J4 . . . . . Wed. 8:00 to 10:00 am

Fundamentals and Diagnostics

Chair: **Tatsuo Okada**, Kyushu Univ. (Japan)

8:00 am: **Picosecond time-scale heat transport in metallic layers** *(Invited Paper),* D. G. Cahill, B. C. Gundrum, R. S. Averback, Univ. of Illinois at Urbana-Champaign . . . . . [6106A-27]

8:30 am: **Fundamentals of laser-induced plume dynamics in ambient gas environment,** N. M. Bulgakova, Institute of Thermophysics (Russia) [6106A-28]

8:50 am: **Ablation of silica glass using laser plasma soft x-rays at around 10nm and ablation mechanism,** T. Makimura, H. Miyamoto, S. Uchida, K. Murakami, Univ. of Tsukuba (Japan); N. Hiroyuki, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6106A-29]

9:10 am: **Modeling focused pulsed laser-induced charge injection in silicon,** M. Meunier, E. Boulais, J. Degorce, G. Wild, V. Binet, Y. Savaria, École Polytechnique de Montréal (Canada) . . . . . [6106A-30]

9:30 am: **Laser-induced transient stress-field studied by time-resolved photoelasticity technique** *(Invited Paper),* Y. Ito, Nagaoka Univ. of Technology (Japan) . . . . . [6106A-31]

Coffee Break . . . . . 10:00 to 10:30 am

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:20 pm

SESSION 9

Conv. Ctr. Room J4 . . . . . Wed. 1:20 to 3:40 pm

PLD and Surface Modification

Chair: **Hiroyuki Niino**, National Institute of Advanced Industrial Science and Technology (Japan)

1:20 pm: **The cross-beam pulsed laser deposition** *(Invited Paper),* A. Gorbunoff, Hochschule für Technik und Wirtschaft Dresden (Germany) . . . . . [6106A-32]

1:50 pm: **Laser welding of silica microspheres to silicone rubber,** M. Okoshi, J. Cho, N. Inoue, National Defense Academy (Japan); J. Li, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6106A-33]

2:10 pm: **Laser surface modifications for improved bio-compatibility and cell adhesion,** L. C. Ionescu, J. Chen, W. O. Sobojeyo, C. B. Arnold, Princeton Univ. . . . . [6106A-34]

2:30 pm: **Laser treatment of micro-components' surface for improved tribological applications,** K. Ye, Y. Goh, National Univ. of Singapore (Singapore); C. Cheng, C. Yeo, Sony Singapore Research Lab. (Singapore); M. H. Hong, National Univ. of Singapore (Singapore) . . . . . [6106A-35]

2:50 pm: **CW-laser induced modification in glasses by laser backside irradiation (LBI),** M. Yoshioka, H. Hidai, H. Tokura, Tokyo Institute of Technology (Japan) . . . . . [6106A-36]

3:10 pm: **Micro/nanoscale surface modification and structuring using lasers** *(Invited Paper),* Y. Lu, Univ. of Nebraska/Lincoln . . . . . [6106A-37]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 10

Conv. Ctr. Room J4 . . . . . Wed. 4:00 to 5:40 pm

Surface Modification and 3D Structuring

Chair: **Andrew S. Holmes**, Imperial College London (United Kingdom)

4:00 pm: **Optical-maskless patterning for nanostructuring,** R. Menon, M. E. Walsh, LumArray Inc. and Massachusetts Institute of Technology; D. Chao, A. Patel, Massachusetts Institute of Technology; H. I. Smith, LumArray Inc. and Massachusetts Institute of Technology . . . . . [6106A-38]

4:20 pm: **Application of UV transparent polymer ablated by F2 laser to a lab-on-a-chip,** K. Obata, The Institute of Physical and Chemical Research (Japan); Y. Hanada, Tokyo Univ. of Science (Japan) and The Institute of Physical and Chemical Research (Japan); K. Sugioka, The Institute of Physical and Chemical Research (Japan) and Tokyo Univ. of Science (Japan); K. Midorikawa, The Institute of Physical and Chemical Research (Japan) . . . . . [6106A-39]

4:40 pm: **Femtosecond laser lithography and applications** *(Invited Paper),* B. N. Chichkov, Laser Zentrum Hannover e.V. (Germany) . . . . . [6106A-40]

5:10 pm: **Optical driven nano robots for micro biology** *(Invited Paper),* K. Ikuta, Nagoya Univ. (Japan) . . . . . [6106A-41]

✔ Posters-Wednesday

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✔ **In situ crystal growth during explosive crystallization,** M. S. Rogers, Univ. of California/Berkeley . . . . . [6106A-42]

✔ **Nitrogen-doped TiO2 thin films grown on various substrates,** T. Sakano, T. Okato, M. Obara, Keio Univ. (Japan) . . . . . [6106A-43]

✔ **Growth of ZnO thin films with ZnO low-temperature buffer layer for blue LED,** T. Osada, T. Okato, M. Obara, Keio Univ. (Japan) . . . . . [6106A-45]

✔ **Synthesis and treatment of nano-structured ZnO by laser ablation,** T. Okada, K. Kawashima, M. Ueda, Kyushu Univ. (Japan) . . . . . [6106A-46]

✔ **Fabrication of ZnO nanoparticles with visible photoluminescence using pulsed lLaser ablation in aqueous media,** C. He, T. Sasaki, Y. Shimizu, N. Koshizaki, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6106A-47]

✔ **Nucleation and growth of single-wall carbon nanotubes in the laser ablation products,** A. Gorbunoff, Hochschule für Technik und Wirtschaft Dresden (Germany); O. Jost, Technische Univ. Dresden (Germany) [6106A-48]

✔ **Active control of the ablation plume for laser ablation atomic fluorescence spectroscopy,** D. Nakamura, T. Takao, Y. Oki, M. Maeda, Kyushu Univ. (Japan) . . . . . [6106A-49]

✔ **A study of angular dependence in the ablation rate of polymers by nanosecond pulses,** J. E. Pedder, A. S. Holmes, Imperial College London (United Kingdom) . . . . . [6106A-50]

✔ **Lateral melt expulsion and debris formation during small-scale femtosecond laser ablation,** S. I. Kudryashov, Arkansas State Univ. . . . . [6106A-51]

✔ **Mechanisms study of laser-induced plasma-assisted ablation (LIPAA),** Y. Hanada, K. Sugioka, K. Obata, K. Midorikawa, The Institute of Physical and Chemical Research (Japan) . . . . . [6106A-52]

✔ **Surface micro-fabrication of silica glass by DPSS-UV laser irradiation,** H. Niino, Y. Kawaguchi, T. Sato, A. Narazaki, T. Gumpenberger, R. Kurosaki, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6106A-53]

✔ **Increase of stability geometrical parameters of microholes,** M. V. Volkov, St. Petersburg Institute of Fine Mechanics and Optics (Russia); V. A. Serebryakov, A. A. Timofeev, S.I. Vavilov State Optical Institute (Russia); X. Zhang, Beijing Aeronautical Manufacturing Technology Research Institute (China) . . . . . [6106A-54]

✔ **Finishing of non-metallic materials including real-time laser ellipsometry monitoring,** Y. D. Filatov, V. I. Sidorko, National Academy of Sciences of Ukraine (Ukraine); A. Y. Filatov, National Taras Shevchenko Univ. of Kyiv (Ukraine) . . . . . [6106A-55]

✔ **Inspection of defects and metallic contamination in SiGe:B CMOS using an in-line photoluminescence monitor,** C. Liao, United Microelectronics Corp. (Taiwan); A. Buczkowski, Accent Optical Technologies; C. C. Chien, K. T. Huang, United Microelectronics Corp. (Taiwan); Z. Li, T. Walker, S. G. Hummel, Accent Optical Technologies . . . . . [6106A-57]

✔ **High Repetition Rate Excimer Laser,** H. Esser, Lambda Physik (Germany); H. Schillinger, TuiLaser AG (Germany) . . . . . [6106A-58]

Thursday 26 January 2006 • Proceedings of SPIE Vol. 6106B

Synthesis and Photonics of Nanoscale Materials IV

Conference Chairs: **David B. Geohegan**, Oak Ridge National Lab.; **Frank Träger**, Univ. Kassel (Germany); **Jan J. Dubowski**, Univ. de Sherbrooke (Canada)

Program Committee: **Steven R. J. Brueck**, The Univ. of New Mexico; **J. Thomas Dickinson**, Washington State Univ.; **Constantine P. Grigoropoulos**, Univ. of California/Berkeley; **Richard F. Haglund, Jr.**, Vanderbilt Univ.; **Hiroshi Kumagai**, The Institute of Physical and Chemical Research (R (Japan); **Motoichi Ohtsu**, The Univ. of Tokyo (Japan); **Xianfan Xu**, Purdue Univ.

Wednesday 25 January

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

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✔ **Research on laser damage of IR detector,** Y. Liu, Shandong Institute of Business and Technology (China) . . . . . [6106B-76]

Thursday 26 January

SESSION 12

Conv. Ctr. Room J4 . . . . . Thurs. 8:00 to 10:00 am

Session I

8:00 am: **Design, fabrication, and characterization of nanometer-scale ridged aperture optical antenna** *(Invited Paper),* X. Xu, E. X. Jin, S. M. Uppuluri, L. Wang, Purdue Univ. . . . . [6106B-59]

8:40 am: **Extremely high efficiency carrier multiplication in semiconductor nanocrystals,** R. D. Schaller, J. M. Pietryga, M. A. Petruska, V. I. Klimov, Los Alamos National Lab. . . . . [6106B-60]

9:00 am: **Selective area immobilization of Avidin on (001) GaAs surface,** X. Ding, K. Moumanis, J. J. Dubowski, Univ. de Sherbrooke (Canada) [6106B-61]

9:20 am: **Preparation of indium tin oxide nanoparticles using laser-induced fragmentation of the particles dispersed in water and their optical properties,** T. Sasaki, H. Usui, Y. Shimizu, N. Koshizaki, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6106B-62]

9:40 am: **Second harmonic generation from centrosymmetric arrays of metal nanoparticles,** M. D. McMahon, R. Lopez, L. C. Feldman, R. F. Haglund, Jr., Vanderbilt Univ. . . . . [6106B-63]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 13

Conv. Ctr. Room J4 . . . . . Thurs. 10:30 am to 12:30 pm

Session II

10:30 am: **Tailored femtosecond pulses for nanoscale laser processing** *(Invited Paper),* L. Englert, L. Haag, C. Sarpe-Tudoran, M. Wollenhaupt, T. Baumert, Univ. Kassel (Germany) . . . . . [6106B-64]

11:10 am: **Synthesis of novel colloidal nanomaterials by femtosecond laser ablation in liquids,** A. V. Kabashin, M. Meunier, S. Besner, P. Boyer, École Polytechnique de Montréal (Canada) . . . . . [6106B-65]

11:30 am: **Production of dichroitic 3D structures by fs laser irradiation in composite glass containing Ag nanoparticles,** G. Seifert, A. V. Podlipensky, A. Abdolvand, H. Graener, Martin-Luther Univ. Halle-Wittenberg (Germany) . . . . . [6106B-66]

11:50 am: **Sub-wavelength ripple formation on dielectric and metallic materials,** J. Gottmann, R. Wagner, RWTH Aachen (Germany) . . . . . [6106B-74]

12:10 pm: **Ferrocene-based monolayers: self-assembly via rigid bidentate anchor groups,** T. Weidner, C. Bruhn, Univ. Kassel (Germany); D. Fenske, Univ. Karlsruhe (Germany); A. Krämer, B. Krohn, Univ. Kassel (Germany); A. Priebe, Univ. Heidelberg (Germany); A. Rothenberger, Univ. Karlsruhe (Germany); D. Rother, U. Siemeling, F. Träger, Univ. Kassel (Germany) . . . . . [6106B-68]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 14

Conv. Ctr. Room J4 . . . . . Thurs. 1:30 to 3:30 pm

Session III

1:30 pm: **Laser engineering of nanohybrid materials for bioapplications** *(Invited Paper),* W. I. Marine, L. Sajti, A. Said, S. Giorgio, V. Khodorkovsky, Univ. de la Méditerranée (France) . . . . . [6106B-78]

2:10 pm: **Synthesis of single wall carbon nanotubes and carbon nanohorns by high power laser vaporization,** A. A. Puretzky, The Univ. of Tennesse; D. J. Styers-Barnett, C. M. Rouleau, Oak Ridge National Lab.; B. Zhao, Oak Rdige National Lab.; H. Hu, H. Cui, Z. Liu, Oak Ridge National Lab.; I. Ivanov, The Univ. of Tennesse and Oak Ridge National Lab.; P. F. Britt, D. B. Geohegan, Oak Ridge National Lab. . . . . [6106B-70]

2:30 pm: **Position-controlled, rapid growth of single-walled carbon nanotubes,** D. J. Styers-Barnett, Z. Liu, Oak Ridge National Lab.; A. Puretzky, The Univ. of Tennessee; C. Rouleau, H. Cui, D. B. Geohegan, Oak Ridge National Lab. . . . . [6106B-71]

2:50 pm: **Nanoscale vibrational analysis of carbon nanotubes using near-field Raman spectroscopy,** T. Yano, Osaka Univ. (Japan); Y. Inouye, S. Kawata, Osaka Univ. (Japan) and The Institute of Physical and Chemical Research (Japan) . . . . . [6106B-72]

3:10 pm: **The effect of tip-enhancement in near-field Raman scattering of C-60,** P. Verma, K. Yamada, Y. Inouye, Osaka Univ. (Japan); S. Kawata, Osaka Univ. (Japan) and The Institute of Physical and Chemical Research (Japan) . . . . . [6106B-73]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 15

Conv. Ctr. Room J4 . . . . . Thurs. 4:00 to 5:00 pm

Session IV

4:00 pm: **Using UV light to achieve micrometer sized sterically oriented immobilisation of proteins** *(Invited Paper),* S. B. Petersen, Aalborg Univ. (Denmark) . . . . . [6106B-77]

4:40 pm: **Angle resolved XPS study of self-assembled monolayers of thiols on GaAs,** D. M. Wieliczka, Univ. of Missouri/Kansas City; X. Ding, J. J. Dubowski, Univ. de Sherbrooke (Canada) . . . . . [6106B-75]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6107

Laser-Based Micropackaging

Conference Chairs: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany); **Willem Hoving**, Philips Ctr. for Industrial Technology (Netherlands); **Yongfeng Lu**, Univ. of Nebraska/Lincoln; **Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan)

Program Committee: **Jun Amako**, Seiko Epson Corp. (Japan); **Dieter Bäuerle**, Johannes Kepler Univ. Linz (Austria); **Jan J. Dubowski**, Univ. de Sherbrooke (Canada); **Christoph Hermanns**, SCHOTT Glas (Germany); **Sergey I. Kudryashov**, Arkansas State Univ.; **Xinbing Liu**, Panasonic Technologies Co.; **Isamu Miyamoto**, Osaka Univ. (Japan); **Andreas Ostendorf**, Laser Zentrum Hannover e.V. (Germany); **Wilhelm Pfleging**, Forschungszentrum Karlsruhe (Germany); **Vladimir V. Semak**, The Pennsylvania State Univ.; **Gurinder P. Singh**, Hitachi Global Storage Technologies; **Koji Sugioka**, The Institute of Physical and Chemical Research (RIKEN) (Japan)

Wednesday 25 January

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

SESSION 1

Hilton Hotel: Santa Clara II . . . . . Wed. 1:10 to 3:30 pm

Bonding and Welding

Chair: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany)

1:10 pm: **A new laser bonding method of anisotropic conductive films in flat panel display and semiconductor packaging applications** *(Invited Paper),* G. Nam, K. Ryu, M. Seo, Institute for Adv Engineering (South Korea); N. Kwak, Jet Tech, Ltd. (South Korea) . . . . . [6107-01]

1:40 pm: **Laser joining of glass to silicon using adhesive for MEMS packaging applications,** F. Bardin, S. Kloss, A. J. Moore, Heriot-Watt Univ. (United Kingdom); I. De Wolf, IMEC (Belgium); C. Wang, D. P. Hand, Heriot-Watt Univ. (United Kingdom) . . . . . [6107-02]

2:00 pm: **Laser micro welding of copper and aluminum,** I. Mys, M. H. Schmidt, Bayerisches Laserzentrum gGmbH (Germany) . . . . . [6107-03]

2:20 pm: **Diode laser welding for packaging of transparent micro-structured polymer chips** *(Invited Paper),* T. Klotzbücher, T. Braune, M. Letschert, K. S. Drese, Institut für Mikrotechnik Mainz GmbH (Germany) . . . . . [6107-04]

2:50 pm: **Laser patterning and multilayer welding of transparent polymers for microfluidic device fabrication,** W. Pfleging, O. Baldus, C. Ziebert, Forschungszentrum Karlsruhe (Germany); I. Tahhan, Albert-Ludwigs-Univ. Freiburg (Germany) . . . . . [6107-05]

3:10 pm: **Laser micro welding of polymer components for dental prothesis,** M. Hustedt, A. von Busse, M. Fargas, O. Meier, Laser Zentrum Hannover e.V. (Germany); H. Bißinger, dentacon GmbH (Germany) . . . . . [6107-06]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 2

Hilton Hotel: Santa Clara II . . . . . Wed. 3:50 to 5:20 pm

Simulation and Modelling

Chair: **Yongfeng Lu**, Univ. of Nebraska/Lincoln

3:50 pm: **Optimization of laser microsoldering by mathematical modelling of joints kinetic formation** *(Invited Paper),* V. P. Veiko, A. A. Allas, Saint-Petersburg State Univ. (Russia) . . . . . [6107-07]

4:20 pm: **Numerical prediction of drilling rates for ultra-high intensity nanosecond laser pulses,** V. V. Semak, The Electro-Optics Ctr. . . . . [6107-08]

4:40 pm: **Ultra-deep drilling of solids by high-power nanosecond lasers: theory and experiments,** S. Paul, K. Lyon, S. I. Kudryashov, S. D. Allen, Arkansas State Univ. . . . . [6107-09]

5:00 pm: **Investigation of CO2 gas breakdown using optical emission spectroscopy,** H. Ling, Y. X. Han, Y. Lu, Univ. of Nebraska/Lincoln . . [6107-10]

✔ Posters-Wednesday

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✔ **Hybrid laser technologies for processing of dielectric materials,** V. K. Syssoev, Lavochkin Association (Russia); Y. N. Bulkin, RFNC-VNIIEF (Russia); A. V. Zaharchenko, P. A. Vyatlev, Lavochkin Association (Russia) . . . . . [6107-26]

✔ **Adaptive modeling of the femto-second inscription in silica,** V. Mezentsev, Aston Univ. (United Kingdom); J. Dreher, Ruhr-Univ. Bochum (Germany); J. Petrovic, Aston Univ. (United Kingdom); R. Grauer, Ruhr-Univ. Bochum (Germany) . . . . . [6107-27]

✔ **Selective laser removal of nano- and micro-particles,** S. Shukla, K. Lyon, S. I. Kudryashov, S. D. Allen, Arkansas State Univ. . . . . [6107-28]

✔ **Microstructures on Si and graphite surfaces fabricated by single intense femtosecond laser pulses,** S. I. Kudryashov, Arkansas State Univ. [6107-29]

Thursday 26 January

SESSION 3

Hilton Hotel: Santa Clara II . . . . . Thurs. 8:30 to 10:00 am

Laser-Patterning I: Optics and Photonics

Chair: **Willem Hoving**, Philips Ctr. for Industrial Technology (Netherlands)

8:30 am: **Developments in laser processing for silica-based planar lightwave circuits** *(Invited Paper),* Y. Nasu, M. Abe, M. Kohtoku, NTT Photonics Labs. (Japan) . . . . . [6107-11]

9:00 am: **Micro-fabrication of advanced photonic devices by means of direct point-by-point femto-second inscription in silica,** V. Mezentsev, M. Dubov, A. Martinez, T. P. Allsop, I. Y. Khrushchev, I. Bennion, Y. Lai, D. J. Webb, F. Floreani, Aston Univ. (United Kingdom) . . . . . [6107-12]

9:20 am: **Use of non-digitized diffractive optical elements for high-throughput and damage-free laser materials processing,** J. Amako, E. Fujii, Y. Yamazaki, T. Shimoda, Seiko Epson Corp. (Japan) . . . . . [6107-13]

9:40 am: **Fabrication, characterization, and simulation of inverse opal 3D photonic crystals using laser-assisted imprinting,** H. Wang, Y. Lu, Z. Y. Yang, Univ. of Nebraska/Lincoln . . . . . [6107-14]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 4

Hilton Hotel: Santa Clara II . . . . . Thurs. 10:30 am to 1:00 pm

Laser-Patterning II: Nano- and Micro-Patterning

Chair: **Kunihiko Washio**, Paradigm Lasers, Inc. (Japan)

10:30 am: **Laser-nanostructure interactions and applications for parallel nanomanufacturing** *(Invited Paper),* S. Chen, The Univ. of Texas at Austin . . . . . [6107-15]

11:00 am: **Excimer laser material processing: state of the art and new approaches in microsystem technology** *(Invited Paper),* W. Pfleging, Forschungszentrum Karlsruhe (Germany); M. Przybylski, ATL Lasertechnik GmbH (Germany); H. J. Brückner, Univ. of Applied Sciences (Germany) [6107-16]

11:30 am: **Thermal damage of silicon wafer in thermal cleaving process with pulsed laser and CW laser,** K. Yamada, Hiroshima Univ. (Japan); T. Ueda, A. Hosokawa, Kanazawa Univ. (Japan); Y. Yamane, K. Sekiya, Hiroshima Univ. (Japan) . . . . . [6107-17]

11:50 am: **Laser slotting of inkjet printer chips,** B. Richerzhagen, D. Perrottet, A. Spiegel, Synova SA (Switzerland) . . . . . [6107-18]

12:10 pm: **Applications of laser patterning to fabricate innovative thin film silicon solar cells** *(Invited Paper),* W. Shinohara, M. Shima, S. Taira, M. Matsumoto, K. Uchihashi, A. Terakawa, SANYO Electric Co., Ltd. (Japan) . . . . . [6107-19]

12:40 pm: **Rapid manufacturing of lattice structures using selective laser melting,** O. Rehme, C. Emmelmann, Technische Univ. Hamburg-Harburg (Germany) . . . . . [6107-20]

Lunch Break . . . . . 1:00 to 2:00 pm

SESSION 5

Hilton Hotel: Santa Clara II . . . . . Thurs. 2:00 to 3:50 pm

Thin Films and Nano-Materials

Chair: **Wilhelm Pfleging**, Forschungszentrum Karlsruhe (Germany)

2:00 pm: **Silica nanowires: manipulating light at the nanoscale** *(Invited Paper),* E. Mazur, Harvard Univ. . . . . [6107-21]

2:30 pm: **Synthesis of carbon nanotubes by laser-assisted chemical vapor deposition,** J. Shi, Y. Lu, X. Wang, Univ. of Nebraska/Lincoln . . . . . [6107-22]

2:50 pm: **Resonant infrared pulsed laser deposition of polyimide,** N. Dygert, R. F. Haglund, Jr., K. E. Schriver, Vanderbilt Univ.; M. R. Papantonakis, Naval Research Lab.; M. Anthamatten, Univ. of Rochester; A. P. Gies, D. M. Hercules, Vanderbilt Univ. . . . . [6107-23]

3:10 pm: **2D surface characterization of laser-deposited carbon films using Raman scattering,** K. Yi, Y. Lu, H. Ling, Univ. of Nebraska/Lincoln . . [6107-24]

3:30 pm: **Laser-assisted synthesis of diamond-like carbon from cyclohexane liquid,** Y. Han, H. Ling, Y. Lu, Univ. of Nebraska/Lincoln [6107-25]

Sunday-Wednesday 22-25 January 2006 • Proceedings of SPIE Vol. 6108

Commercial and Biomedical Applications of Ultrafast Lasers VI

Conference Sponsors: **Del Mar Ventures, Spectra-Physics, High Q Laser, Time-Bandwidth Products, Femtolasers**

Conference Chairs: **Joseph Neev**, Y-Beam Technologies; **Stefan Nolte**, Friedrich-Schiller-Univ. Jena (Germany); **Alexander Heisterkamp**, Harvard Univ.; **Christopher B. Schaffer**, Univ. of California/San Diego

Program Committee: **Emmanuel Beaurepaire**, École Polytechnique (France); **Brett E. Bouma**, Harvard Medical School; **James E. Carey**, Harvard Univ.; **Donald J. Harter**, IMRA America, Inc.; **Daniel J. Kane**, Southwest Sciences, Inc.; **Karsten König**, Fraunhofer-Institut für Biomedizinische Technik (Germany); **Eric Mazur**, Harvard Univ.; **Nozomi Nishimura**, Univ. of California/San Diego; **Minoru Obara**, Keio Univ. (Japan); **Andreas Ostendorf**, Laser Zentrum Hannover e.V. (Germany); **Jeffrey A. Squier**, Colorado School of Mines; **Brent C. Stuart**, Lawrence Livermore National Lab.; **Gregg D. Sucha**, IMRA America, Inc.; **Philbert S. Tsai**, Univ. of California/San Diego; **Alfred Vogel**, Univ. Luebeck (Germany)

Sunday 22 January

SESSION 1

Conv. Ctr. Room A3 . . . . . Sun. 1:20 to 3:20 pm

In Vivo Manipulation of Biological Systems with Femtosecond Lasers I

Chair: **Christopher B. Schaffer**, Univ. of California/San Diego

1:20 pm: **Femtosecond laser dissection of neural networks** *(Invited Paper),* A. D. Samuel, Harvard Univ. . . . . [6108-01]

1:50 pm: **Blood flow changes following optically-induced microstrokes in rat brain,** N. Nishimura, B. Friedman, N. Kort, P. D. Lyden, D. D. Kleinfeld, C. B. Schaffer, Univ. of California/San Diego . . . . . [6108-02]

2:10 pm: **Sub-cellular nanosurgery in live cells using ultrashort laser pulses,** I. Z. Maxwell, E. Mazur, Harvard Univ. . . . . [6108-03]

2:30 pm: **Nanosurgery of sub-cellular organelles in living cells using a femtosecond laser oscillator,** W. Watanabe, T. Shimada, S. Matsunaga, T. Higashi, H. Ishii, K. Fukui, K. Itoh, Osaka Univ. (Japan) . . . . . [6108-04]

2:50 pm: **Non-destructive micro-patterning of living cells and protein crystals by focused femtosecond laser** *(Invited Paper),* Y. Hosokawa, Osaka Univ. (Japan) . . . . . [6108-49]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 2

Conv. Ctr. Room A3 . . . . . Sun. 3:50 to 5:20 pm

In Vivo Manipulation of Biological Systems with Femtosecond Lasers II

Chair: **Nozomi Nishimura**, Univ. of California/San Diego

3:50 pm: **Manipulation of morphogenetic movements in live Drosophila embryos using femtosecond pulses** *(Invited Paper),* W. Supatto, Institut Curie (France); D. Débarre, J. Martin, M. Schanne-Klein, École Polytechnique (France); E. Farge, Institut Curie (France); E. Beaurepaire, École Polytechnique (France) . . . . . [6108-05]

4:20 pm: **Advances in lasers for multiphoton excitation microscopy,** C. Dorman, Coherent, Inc. (United Kingdom) . . . . . [6108-06]

4:40 pm: **Simulation of ultrashort pulse induced plasma generation and interaction within the bulk of transparent Kerr-media,** C. L. Arnold, W. Ertmer, H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) [6108-07]

5:00 pm: **Third harmonic generation micro-spectroscopy,** O. Clay, Univ. of California/San Diego; A. Millard, Univ. of Connecticut Health Ctr.; C. Schaffer, P. Tsai, Univ. of California/San Diego; J. Aus-der-Au, Spectra-Physics; J. Squier, Colorado School of Mines; D. Kleinfeld, Univ. of California/San Diego [6108-08]

Monday 23 January

SESSION 3

Conv. Ctr. Room A3 . . . . . Mon. 11:00 am to 12:20 pm

Ultrashort Pulse Characterization: New Methods and Directions I

Chair: **Daniel J. Kane**, Southwest Sciences, Inc.

11:00 am: **An introduction to the characterization of ultrashort laser pulses** *(Invited Paper),* X. Gu, Max-Planck-Institut für Quantenoptik (Germany) and Georgia Institute of Technology; S. Akturk, P. Gabolde, Q. Cao, A. P. Shreenath, R. P. Trebino, Georgia Institute of Technology . . . . . [6108-09]

12:00 pm: **Spectral phase measurement devices for new femtosecond laser sources,** V. S. Paziouk, A. V. Konyashchenko, S. E. Egorov, A. J. Carson, C. C. Barnes, Del Mar Photonics, Inc. . . . . [6108-10]

Lunch Break . . . . . 12:20 to 2:00 pm

SESSION 4

Conv. Ctr. Room A3 . . . . . Mon. 2:00 to 3:30 pm

Ultrashort Pulse Characterization: New Methods and Directions II

Chair: **Xun Gu**, Georgia Institute of Technology

2:00 pm: **The MIIPS method for simultaneous phase measurement and compensation of femtosecond laser pulses and its role in two-photon microscopy and imaging** *(Invited Paper),* M. Dantus, Michigan State Univ. . . . . [6108-11]

2:30 pm: **Closed-loop control of a pulse shaper using real-time SHG FROG,** D. J. Kane, Southwest Sciences, Inc. . . . . [6108-12]

2:50 pm: **The general theory of first-order spatio-temporal distortions of Gaussian pulses and beams,** S. Akturk, X. Gu, P. Gabolde, R. P. Trebino, Georgia Institute of Technology . . . . . [6108-13]

3:10 pm: **Using GRENOUILLE to measure spatio-temporal distortions,** S. Akturk, X. Gu, Z. Wang, R. P. Trebino, Georgia Institute of Technology . . . . . [6108-14]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 5

Conv. Ctr. Room A3 . . . . . Mon. 4:00 to 5:40 pm

Applications of Ultrashort Pulses in Materials Characterization

Chair: **Joseph Neev**, Y-Beam Technologies

4:00 pm: **Silicon flip-chip imaging with a resolution of 325-nm using solid-immersion lenses and the optical-beam induced current method,** E. Ramsay, D. Xiao, N. Pleynet, R. J. Warburton, D. T. Reid, Heriot-Watt Univ. (United Kingdom) . . . . . [6108-15]

4:20 pm: **Electrical signal probing in a silicon CMOS integrated circuit using electric-field-induced second-harmonic generation,** E. Ramsay, D. Xiao, D. T. Reid, Heriot-Watt Univ. (United Kingdom); B. Offenbeck, N. Weber, Fraunhofer-Institut für Integrierte Schaltungen (Germany) . . . . . [6108-16]

4:40 pm: **Femtosecond laser-induced lattice dynamics in semiconductors: Peierls structural transitions versus point defect formation and 'cold melting',** S. I. Kudryashov, Arkansas State Univ. . . . . [6108-17]

5:00 pm: **The influence of input pump polarization on supercontinuum generation in photonic crystal fibers,** P. Falk, Danmarks Tekniske Univ. (Denmark); M. Delgado-Pinar, Univ. de València (Spain); M. H. Frosz, Danmarks Tekniske Univ. (Denmark); L. Thrane, P. E. Andersen, Risø National Lab. (Denmark); A. O. Bjarklev, O. Bang, Danmarks Tekniske Univ. (Denmark) . . . . . [6108-18]

5:20 pm: **Ultra-high resolution, polarization sensitive transversal optical coherence tomography for structural analysis and strain mapping,** K. Wiesauer, Upper Austrian Research GmbH (Austria); M. Pircher, E. Götzinger, C. K. Hitzenberger, Medizinische Univ. Wien (Austria); R. Engelke, G. Ahrens, K. Pfeiffer, U. Ostrzinski, G. Grützner, micro resist technology GmbH (Germany); R. Oster, Eurocopter Deutschland GmbH (Germany); D. Stifter, Upper Austrian Research GmbH (Austria) . . . . . [6108-19]

Tuesday 24 January

SESSION 6

Conv. Ctr. Room A3 . . . . . Tues. 8:00 to 10:00 am

Joint session with conference 6106A.

Femtosecond Laser Micromachining

Chair: **Constantine P. Grigoropoulos,** Univ. of California/Berkeley

8:00 am: **Femtosecond laser micromachining** *(Invited Paper),* E. Mazur, Harvard Univ. . . . . [6106A-19]

8:30 am: **Exploiting heat-accumulation effects in high-repetition rate ultrashort laser microprocessing** *(Invited Paper),* P. R. Herman, S. Eaton, H. Zhang, J. Li, Univ. of Toronto (Canada) . . . . . [6108-20]

9:00 am: **Investigation of femtosecond laser irradiation on fused silica etching selectivity,** Y. Bellouard, Technische Univ. Eindhoven (Netherlands); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland); A. A. Said, M. A. Dugan, P. Bado, Translume . . . . . [6108-21]

9:20 am: **Tailored excitation sequences for optimized laser induced modifications in bulk transparent materials exposed to sub-ps irradiation,** A. Mermillod-Blondin, Univ. Jean Monnet Saint-Etienne (France) and Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); R. Stoian, Univ. Jean Monnet Saint-Etienne (France); A. Rosenfeld, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); E. Audouard, Univ. Jean Monnet Saint-Etienne (France); I. V. Hertel, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [6106A-20]

9:40 am: **Unified model of femtosecond laser ionization in bulk dielectrics,** S. I. Kudryashov, Arkansas State Univ. . . . . [6108-22]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 7

Conv. Ctr. Room A3 . . . . . Tues. 10:30 am to 12:10 pm

Joint session with conference 6106A.

Femtosecond Laser Micromachining: Fundamentals

Chair: **Eric Mazur,** Harvard Univ.

10:30 am: **Laser nanoprocessing using near-field probes** *(Invited Paper),* C. P. Grigoropoulos, Univ. of California/Berkeley . . . . . [6106A-21]

11:00 am: **Time resolved studies of femtosecond laser ablation of silicon (100) with thermal oxide films via pump-probe imaging** *(Invited Paper, Presentation Only),* S. M. Yalisove, J. P. McDonald, Y. P. Picard, Univ. of Michigan . . . . . [6108-23]

11:30 am: **Dynamics of femtosecond laser-induced cluster emission from silicon,** A. V. Bulgakov, Institute of Thermophysics (Russia); I. Ozerov, W. I. Marine, Univ. de la Méditerranée (France) . . . . . [6106A-22]

11:50 am: **Suited simulations for optimal ultrafast laser processing of metals,** E. Audouard, J. Colombier, A. Mermillod Blondin, N. Huot, R. Stoian, Univ. Jean Monnet Saint-Etienne (France); H. Soder, Impulsion SAS (France) . . . . . [6106A-23]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 8

Conv. Ctr. RoomA3 . . . . . Tues. 1:10 to 3:20 pm

Joint session with conference 6106A.

Femtosecond Laser Micromachining: Periodic and Internal Structuring

Chair: **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

1:10 pm: **Generation of new nanomaterials by interfering femtosecond laser processing and its applications** *(Invited Paper),* Y. Nakata, Kyushu Univ. (Japan) . . . . . [6106A-24]

1:40 pm: **Fabrication of periodic arrays of gathering titania-organic hybrid pillars derived from multi-beam laser interference technique,** H. Segawa, Tokyo Institute of Technology (Japan); H. Misawa, Hokkaido Univ. (Japan); T. Yano, Tokyo Insititute of Technology (Japan); S. Shibata, Tokyo Institute of Technology (Japan) . . . . . [6106A-25]

2:00 pm: **Femtosecond laser writing of Bragg gratings using a single-pulse processing,** I. Sohn, M. Lee, T. Kim, Information and Communications Univ. (South Korea); S. Lee, J. Chung, Phoco Co., Ltd. (South Korea) . . . . [6106A-26]

2:20 pm: **Waveguide writing in silica glass with a femtosecond fiber laser at the wavelength of 1560-nm,** W. Watanabe, T. Tamaki, K. Itoh, Osaka Univ. (Japan); H. Nagai, M. Yoshida, AISIN SEIKI CO., LTD. (Japan) . . . . . [6108-24]

2:40 pm: **Optimized precision micromachining using commercially-available, high-repetition rate, microjoule, femtosecond fiber lasers,** M. L. Stock, G. D. Sucha, A. Y. Arai, IMRA America, Inc. . . . . [6108-25]

3:00 pm: **Waveguide writing in bulk PMMA by femtosecond laser pulses,** W. Watanabe, S. Sowa, K. Itoh, Osaka Univ. (Japan) . . . . . [6108-26]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 9

Conv. Ctr. Room A3 . . . . . Tues. 3:50 to 5:40 pm

Joint session with conference 6106A.

Femtosecond Laser Micromachining: Fabricating Photonic Devices

Chair: **Peter R. Herman,** Univ. of Toronto (Canada)

3:50 pm: **Crossed beam irradiation for femtosecond laser micro and nanomachining with three-dimensionally isotropic spatial resolution** *(Invited Paper),* K. Sugioka, K. Midorikawa, The Institute of Physical and Chemical Research (Japan) . . . . . [6108-27]

4:20 pm: **Femtosecond-laser microstructuring of silicon for novel photovoltaic devices,** B. R. Tull, J. E. Carey III, M. T. Winkler, E. Mazur, Harvard Univ. . . . . [6108-28]

4:40 pm: **Laser-based fabrication of a displacement sensor with an integrated high-accuracy position sensor,** P. Bado, M. A. Dugan, A. A. Said, Translume; Y. Bellouard, Technische Univ. Eindhoven (Netherlands) . . [6108-29]

5:00 pm: **Discrete spatial soliton formation in a two-dimensional fs laser written waveguide array in fused silica,** A. Szameit, D. Blömer, J. Burghoff, T. Pertsch, S. Nolte, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6108-30]

5:20 pm: **3D photonic devices at telecom wavelengths fabricated by a femtosecond oscillator,** V. A. Maselli, R. Osellame, N. Chiodo, G. Cerullo, P. Laporta, Politecnico di Milano (Italy); P. Ferraro II, S. M. De Nicola, A. Finizio, Consiglio Nazionale delle Ricerche (Italy) . . . . . [6108-31]

LASE Seminar and Panel Discussion

Quantifying High-Power Diode Laser Lifetime

Tues. 6:00 to 7:30 pm · Convention Center: Room J3

See page 16 for details.

Wednesday 25 January

SESSION 10

Conv. Ctr. Room A3 . . . . . Wed. 8:00 to 10:00 am

Novel Ultrafast Laser Sources

Chair: **Alexander Heisterkamp**, Laser Zentrum Hannover e.V. (Germany)

8:00 am: **Pulse shortening utilizing acceptor dye as saturable absorber in energy transfer distributed feedback dye laser,** P. Palanisamy, Anna Univ. (India); M. B. Ahamed, Crescent Engineering College (India) . . . . . [6108-32]

8:20 am: **Development of diode-pumped high average power continuous-wave and ultrashort pulse Yb:KGW lasers for nonlinear microscopy,** A. Major, V. Barzda, Univ. of Toronto at Mississauga (Canada) . . . . . [6108-33]

8:40 am: **New compressed Ti:sapphire femtosecond amplifier layout,** S. Y. Tenyakov, A. V. Konyashchenko, S. E. Egorov, A. J. Carson, C. C. Barnes, Del Mar Photonics, Inc. . . . . [6108-34]

9:00 am: **351-nm femtosecond with Nd:glass regenerative amplifier for thin films ablation,** K. Mukaihara, Y. Suzuki, S. Ito, M. Yoshioka, Laserfront Technologies, Inc. (Japan) . . . . . [6108-35]

9:20 am: **Tunable ultrashort pulse energy transfer distributed feedback dye laser,** M. B. Ahamed, Crescent Engineering College (India); P. Palanisamy, Anna Univ. (India) . . . . . [6108-36]

9:40 am: **Generation of tailored picosecond-pulse-trains for micro-machining,** A. Nebel, T. Herrmann, B. Henrich, R. Knappe, Lumera Laser GmbH (Germany) . . . . . [6108-37]

Coffee Break . . . . . 10:00 to 10:30 am

LASE PLENARY SESSION

Wed. 10:30 am to 12:30 pm · Convention Center: Room J3

10:30 am: **Welcome and Introductions**

10:40 am: **Laser Frequency Combs**
Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik and Ludwig-Maximilians-Universität (Germany)

11:20 am: **Ways to a Brighter Future with Lasers**
David Hanna, Southampton Univ., Deputy Director of the Optoelectronics Research Ctr. (UK)

11:50 am: **Taking Technology to the Marketplace**
Aram Mooradian, Novalux, Inc.

12:20 pm: **Closing Remarks**

See p. 14–15 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:10 pm

SESSION B

Conv. Ctr. Room A3 . . . . . Wed. 1:10 pm

Joint session with conference 6102.

Fiber Amplifiers for Ultrafast Pulses

Chair: **James D. Kafka**, Spectra-Physics

1:10 pm: **Exploiting nonlinearity in femtosecond fiber amplifiers** *(Invited Paper),* F. W. Wise, L. Kuznetsova, A. Chong, S. Zhou, Cornell Univ. . . . . [6102-33]

1:40 pm: **Ultrafast high energy amplifiers beyond the B-integral limit** *(Invited Paper),* L. Shah, Z. Liu, I. Hartl, G. Imeshev, G. Cho, M. E. Fermann, IMRA America, Inc. . . . . [6102-34]

2:10 pm: **20 W, 50 fs pulses from a fiber laser system using nonlinear fiber compression,** F. Röser, T. Schreiber, A. Liem, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-35]

2:30 pm: **Compact μJ-level all-polarization maintaining femtosecond fiber source,** T. Schreiber, B. Ortac, C. K. Nielsen, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-36]

2:50 pm: **High average power and energy-scalable fiber CPA at 1558-nm using chirped volume Bragg grating pulse stretchers and compressors,** M. Cheng, Univ. of Michigan; V. I. Smirnov, E. Flecher, L. B. Glebov, College of Optics and Photonics/Univ. of Central Florida; A. Galvanauskas, Univ. of Michigan . . . . . [6102-37]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 11

Conv. Ctr. Room J2 . . . . . Wed. 3:30 to 4:40 pm

Joint session with conference 6102.

Applications of Ultrafast Fiber Sources (Joint Session)

Chair: **Robert G. Waarts**, Coherent Inc.

3:30 pm: **Intense ultra-short fiber laser systems and their applications** *(Invited Paper),* J. Limpert, F. Röser, T. Schreiber, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-38]

4:00 pm: **High energy, short pulse fiber laser front end for kilo-Joule class CPA systems,** J. W. Dawson, S. Mitchell, R. J. Beach, M. J. Messerly, C. W. Siders, C. P. J. Barty, Lawrence Livermore National Lab. . . . . [6102-39]

4:20 pm: **Generation of terahertz radiation using a compact ultrashort pulse parabolic fiber laser amplifier at 1064-nm,** G. Matthaeus, Friedrich-Schiller-Univ. Jena (Germany); S. Haeffelin, Embry-Riddle Aeronautical Univ.; T. Schreiber, B. Ortac, J. Limpert, S. Nolte, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6108-38]

SESSION C

Conv. Ctr. Room J2 . . . . . Wed. 4:40 to 6:20 pm

Joint session with conference 6102.

Ultrafast Fiber Lasers

Chair: **Frank W. Wise**, Cornell Univ.

4:40 pm: **Self-similar low-noise femtosecond ytterbium-doped double-clad fiber laser,** B. Ortac, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); A. Hideur, C. Chedot, M. Brunel, G. Martel, Univ. de Rouen (France) . [6102-40]

5:00 pm: **All-fiber, pigtailed, passively modelocked laser oscillator at 1.5μm with 2.2W average power and 160MHz repetition rate,** P. G. Polynkin, A. Polynkin, D. Panasenko, M. Mansuripur, J. V. Moloney, N. N. Peyghambarian, The Univ. of Arizona . . . . . [6102-41]

5:20 pm: **Single pulse and bound state operation of a self-starting self-similar all-PM Yb-doped fiber laser,** C. K. Nielsen, B. Ortac, T. Schreiber, J. Limpert, R. Hohmuth, W. Richter, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6102-42]

5:40 pm: **Wide and fast wavelength-tunable mode-locked fiber laser using dispersion tuning,** M. Asano, S. Yamashita, The Univ. of Tokyo (Japan) . . . . . [6102-43]

6:00 pm: **Polarization-maintaining picosecond oscillator based on quantum dots SESAM,** P. Crittenden, A. Starodumov, M. K. Reed, Coherent, Inc. . . . . [6102-44]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Method for fiber Bragg grating control during the fabrication process,** N. K. Berger, Technion - Israel Institute of Technology (Israel); B. Levit, Technion - Israel Institute of Technology (Israel); B. Fischer, Technion - Israel Institute of Technology (Israel) . . . . . [6108-39]

✔ **Femtosecond laser processing of subwavelength-sized voids for compact optical devices,** E. Toratani, M. Kamata, M. Obara, Keio Univ. (Japan) . . . . . [6108-40]

✔ **Double pulse femtosecond laser micromachining of dielectric materials, semiconductor, and metal,** T. Nagata, M. Obara, Keio Univ. (Japan) . . . . . [6108-41]

✔ **Nanohole fabrication on silicon substrate surface by femtosecond laser pulses with gold-particles and nanorods,** H. Takada, M. Obara, Keio Univ. (Japan) . . . . . [6108-42]

✔ **Ultrasimple alignment-free ultrashort pulse measurement devices,** S. Akturk, D. Lee, A. P. Shreenath, P. Gabolde, Q. Cao, X. Gu, R. P. Trebino, Georgia Institute of Technology . . . . . [6108-43]

✔ **Reduction of sliding surface friction by nano-dimples fabricated using femtosecond laser pulses,** T. Sakai, M. Obara, Keio Univ. (Japan) [6108-44]

✔ **Nonlinear frequency chirp measurement of frequency sweeping lasers for FD-OCT applications,** T. Ahn, D. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6108-45]

✔ **Multiphoton microscopy for cell surgery,** J. Baumgart, A. Heisterkamp, Laser Zentrum Hannover e.V. (Germany); W. Ertmer, Univ. Hannover (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6108-46]

✔ **Controlled nonlinearity in femtosecond laser written waveguides,** A. Szameit, D. Blömer, J. Burghoff, T. Pertsch, S. Nolte, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6108-47]

✔ **Structural modification in silica glass by a femtosecond fiber laser at 1556.9-nm and 258.5 kHz repetition rate,** T. Tamaki, W. Watanabe, K. Itoh, Osaka Univ. (Japan); H. Nagai, M. Yoshida, AISIN SEIKI CO., LTD. (Japan) . . . . . [6108-48]

✔ **Reality of superposition principle and the coherence function for short pulses,** C. Roychoudhuri, Univ. of Connecticut and Femto Macro Continuum . . . . . [6108-50]

SPIE International Symposium

MOEMS/MEMS 2006

Micro & Nanofabrication

21–26 January 2006 *San Jose Convention Center • San Jose, California USA*

Micro/Nanofabrication

6109 Micromachining and Microfabrication Process Technology XI *(Maher/Stewart/Chiao)*

6110 Micromachining Technology for Micro-Optics and Nano-Optics IV *(Johnson/Nordin/Suleski)*

Devices/Applications/Reliability

6111 Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS V *(Tanner/Ramesham)*

6112 Microfluidics, BioMEMS, and Medical Microsystems IV *(Papautsky/Wang/Vauchier)*

6113 MEMS/MOEMS Components and Their Applications III *(Olivier/Tadigadapa/Henning)*

6114 MOEMS, Display, Imaging, and Miniaturized Microsystems IV *(Ürey/Dickensheets/Gogoi)*

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Ian Papautsky, Univ. of Cincinnati
Rajeshuni Ramesham, Jet Propulsion Lab.
Thomas J. Suleski, Univ. of North Carolina/Charlotte
Srinivas A. Tadigadapa, The Pennsylvania State Univ.
Danelle M. Tanner, Sandia National Labs.
Claude Vauchier, CEA-LETI Grenoble (France)
Wanjun Wang, Louisiana State Univ.
Hakan Ürey, Koç Univ. (Turkey)

Symposium Steering Committee

The MOEMS-MEMS Symposium Steering Committee advises the Executive Committee on issues pertaining to the symposium future trend, enhancing the symposium programs and its visibility to all members of the technical community, and defining its roadmap to lead the symposium to excellence.

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Albert K. Henning, Redwood Microsystems, Inc.
Larry Hornbeck, Texas Instruments Inc.
James Knutti, Silicon Microstructures
Rajeshuni Ramesham, Jet Propulsion Lab.
Ray Roop, Motorola, Inc.
Marilyn Gorsuch, SPIE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	22 January	23 January	24 January	25 January	26 January

Micro/Nanofabrication

6110 **Micromachining Technology for Micro-Optics and Nano-Optics IV** *(Johnson, Nordin, Suleski)* p. 148

6109 **Micromachining and Microfabrication Process Technology XI** *(Maher, Stewart, Chiao)* p. 146

Devices/Applications/Reliability

6111 **Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS V** *(Tanner, Ramesham)* p. 150

6112 **Microfluidics, BioMEMS, and Medical Microsystems IV** *(Papautsky, Wang, Vauchier)* p. 152

6114 **MOEMS, Display, Imaging, and Miniaturized Microsystems IV** *(Ürey, Dickensheets, Gogoi)* p. 156

6113 **MEMS/MOEMS Components and Their Applications III** *(Olivier, Tadigadapa, Henning)* p. 154

MOEMS-MEMS Special Events

PLENARY SESSION
9:00 am to Noon
Marriott Hotel: San Jose Ballroom, Salon IV
p. 18

9:00 to 9:10 am
Opening Remarks and Introduction

9:10 to 10:00 am
Fluidic Optics

10:00 to 10:20 am
Coffee Break

10:20 to 11:10 am
Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?

11:10 am to Noon
Tunable Micro-optics

Panel Discussion: **Progress and Prospects in Microfluidics**
7:30 to 9:30 pm
Fairmont Hotel: Gold, p. 19

Technical Group Meeting: **Adaptive Optics**

Panel Discussion: **Professional Training in Adaptive Optics**
7:30 to 9:00 pm
Fairmont Hotel: Piedmont, p. 19

MOEMS-MEMS Round Table Discussion: **Center for Optical MEMS,** 5:30 to 6:30 pm, Hilton Hotel: Santa Clara I, p. 19

Wednesday 25 January 2006 • Proceedings of SPIE Vol. 6109

Micromachining and Microfabrication Process Technology XI

Conference Chairs: **Mary-Ann Maher**, SoftMEMS; **Harold D. Stewart**, Sandia National Labs.; **Jung-Chih Chiao**, The Univ. of Texas at Arlington

Program Committee: **Mu Chiao**, The Univ. of British Columbia (Canada); **Debabani Choudhury**, HRL Labs., LLC; **Eric Donzier**, Schlumberger Cambridge Research (United Kingdom); **David A. Koester**, MCNC; **Sanjay Krishna**, Univ. of New Mexico; **Tamal Mukherjee**, Carnegie Mellon Univ.; **Jeongsik Sin**, Univ. of Texas at Arlington; **Yu-Chuan Su**, National Tsing Hua Univ. (Taiwan); **T. C. Yih**, The Univ. of Texas at San Antonio; **Nan Zhang**, General MEMS Corp.

Monday 23 January

Plenary Session . . . . . Mon. 9.00 am to Noon

Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am	**Opening Remarks and Introduction**
9:10 to 10:00 am	**Fluidic Optics,** George Whitesides, Harvard Univ.
10:00 to 10:20 am	Coffee Break
10:20 to 11:10 am	**Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?** Marc Madou, Univ. of California/Irvine
11:10 am to Noon	**Tunable Micro-optics,** IMTEK—Dept. of Microsystems Technology, Univ. of Freiburg (Germany)

See p. 18-19 for details.

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm · Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ. of Caliifornia/Irvine; **Eric Mounier,** Yole Développment; **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George M. Whitesides,** Harvard Univ.

See p. 19 for details.

Wednesday 25 January

SESSION 1

Hilton Hotel: University Room . . . . . Wed. 8:00 to 9:00 am

Devices I

Chair: **Mary-Ann Maher**, SoftMEMS

8:00 am: **Injection molded microfluidic devices for biological sample separation and detection** *(Invited Paper)***,** A. M. Morales, B. A. Simmons, T. I. Wallow, E. B. Cummings, R. V. Davalos, L. A. Domeier, M. C. Hunter, G. J. McGraw, Sandia National Labs. . . . . [6109-01]

8:40 am: **Nanofabrication of electrochemical probes for single cell analysis,** R. J. Fasching, S. Bai, F. Prinz, Stanford Univ. . . . . [6109-02]

SESSION 2

Hilton Hotel: University Room . . . . . Wed. 9:00 to 11:50 am

Devices II

Chair: **Jeongsik Sin**, The Univ. of Texas at Arlington

9:00 am: **Fabrication of three-dimensional near-IR photonic crystals using deep-UV contact photolithography and silicon micromachining,** B. S. Citla, S. Venkataraman, J. Murakowski, G. J. Schneider, D. W. Prather, Univ. of Delaware . . . . . [6109-03]

9:20 am: **Assembled Fourier transform microspectrometer,** J. Sin, W. H. Lee, D. Popa, H. E. Stephanou, The Univ. of Texas at Arlington . . . . . [6109-04]

9:40 am: **Polymer-based Fabry-Perot filter integrated with 3D MEMS structures,** P. Zhang, K. Le, S. M. N. Rao, L. Hsu, J. Chiao, The Univ. of Texas at Arlington . . . . . [6109-05]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **An optical scanner based on electromagnetically actuated optical fiber,** H. P. Hu, K. D. Le, J. Chiao, The Univ. of Texas at Arlington . . . . . [6109-06]

10:50 am: **Enhancement of structural stiffness in MEMS structures,** S. Ilias, F. Picard, P. Topart, C. Larouche, H. Jerominek, Institut National d'Optique (Canada) . . . . . [6109-07]

11:10 am: **Process design and tracking support for MEMS,** A. Wagener, J. Popp, Univ. of Siegen (Germany); D. Ortloff, Cavendish-Kinetics B.V. (Netherlands); T. Schmidt, K. Hahn, R. Brueck, Univ. of Siegen (Germany) . . . . . [6109-08]

11:30 am: **Fabrication of integrated light guiding plate for backlight system,** Z. Chen, C. Chien, Tatung Univ. (Taiwan) . . . . . [6109-09]

Lunch/Exhibition Break . . . . . 11:50 am to 1:20 pm

SESSION 3

Hilton Hotel: University Room . . . . . Wed. 1:20 to 2:20 pm

Fabrication Techniques I

Chair: **Harold D. Stewart**, Sandia National Labs.

1:20 pm: **Advancing three-dimensional MEMS by complimentary laser micromanufacturing,** J. A. Palmer, J. D. Williams, T. Lemp, Sandia National Labs.; F. R. Medina, R. B. Wicker, The Univ. of Texas at El Paso . . . . . [6109-11]

1:40 pm: **Microstereolithography production of integrated Hadamard mask structures,** C. J. Robinson, L. M. Southwell, J. A. Palmer, B. Chavez, M. W. Smith, M. B. Sinclair, Sandia National Labs.; F. Medina, R. B. Wicker, The Univ. of Texas at El Paso; B. Stucker, Utah State Univ. . . . . [6109-12]

2:00 pm: **Optical analysis of scanning microstereolithography systems,** S. P. Deshmukh, P. S. Gandhi, S. K. Dubey, Indian Institute of Technology Bombay (India) . . . . . [6109-14]

SESSION 4

Hilton Hotel: University Room . . . . . Wed. 2:20 to 4:10 pm

Fabrication Techniques II

Chair: **Nan Zhang**, General MEMS Corp.

2:20 pm: **High-aspect-ratio plasma etching of bulk lead zirconate titanate,** S. S. Subasinghe, S. A. Tadigadapa, The Pennsylvania State Univ. . . [6109-15]

2:40 pm: **Fabrication of micro-chambers and enclosures using synchronus localized electro-deposition,** R. A. Said, United Arab Emirates Univ. (United Arab Emirates) . . . . . [6109-16]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Enhanced filling of interconnect deep trenches using forced convection magneto-electroplating,** R. A. Said, United Arab Emirates Univ. (United Arab Emirates) . . . . . [6109-17]

3:50 pm: **Anisotropic etching of single crystalline SiC using molten KOH for SiC bulk micromachining,** K. Fukunaga, J. Suda, T. Kimoto, Kyoto Univ. (Japan) . . . . . [6109-18]

SESSION 5

Hilton Hotel: University Room . . . . . Wed. 4:10 to 5:30 pm

Metrology and Test

Chair: **Mary-Ann Maher**, SoftMEMS

4:10 pm: **Zero-crossing edge detection for visual force measurement in assembly of MEMS devices,** Y. H. Anis, J. K. Mills, W. L. Cleghorn, Univ. of Toronto (Canada) . . . . . [6109-19]

4:30 pm: **Endpoint detection method for time division multiplex etch processes,** R. J. Westerman, D. Johnson, S. Lai, M. Teixeira, Unaxis USA, Inc. . . . . [6109-20]

4:50 pm: **Combined low-coherence interferometry and spectrally resolved reflectometry for nondestructive characterization of small-diameter high-aspect ratio microfabricated and micromachined structures, and mulilayer membranes,** W. J. Walecki, T. Azfar, A. Pravdivstev, M. Santos II, A. Koo, Frontier Semiconductor Inc. . . . . [6109-21]

5:10 pm: **Out-of-plane deformation of freestanding micro-rings for tensile stress measurements,** Y. Chen, National Tsing Hua Univ. (Taiwan) . . [6109-22]

MOEMS-MEMS Round Table Discussion

Organizing a National Center for Optical MEMS

Wednesday 25 January · 5:30 to 6:30 pm · Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab.;
Albert Henning, Redwood Microsystems, Inc.

See p. 19 for details.

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Research on Ni-electroplating of double-width micro-cantilever,** Y. Liu, D. Sun, Xiamen Univ. (China) . . . . . [6109-23]

✔ **Investigation on overplating high-aspect-ratio microstructure,** Y. Guo, G. Liu, Y. Tian, Univ. of Science and Technology of China (China) . [6109-24]

✔ **Characterization of nonlinear optical thin-film fabricated with dye-doped UV curing epoxy,** K. Le, P. Zhang, H. P. Hu, J. Chiao, The Univ. of Texas at Arlington . . . . . [6109-25]

✔ **A curled-hinge comb micromirror using CMOS-MEMS process,** Y. R. Huang, H. M. Tai, H. Chou, National Tsing Hua Univ. (Taiwan) [6109-26]

✔ **5~10 GHz surface acoustic-wave resonators and low-loss wide-band filters using submicron fabrication technology,** K. Yamanouchi, Y. Satoh, H. Isono, Tohoku Institute of Technology (Japan) . . . . . [6109-27]

✔ **Development of fabrication techniques for high-density integrated MIM capacitors in power conversion equipment,** M. Brunet, P. Dubreuil, E. Scheid, J. Sanchez, Lab. d'Analyse et d'Architecture des Systèmes (France) . . . . . [6109-29]

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6110

Micromachining Technology for Micro-Optics and Nano-Optics IV

Conference Chairs: **Eric G. Johnson**, College of Optics and Photonics/Univ. of Central Florida; **Gregory P. Nordin**, The Univ. of Alabama in Huntsville; **Thomas J. Suleski**, Univ. of North Carolina/Charlotte

Program Committee: **John M. Ballato**, Clemson Univ.; **Gregg T. Borek**, MEMS Optical Inc.; **Matthew A. Davies**, Univ. of North Carolina/Charlotte; **Erez Hasman**, Technion - Israel Institute of Technology (Israel); **Heidi Hockel**, FemtOptics; **Shanalyn A. Kemme**, Sandia National Labs.; **Pieter G. Kik**, College of Optics and Photonics/Univ. of Central Florida; **Ernst-Bernhard Kley**, Friedrich-Schiller-Univ. Jena (Germany); **Stephen M. Kuebler**, College of Optics and Photonics/Univ. of Central Florida; **Patrick P. Naulleau**, Lawrence Berkeley National Lab.; **Luiz G. Neto**, Univ. de São Paulo (Brazil); **Fredrik K. Nikolajeff**, Uppsala Univ. (Sweden); **Yuzo Ono**, Ritsumeikan Univ. (Japan); **Dennis W. Prather**, Univ. of Delaware; **John A. Rogers**, Univ. of Illinois at Urbana-Champaign; **Michael P. Watts**, Molecular Imprints, Inc.

Monday 23 January

Plenary Session . . . . . Mon. 9.00 am to Noon

Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am	**Opening Remarks and Introduction**
9:10 to 10:00 am	**Fluidic Optics,** George Whitesides, Harvard Univ.
10:00 to 10:20 am	Coffee Break
10:20 to 11:10 am	**Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?** Marc Madou, Univ. of California/Irvine
11:10 am to Noon	**Tunable Micro-optics,** IMTEK—Dept. of Microsystems Technology, Univ. of Freiburg (Germany)

See p. 18-19 for details.

SESSION 1

Hilton Hotel: Santa Clara I/II Room . . . . . Mon. 1:30 to 2:50 pm

Advanced Lithography I

Chair: **Thomas J. Suleski**, Univ. of North Carolina/Charlotte

1:30 pm: **Advanced interference lithography for patterning nano-optics** *(Invited Paper, Presentation Only),* M. L. Schattenburg, C. Chang, R. K. Heilmann, J. Montoya, Y. Zhao, Massachusetts Institute of Technology; P. Glenn, Bauer Associates, Inc.; D. J. Smith, Plymouth Grating Lab. Inc.; D. Chargin, S. Ivanov, Franhofer USA . . . . . [6110-01]

2:00 pm: **SU-8 multiple layer structuring by means of maskless photolithography (DWL66),** A. A. Saghiri, M. Kaden, K. Rössler, R. Wijnaendts, S. Preus, A. Forozan, Heidelberg Instruments Mikrotechnik GmbH (Germany) . . . . . [6110-03]

2:20 pm: **Modeling the fabrication of nano-optical structures** *(Invited Paper)***,** R. C. Rumpf, College of Optics and Photonics/Univ. of Central Florida [6110-04]

Coffee Break . . . . . 2:50 to 3:30 pm

SESSION 2

Hilton Hotel: Santa Clara I/II Room . . . . . Mon. 3:30 to 4:50 pm

Etching Micro- and Nano-Optics

Chair: **Gregory P. Nordin**, The Univ. of Alabama in Huntsville

3:30 pm: **A new fabrication technique for complex refractive micro-optical systems** *(Invited Paper)***,** M. Tormen, A. Carpentiero, E. Ferrari, D. Cojoc, S. Cabrini, E. Di Fabrizio, Istituto Nazionale per la Fisica della Materia (Italy) . . . . . [6110-05]

4:00 pm: **Fabrication of 3D photonic crystals by two-step dry etching of layered media,** P. Srinivasan, R. C. Rumpf, E. G. Johnson, College of Optics and Photonics/Univ. of Central Florida . . . . . [6110-06]

4:20 pm: **Ion beams for fabrication of micro- and nano-optics** *(Invited Paper)***,** A. Schindler, Institut fuer Oberflaechen- modifizierung IOM (Germany) . . . . . [6110-07]

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm · Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ. of Caliifornia/Irvine; **Eric Mounier,** Yole Développment; **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George M. Whitesides,** Harvard Univ.

See p. 19 for details.

Tuesday 24 January

SESSION 3

Hilton Hotel: Santa Clara I/II Room . . . . . Tues. 8:00 to 9:50 am

Materials

Chair: **Eric G. Johnson**, College of Optics and Photonics/Univ. of Central Florida

8:00 am: **Multiphoton polymerization of waveguides in self-assembled 3D photonic crystals** *(Invited Paper, Presentation Only),* P. V. Braun, Univ. of Illinois at Urbana-Champaign . . . . . [6110-08]

8:30 am: **Optimization of SU-8 processing for integrated optics,** T. A. Anhoj, A. M. Jorgensen, D. A. Zauner, J. Hübner, Technical Univ. of Denmark (Denmark) . . . . . [6110-09]

8:50 am: **The study on spatial resolution in two-photon induced polymerization,** K. Takada, H. Sun, Osaka Univ. (Japan); S. Kawata, Osaka Univ. (Japan) and RIKEN (Japan) . . . . . [6110-10]

9:10 am: **Affect of two- and three-zone phase masks on the axial and transverse intensity distribution under high-numerical aperture focusing,** S. M. Kuebler, T. Jabbour, College of Optics and Photonics/Univ. of Central Florida . . . . . [6110-11]

9:30 am: **Grey-scale electron-beam lithography in functionalized SU-8 for active optical devices,** S. Balslev, T. Rasmussen, P. Shi, A. Kristensen, Technical Univ. of Denmark (Denmark) . . . . . [6110-12]

Coffee Break . . . . . 9:50 to 10:20 am

SESSION 4
Hilton Hotel: Santa Clara I/II Room . . . . . Tues. 10:20 to 11:30 am

Advanced Lithography II

Chair: **Shanalyn A. Kemme**, Sandia National Labs.

10:20 am: **New nanofabrication technique using overlay for 15-nm zone plate** *(Invited Paper)***,** W. Chao, B. Harteneck, J. A. Liddle, E. Anderson, Lawrence Berkeley National Lab.; D. Attwood, Univ. of California/ Berkeley . . . . . [6110-13]

10:50 am: **Extreme ultraviolet phase contrast imaging** *(Presentation Only),* G. Denbeaux, SUNY/Univ. at Albany; A. Barty, Lawrence Livermore National Lab.; Y. Liu, K. Goldberg, Lawrence Berkeley National Lab.; R. Garg, SUNY/ Univ. at Albany; O. Wood, SEMATECH, Inc. . . . . [6110-14]

11:10 am: **EUV binary phase gratings: fabrication and application to diffractive optics** *(Presentation Only),* F. H. Salmassi, Lawrence Berkeley National Lab.; P. P. Naulleau, SUNY/Univ. at Albany . . . . . [6110-15]

Lunch/Exhibition . . . . . 11:30 am to 1:00 pm

SESSION 5
Hilton Hotel: Santa Clara I/II Room . . . . . Tues. 1:00 to 2:30 pm

Applications I

Chair: **Raymond C. Rumpf**,
College of Optics and Photonics/Univ. of Central Florida

1:00 pm: **Giant optical activity in quasi 2D planar nanostructures** *(Invited Paper)***,** M. Kuwata-Gonokami, N. Saito, Y. Ino, The Univ. of Tokyo (Japan); M. Kauranen, Tampere Univ. of Technology (Finland); K. Jefimovs, J. Trunen, T. Vallius, Y. Svirko, Univ. of Joensuu (Finland) . . . . . [6110-16]

1:30 pm: **Monolithic fabrication of hollow ARROW-based sensors,** A. R. Hawkins, J. P. Barber, E. J. Lunt, Brigham Young Univ.; H. Schmidt, D. Yin, Univ. of California/Santa Cruz . . . . . [6110-17]

1:50 pm: **Fabrication of tapered air-core defects in 3D photonic crystals for multifunctional scanning-probe NSOM tips,** G. J. Schneider, J. Murakowski, D. W. Prather, Univ. of Delaware . . . . . [6110-18]

2:10 pm: **Fabrication issues for a chirped, subwavelength form-birefringent polarization splitter,** S. A. Kemme, J. R. Wendt, A. A. Cruz-Cabrera, D. W. Peters, R. R. Boye, T. R. Carter, S. Samora, Sandia National Labs. . . . [6110-19]

SESSION 6
Hilton Hotel: Santa Clara I/II Room . . . . . Tues. 2:30 to 4:40 pm

Replication

Chair: **Stephen M. Kuebler**,
College of Optics and Photonics/Univ. of Central Florida

2:30 pm: **Fabrication of nano- and micro-optical elements by step and flash imprint lithography** *(Invited Paper)***,** D. L. LaBrake, N. Khusnatdinov, G. Doyle, M. Miller, N. Stacey, M. Watts, Molecular Imprints, Inc. . . . . [6110-20]

3:00 pm: **Micro-optical module fabrication using nano-imprint technology** *(Presentation Only),* M. Rossi, H. Rudmann, Heptagon Oy (Switzerland); R. Pelzer, EV Group (Austria); M. G. Salt, Heptagon Oy (Switzerland) . [6110-21]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **The impact of step and flash imprint lithography for nanomanufacturing applications in optics** *(Presentation Only),* D. L. LaBrake, Molecular Imprints, Inc. . . . . [6110-22]

4:10 pm: **High-performance plasmonic crystal sensor** *(Invited Paper, Presentation Only),* V. Malyarchuk, F. Hua, N. H. Mack, V. T. Velasquez, J. O. White, R. G. Nuzzo, J. A. Rogers, Univ. of Illinois at Urbana-Champaign . . . . . [6110-23]

SESSION 7
Hilton Hotel: Santa Clara I/II Room . . . . . Tues. 4:40 to 5:50 pm

Applications II

Chair: **Michael P. Watts**, Molecular Imprints, Inc.

4:40 pm: **Fabrication of dual grating reflectors for high-power laser diodes,** J. K. O'Daniel, O. V. Smolski, E. G. Johnson, College of Optics and Photonics/ Univ. of Central Florida . . . . . [6110-24]

5:00 pm: **Investigation of the III-V oxidation process for the fabrication of sub-micron three-dimensional photonic devices,** K. Swaminathan, J. Murakowski, C. Schuetz, G. Schneider, D. Prather, Univ. of Delaware . . . . . [6110-25]

5:20 pm: **Manufacture and replication of a novel polymer anti-reflective structure** *(Invited Paper)***,** S. M. Scott, Reflexite Precision Technology Ctr.; M. Gebhard, Fresnel Optics GmbH (Germany) . . . . . [6110-26]

MOEMS-MEMS Round Table Discussion

Organizing a National Center for Optical MEMS

Wednesday 25 January · 5:30 to 6:30 pm · Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab.;
Albert Henning, Redwood Microsystems, Inc.

See p. 19 for details.

Wednesday 25 January

✔ Posters-Wednesday

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✔ **Fabrication of 3D photonic crystal by deep x-ray lithography,** G. Liu, Y. Tian, Y. Xiong, Y. Kan, Univ. of Science and Technology of China (China) . . . . . [6110-28]

✔ **Novel method for fabrication of high-efficiency diffractive optics for short wavelength radiation,** R. Garg, J. Evertsen, G. Denbeaux, SUNY/Univ. at Albany . . . . . [6110-29]

✔ **Technology development of mold fabrication for free-form surface, DOE, and microlens,** S. Kitagawa, H. Owari, S. Kawai, M. Seigo, Nalux Co., Ltd. (Japan) . . . . . [6110-30]

✔ **Tolerancing microlenses using ZEMAX,** A. Stockham, MEMS Optical Inc. . . . . [6110-31]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6111

Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS V

Conference Chairs: **Danelle M. Tanner**, Sandia National Labs.; **Rajeshuni Ramesham**, Jet Propulsion Lab.

Program Committee: **Susanne Arney**, Lucent Technologies/Bell Labs.; **Kenneth A. Gall**, Georgia Institute of Technology; **Allyson L. Hartzell**, Exponent, Inc.; **Ryan M. Hickey**, Bookham, Inc. (Canada); **Richard C. Kullberg**, SAES Getters USA, Inc.; **Leslie M. Phinney**, Sandia National Labs.; **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.; **Jeremy A. Walraven**, Sandia National Labs.; **Ann Witvrouw**, IMEC (Belgium); **James L. Zunino III**, U.S. Army RDECOM

Monday 23 January

Plenary Session . . . . . Mon. 9.00 am to Noon

Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am	**Opening Remarks and Introduction**
9:10 to 10:00 am	**Fluidic Optics,** George Whitesides, Harvard Univ.
10:00 to 10:20 am	Coffee Break
10:20 to 11:10 am	**Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?** Marc Madou, Univ. of California/Irvine
11:10 am to Noon	**Tunable Micro-optics,** IMTEK—Dept. of Microsystems Technology, Univ. of Freiburg (Germany)

See p. 18-19 for details.

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm · Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ. of Caliifornia/Irvine; **Eric Mounier,** Yole Développment; **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George M. Whitesides,** Harvard Univ.

See p. 19 for details.

Wednesday 25 January

SESSION 1

Hilton Hotel: Santa Clara I Room . . . . . Wed. 8:00 to 9:50 am

MEMS Surfaces, Coatings, and Effects

Chair: **Rajeshuni Ramesham**, Jet Propulsion Lab.

8:00 am: **Stiction force estimation from detachment length and electrostatic measurements on cantilever beams** *(Invited Paper)***,** E. Bhattacharya, S. Basu, A. Prabhakar, Indian Institute of Technology Madras (India) . . . . . [6111-01]

8:30 am: **The use of electrical actuation to repair stiction-failed micro-cantilevers,** K. D. Murphy, A. A. Savkar, Univ. of Connecticut . . . . . [6111-02]

8:50 am: **Electrical breakdown across micron scale gaps in MEMS structures,** F. W. Strong, J. L. Skinner, Univ. of California/Davis and Sandia National Labs.; N. C. Tien, Univ. of California/Davis . . . . . [6111-03]

9:10 am: **Infrared laser deposition of Teflon(r) coatings on microstructures,** R. F. Haglund, Jr., Vanderbilt Univ.; C. P. Grigoropoulos, K. Komvopoulos, Univ. of California/Berkeley; M. R. Papantonakis, Naval Research Lab.; K. E. Schriver, Vanderbilt Univ. . . . . [6111-04]

9:30 am: **Galvanic corrosion: a microsystems device integrity and reliability concern,** D. C. Miller, Univ. of Colorado at Boulder; W. L. Hughes, Z. L. Wang, K. Gall, Georgia Institute of Technology; C. R. Stoldt, Univ. of Colorado at Boulder . . . . . [6111-05]

Coffee Break . . . . . 9:50 to 10:20 am

SESSION 2

Hilton Hotel: Santa Clara I Room . . . . . Wed. 10:20 to 11:40 am

MEMS/MOEMS Material Properties

Chair: **Allyson L. Hartzell**, Exponent Inc.

10:20 am: **Reaction layer evolution during cyclic loading of micron-scale polycrystalline silicon films used in MEMS,** O. N. Pierron, C. L. Muhlstein, The Pennsylvania State Univ. . . . . [6111-07]

10:40 am: **Stiffness modification of micromachined silicon beams using carbon nanotubes,** P. Joshi, A. Gupta, S. A. Tadigadapa, P. C. Eklund, The Pennsylvania State Univ. . . . . [6111-08]

11:00 am: **Experimental and computational study on laser heating of surface micromachined catilevers,** L. M. Phinney, O. B. Spahn, C. C. Wong, Sandia National Labs. . . . . [6111-09]

11:20 am: **Bending of aluminum alloy beams depending on irradiance and repetition rate of UV-laser radiation,** M. Krellmann, M. Friedrichs, U. A. Dauderstädt, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6111-10]

Lunch/Exhibition Break . . . . . 11:40 am to 1:00 pm

SESSION 3

Hilton Hotel: Santa Clara I Room . . . . . Wed. 1:00 to 2:30 pm

Device Reliability

Chair: **Ryan M. Hickey**, Bookham, Inc. (Canada)

1:00 pm: **Reliability of MEMS for space applications** *(Invited Paper)***,** H. R. Shea, Swiss Federal Institutes of Technology (Switzerland) . . . . [6111-12]

1:30 pm: **Reliability testing and qualification of the TeraVicta rf-MEMS switch,** J. S. McKillop, TeraVicta Technologies, Inc. . . . . [6111-13]

1:50 pm: **Reliability of MEMS in liquid environments,** S. M. Ali, S. C. Mantell, E. K. Longmire, Univ. of Minnesota . . . . . [6111-14]

2:10 pm: **A density-viscosity MEMS sensor for oilfield applications,** C. K. Harrison, S. Ryu, A. Goodwin, K. Hsu, Schlumberger; E. Donzier, Schlumberger (France); F. Marty, B. Mercier, Groupe ESIEE (France) . [6111-15]

SESSION 4

Hilton Hotel: Santa Clara I Room . . . . . Wed. 2:30 to 4:40 pm

Mechanisms, Structures, and Models

Chair: **Danelle M. Tanner**, Sandia National Labs.

2:30 pm: **Failure mechanisms of DC and capacitive rf-MEMS switches** *(Invited Paper)***,** S. T. Patton, Univ. of Dayton Research Institute; J. S. Zabinski, Air Force Research Lab. . . . . [6111-17]

3:00 pm: **Reliabilty study of ohmic contacts in rf MEMS** *(Invited Paper)***,** R. Ramadoss, Auburn Univ. . . . . [6111-18]

Coffee Break . . . . . 3:30 to 4:00 pm

4:00 pm: **A transient charging model to predict actuation-voltage shift in rf-MEMS capacitive switches,** X. Yuan, J. C. M. Hwang, Lehigh Univ.; D. Forehand, C. L. Goldsmith, MEMtronics Corp. . . . . [6111-20]

4:20 pm: **A micromachined resonant force sensor for passive microgripping applications: 3D microassembly,** I. B. Bahadur, J. K. Mills, Univ. of Toronto (Canada) . . . . . [6111-21]

MOEMS-MEMS Round Table Discussion

Organizing a National Center for Optical MEMS

Wednesday 25 January · 5:30 to 6:30 pm · Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab.;
Albert Henning, Redwood Microsystems, Inc.

See p. 19 for details.

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Design and fabrication of the degradation level monitoring sensor for power transformer insulating oil,** S. Kim, Y. Kim, J. Yang, Kyungpook National Univ. (South Korea); S. Lee, Korean Agency for Standards and Technology (South Korea); S. Park, Kyungpook National Univ. (South Korea) . . . . . [6111-33]

✔ **An intensity based optical technique for fast 3D surface profiling of MOEMS,** I. Lyuboshenko, Phasique, Telecom Paris (France); A. Bosseboeuf, Univ. Paris-Sud II (France) . . . . . [6111-34]

✔ **Modeling and analysis of MEMS-based resonant beam sensor actuated by bent beam thermal actuator,** P. Hassanpour, W. L. Cleghorn, Univ. of Toronto (Canada); E. Esmailzadeh, Univ. of Ontario Institute of Technology (Canada); J. K. Mills, Univ. of Toronto (Canada) . . . . . [6111-35]

✔ **A critical comparison and development of nano-mechanical characterization on MEMS/NEMS thin-film materials,** J. H. He, Institute of Microelectronics (Singapore); H. Le, D. F. Moore, Univ. of Cambridge (United Kingdom) . . . . . [6111-11]

✔ **Temperature compensation analysis of liquid lens for variable-focus control,** S. J. Chen, C. Shen, National Changhua Univ. of Education (Taiwan) . . . . . [6111-32]

Thursday 26 January

SESSION 5

Hilton Hotel: Santa Clara I Room . . . . . Thurs. 8:00 to 9:50 am

Testing and Characterization

Chair: **Leslie M. Phinney**, Sandia National Labs.

8:00 am: **High-g testing of MEMS devices** *(Invited Paper)***,** R. O'Reilly, Analog Devices, Inc. . . . . [6111-22]

8:30 am: **Experimental apparatus and software design for dynamic long-term reliability testing of a spring-mass MEMS device,** P. L. Reu, D. M. Tanner, D. S. Epp, T. B. Parson, B. L. Boyce, Sandia National Labs. . . . . [6111-23]

8:50 am: **Guidelines for long-term performance testing of microelectromechanical systems in military applications,** R. B. Mason, M. Rippen, L. Gintert, Concurrent Technologies Corp.; D. Skelton, J. L. Zunino, U.S. Army Research, Development and Engineering Command; I. Gutmanis, Sterling Hobe Corp. . . . . [6111-24]

9:10 am: **The ultra-fine dynamics of MEMS as revealed by the polytec microsystem analyzer,** E. M. Lawrence, Polytec, Inc.; C. Rembe, Polytec GmbH (Germany); H. Zhang, XCOM Wireless, Inc. . . . . [6111-25]

9:30 am: **Novel combined low-coherence interferometry spectrally resolved reflectometry compatible with high-resolution Raman spectroscopy for nondestructive characterization of MEMS structures,** W. J. Walecki, T. Azfar, A. Pravdivtsev, M. Santos, A. Koo, Frontier Semiconductor Inc. . . . . [6111-26]

Coffee Break . . . . . 9:50 to 10:30 am

SESSION 6

Hilton Hotel: Santa Clara I Room . . . Thurs. 10:30 am to 12:10 pm

Packaging and Processing

Chair: **Richard C. Kullberg**, SAES Getters USA, Inc.

10:30 am: **High and stable Q-factor in resonant MEMS with getter film,** A. Conte, M. Moraja, G. Longoni, SAES Getters S.p.A. (Italy); A. Fourrier, Thales Avionics (France) . . . . . [6111-27]

10:50 am: **Wafer bonding for 3D integration of MEMS/CMOS,** B. Xu, SUNY/Univ. at Albany . . . . . [6111-28]

11:10 am: **High-speed anisotropic etching of glass for microsystems applications,** A. Goyal, S. A. Tadigadapa, The Pennsylvania State Univ. . . . . [6111-29]

11:30 am: **Hot gas stream application in micro-bonding technique,** D. Andrijasevic, I. Giouroudi, W. Smetana, H. Homolka, Technische Univ. Wien (Austria); S. Boehm, Technische Univ. Braunschweig (Germany); W. Brenner, Technische Univ. Wien (Austria) . . . . . [6111-30]

11:50 am: **Hermeticity tests on organically sealed micro-packages using FTIR spectroscopy,** D. Veyrié, Ctr. National d'Études Spatiales (France) and Univ. Bordeaux 1 (France); J. Roux, F. Pressecq, Ctr. National d'Études Spatiales (France); A. Tetelin, C. Pellet, Univ. Bordeaux 1 (France) . . . [6111-31]

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6112

Microfluidics, BioMEMS, and Medical Microsystems IV

Conference Chairs: **Ian Papautsky**, Univ. of Cincinnati; **Wanjun Wang**, Louisiana State Univ.

Cochair: **Claude Vauchier**, CEA-LETI Grenoble (France)

Program Committee: **Holger Becker**, Microfluidic ChipShop GmbH (Germany); **Isabelle Chartier**, CEA-LETI Grenoble (France); **Jin-Woo Choi**, Louisiana State Univ.; **Bruce K. Gale**, Univ. of Utah; **Raymond P. Mariella, Jr.**, Lawrence Livermore National Lab.; **Anne Pepin**, CNRS/LPN (France); **Albert van den Berg**, Univ. Twente (Netherlands); **Bernhard H. Weigl**, PATH; **Peter Woias**, Albert-Ludwigs-Univ. Freiburg (Germany)

Monday 23 January

Plenary Session . . . . . Mon. 9.00 am to Noon

Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am	**Opening Remarks and Introduction**
9:10 to 10:00 am	**Fluidic Optics,** George Whitesides, Harvard Univ.
10:00 to 10:20 am	Coffee Break
10:20 to 11:10 am	**Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?** Marc Madou, Univ. of California/Irvine
11:10 am to Noon	**Tunable Micro-optics,** IMTEK—Dept. of Microsystems Technology, Univ. of Freiburg (Germany)

See p. 18-19 for details.

SESSION 1

Hilton Hotel: Almaden I Room . . . . . Mon. 1:00 to 3:00 pm

Lab-on-a-Chip I

Chair: **Ian Papautsky**, Univ. of Cincinnati

1:00 pm:  **Digital microfluidics for biosensors, bio-assays, and biomedicine** *(Invited Paper, Presentation Only),* A. P. Lee, Univ. of California/Irvine . . . . . [6112-01]

1:40 pm: **Fully integrated multiplexed lab-on-a-chip assay for enteric pathogens,** B. H. Weigl, PATH; J. Gerdes, Micronics, Inc.; L. Dillman, R. Peck, PATH; P. Yager, Univ. of Washington; D. Hoekstra, Micronics, Inc.; P. Tarr, Washington Univ. in St. Louis; S. Ramachandran, M. Lemba, Univ. of Washington . . . . . [6112-02]

2:00 pm: **Water analysis on a lab-on-a-chip system,** H. J. Freimuth, F. von Germar, I. Frese, E. Nahrstedt, B. Baser, K. Drese, P. Detemple, T. Doll, Institut für Mikrotechnik Mainz GmbH (Germany) . . . . . [6112-03]

2:20 pm: **Rapid and automated sample preparation for nucleic acid analysis on a microfluidic CD (compact disk),** J. Kim, H. Kido, J. V. Zoval, Univ. of California/Irvine; R. Peytavi, M. G. Bergeron, Univ. Laval (Canada); M. J. Madou, Univ. of California/Irvine . . . . . [6112-04]

2:40 pm: **Whole-cell luminescence biosensor-based lab-on-chip integrated system for water toxicity analysis,** A. Rabner, Y. Y. Shacham, Tel Aviv Univ. (Israel); S. Belkin, The Hebrew Univ. of Jerusalem (Israel) . . . . . [6112-05]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 2

Hilton Hotel: Almaden I Room . . . . . Mon. 3:30 to 4:50 pm

Optical Detection Methods

Chair: **Wanjun Wang**, Louisiana State Univ.

3:30 pm: **Monolithic single-mode SU-8 waveguides for integrated optics,** M. Nordström, D. A. Zauner, J. Hübner, A. Boisen, Danmarks Tekniske Univ. (Denmark) . . . . . [6112-06]

3:50 pm: **Characterization of SU-8 optical multimode waveguides for integrated optics and sensing on microchip devices,** A. Piruska, A. A. S. Bhagat, K. Zhou, E. T. K. Peterson, I. Papautsky, C. J. Seliskar, Univ. of Cincinnati . . . . . [6112-07]

4:10 pm: **Polymeric waveguides for orthogonal near-surface fluorescent excitation,** P. Datta, S. Gurung, F. Xu, S. A. Soper, J. Goettert, Louisiana State Univ. . . . . [6112-08]

4:30 pm: **On-chip integrated spectrometer and microfluidic fluorescence set-up,** A. M. Jorgensen, D. A. Zauner, T. A. Anhoj, P. M. Moselund, J. Hübner, Danmarks Tekniske Univ. (Denmark) . . . . . [6112-09]

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm · Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ. of Caliifornia/Irvine; **Eric Mounier,** Yole Développment; **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George M. Whitesides,** Harvard Univ.

See p. 19 for details.

Tuesday 24 January

SESSION 3

Hilton Hotel: Almaden I Room . . . . . Tues. 8:00 to 10:00 am

Lab-on-a-Chip II

Chair: **Abraham P. Lee**, Univ. of California/Irvine

8:00 am: **High-precision micromilling for low-cost fabrication of metal mold masters,** M. L. Hupert, J. W. Guy, C. Situma, S. D. Llopis, S. Rani, D. E. Nikitopoulos, S. A. Soper, Louisiana State Univ. . . . . [6112-11]

8:20 am: **Microelectrodes integrated cell-chip for drug effects study,** Y. Chen, Institute of Microelectronics (Singapore); H. Cui, J. Ye, National Univ. of Singapore (Singapore); S. Chong, Institute of Microelectronics (Singapore); T. Lim, F. Sheu, National Univ. of Singapore (Singapore); H. Cheong, Institute of Microelectronics (Singapore) . . . . . [6112-12]

8:40 am: **Injection and manipulation of silicon microbeads in a customized microfluidic platform,** D. Hoffmann, D. Brennan, M. Loughran, Tyndall National Institute (Ireland) . . . . . [6112-14]

9:00 am: **Multiwell cell culture plate format with integrated microfluidic perfusion system,** K. Domansky, W. Inman, J. Serdy, L. G. Griffith, Massachusetts Institute of Technology . . . . . [6112-15]

9:20 am: **An injection micromixer fabricated by improved SU-8 processing for biochemical microfluidic systems,** C. Liu, Z. Ling, K. Lian, J. Goettert, J. Hormes, Louisiana State Univ. . . . . [6112-16]

9:40 am: **Extraction of coeliac disease toxic gluten from processed food and optical detection in a micro system** *(Presentation Only),* F. von Germar, F. Doffing, I. Frese, K. S. Drese, Institut für Mikrotechnik Mainz GmbH (Germany); M. C. Bermudo, C. O'Sullivan, Univ. Rovira i Virgili (Spain) [6112-10]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 4

Hilton Hotel: Almaden I Room . . . . . Tues. 10:30 to 11:50 am

Microfluidic Devices and Applications

Chair: **Bruce K. Gale**, Univ. of Utah

10:30 am: **Multi-directional pumping of biofluids for efficient transport and mixing,** S. Vijendran, Univ. of Cambridge (United Kingdom); M. Mpholo, National Univ. of Lesotho (Lesotho); C. G. Smith, Univ. of Cambridge (United Kingdom) . . . . . [6112-17]

10:50 am: **Peltier-actuated microvalves for integrated microfluidic systems,** R. P. Welle, B. S. Hardy, The Aerospace Corp. . . . . [6112-18]

11:10 am: **Passive micromixer with break-up obstructions,** A. A. S. Bhagat, E. T. K. Peterson, I. Papautsky, Univ. of Cincinnati . . . . . [6112-19]

11:30 am: **Theoretical and experimental study of electro-osmosis-driven two-fluid displacement in a microcapillary,** H. Y. Gan, C. Yang, Nanyang Technological Univ. (Singapore); Y. M. Wan, G. C. Lim, Singapore Institute of Manufacturing Technology (Singapore); Y. C. Lam, Nanyang Technological Univ. (Singapore) . . . . . [6112-21]

Wednesday 25 January

MOEMS-MEMS Round Table Discussion

Organizing a National Center for Optical MEMS

Wednesday 25 January · 5:30 to 6:30 pm · Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab.; **Albert Henning,** Redwood Microsystems, Inc.

See p. 19 for details.

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

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✔ **Microfluidic DNA extraction using a patterned aluminum oxide membrane,** J. Kim, B. K. Gale, Univ. of Utah . . . . . [6112-22]

✔ **Digital in-line holographic microscopy applied to microfluidic studies,** J. I. Garcia-Sucerquia, Dalhousie Univ. (Canada) . . . . . [6112-23]

✔ **Fabrication and test of an electrochemical microactutor,** D. E. Lee, W. Wang, S. Soper, Louisiana State Univ. . . . . [6112-24]

✔ **New approaches to speed up the development of complex disposable lab-on-a-chip devices** *(Presentation Only),* T. Stange, H. Brüning, H. Hartmann, L. Weber, thinXXS Microtechnology (Germany) . . . . . [6112-25]

✔ **Metal complex speciation on-chip,** K. Faure, National Univ. of Ireland/Cork (Ireland); M. Loughran, Tyndall National Institute (Ireland); J. D. Glennon, National Univ. of Ireland/Cork (Ireland) . . . . . [6112-26]

✔ **Design of controlled drug delivery system with optimal release characteristics,** X. Wang, T. Chen, Xi'an Jiaotong Univ. (China) . . [6112-27]

✔ **The project and simulation of the compositive miniature spectrum instrument,** W. Jianguo, Chongqing Univ. (China) . . . . . [6112-28]

✔ **Micro-cantilever resonance sensor for biomolecular detection by using self-assembly nanoparticles,** J. H. He, Institute of Microelectronics (Singapore); J. Ye, National Univ. of Singapore (Singapore); C. W. H. Li, Institute of Microelectronics (Singapore); T. M. Lim, National Univ. of Singapore (Singapore); H. W. Cheong, Institute of Microelectronics (Singapore) . . . . . [6112-29]

Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6113

MEMS/MOEMS Components and Their Applications III

Conference Chairs: **Scot S. Olivier**, Lawrence Livermore National Lab.; **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.; **Albert K. Henning**, Redwood Microsystems Inc.

Program Committee: **Farrokh Ayazi**, Georgia Institute of Technology; **Thomas G. Bifano**, Boston Univ.; **Quanfang Chen**, Univ. of Central Florida; **Bishnu P. Gogoi**, Freescale; **Joel A. Kubby**, Univ. of California/Santa Cruz; **Michael W. Putty**, Delphi Corp.; **William C. Tang**, Univ. of California/Irvine; **Wanjun Wang**, Louisiana State Univ.; **Eui-Hyeok Yang**, Jet Propulsion Lab.

SPIE and the organizers gratefully acknowledge the following contributor

Center for Adaptive Optics

An NSF Science and Technology Center

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm · Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ. of Caliifornia/Irvine; **Eric Mounier,** Yole Développment; **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George M. Whitesides,** Harvard Univ.

See p. 19 for details.

Monday 23 January

Plenary Session . . . . . Mon. 9.00 am to Noon

Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am	**Opening Remarks and Introduction**
9:10 to 10:00 am	**Fluidic Optics,** George Whitesides, Harvard Univ.
10:00 to 10:20 am	Coffee Break
10:20 to 11:10 am	**Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?** Marc Madou, Univ. of California/Irvine
11:10 am to Noon	**Tunable Micro-optics,** IMTEK—Dept. of Microsystems Technology, Univ. of Freiburg (Germany)

See p. 18-19 for details.

SESSION 1

Hilton Hotel: San Carlos I/II Room . . . . . Mon. 1:30 to 3:40 pm

Gyroscopes and Inertial Sensors

Chairs: **Terry V. Roszhart**, **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.

1:30 pm: **Silicon on insulator inertial MEMS device processing** *(Invited Paper)***,** W. D. Sawyer, M. S. Prince, Charles Stark Draper Lab., Inc. . . . . [6113-02]

2:00 pm: **MEMS inertial sensors with integrated optical transducers** *(Invited Paper, Presentation Only),* D. W. Carr, Sandia National Labs. . [6113-03]

2:30 pm: **The effects of collateral modes on MEMS gyro errors** *(Invited Paper)***,** T. V. Roszhart, The Pennsylvania State Univ. . . . . [6113-04]

3:00 pm: **A novel excitation scheme for MEMS gyroscopes using parametric pumping for near inertial grade performance,** B. J. Gallacher, J. S. Burdess, K. M. Harish, Univ. of Newcastle Upon Tyne (United Kingdom) . . . . . [6113-05]

3:20 pm: **Markets and applications for MEMS inertial sensors,** R. H. Dixon, J. Bouchaud, Wicht Technologie Consulting (Germany) . . . . . [6113-06]

Tuesday 24 January

SESSION 2

Hilton Hotel: San Carlos I/II Room . . . . Tues. 8:00 am to 12:00 pm

Applications of MEMS Adaptive Optics I

Chair: **Scot S. Olivier**, Lawrence Livermore National Lab.

8:00 am: **MEMS for the next generation of giant astronomical telescopes** *(Invited Paper)***,** D. T. Gavel, Univ. of California/Santa Cruz . . . . . [6113-07]

8:30 am: **MEMS-based extreme adaptive optics for planet detection** *(Invited Paper)***,** B. A. Macintosh, Lawrence Livermore National Lab. . . [6113-08]

9:00 am: **Requirements for MEMS mirrors for adaptive optics in the eye** *(Invited Paper)***,** C. J. Dainty, E. Dalimier, E. M. Daly, National Univ. of Ireland/Galway (Ireland) . . . . . [6113-09]

9:30 am: **MEMS-based ophthalmic adaptive optics** *(Invited Paper)* A. Roorda, Univ. of California/Berkeley . . . . . [6113-10]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Adaptive micro-optics inside the eye** *(Invited Paper)***,** G. V. Vdovin, A. N. Simonov, Technische Univ. Delft (Netherlands); M. Rombach, AkkoLens International (Netherlands); M. Y. Loktev, Flexible Optical B.V. (Netherlands) . . . . . [6113-11]

11:00 am: **Adaptive laser resonator control with deformable MOEMS mirrors** *(Invited Paper)***,** U. Wittrock, P. Welp, Fachhochschule Münster (Germany) . . . . . [6113-12]

11:30 am: **Tiny bimorph mirrors for laser beam control** *(Invited Paper)***,** A. V. Kudryashov, Moscow State Open Univ. (Russia) . . . . . [6113-13]

Lunch/Exhibition . . . . . 12:00 to 1:30 pm

SESSION 3

Hilton Hotel: San Carlos I/II Room . . . . . Tues. 1:30 to 3:20 pm

MEMS Adaptive Optics Systems and Performance

Chair: **Thomas G. Bifano**, Boston Univ.

1:30 pm: **MEMs-based adaptive optics systems: the Naval Research Laboratory Program** *(Invited Paper)*, S. R. Restaino, J. Andrews, T. Martinez, Naval Research Lab.; D. Payne, Narrascape; D. V. Wick, Sandia National Labs.; C. Wilcox, Naval Research Lab. . . . . [6113-14]

2:00 pm: **Frequency stability of combined wavefront corrective elements for adaptive optics,** C. Wilcox, J. Andrews, S. R. Restaino, T. Martinez, Naval Research Lab.; S. Teare, New Mexico Institute of Mining and Technology; D. Payne, Narrascape . . . . . [6113-15]

2:20 pm: **Image sharpening and MEMS mirrors,** L. P. Murray, C. J. Dainty, National Univ. of Ireland/Galway (Ireland) . . . . . [6113-16]

2:40 pm: **Characterization of contour shapes achievable with a 140 actuator and 4μm stroke MEMS deformable mirror,** Y. Zhou, T. Bifano, Boston Univ. . . . . [6113-17]

3:00 pm: **Extreme adaptive optics testbed: performance and characterization of a 1024-MEMS deformable mirror,** J. W. Evans, L. Poyneer, B. Macintosh, G. Sommargren, Lawrence Livermore National Lab.; S. Severson, D. Dillon, Univ. of California/Santa Cruz; D. Palmer, S. Olivier, Lawrence Livermore National Lab. . . . . [6113-18]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Hilton Hotel: San Carlos I/II Room . . . . . Tues. 3:50 to 5:50 pm

MEMS Adaptive Optics Devices I

Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

3:50 pm: **Characterization of a new deformable mirror technology based on a magnetic technology** *(Invited Paper)*, J. Ballesta, Engineering Synthesis Design Inc. . . . . [6113-23]

4:20 pm: **MEMS analog light processing: an enabling technology for adaptive optical phase control** *(Invited Paper)*, A. Gehner, M. Wildenhain, H. Neumann, H. Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6113-20]

4:50 pm: **Performance of a high-stroke segmented MEMS deformable-mirror technology** *(Invited Paper)*, M. A. Helmbrecht, T. N. Juneau, M. R. Hart, N. Doble, Iris AO, Inc. . . . . [6113-21]

5:20 pm: **High-performance adaptive optics using microscale assembly** *(Invited Paper)*, M. B. Cohn, MicroAssembly Technologies, Inc. . . . . [6113-22]

Technical Group Meeting

Adaptive Optics

Panel Discussion

Professional Training in Adaptive Optics

Tuesday 24 January · 7:30 to 9:00 pm · Fairmont Hotel: Piedmont

Chair: **Scot S. Olivier,** Lawrence Livermore National Lab.

Wednesday 25 January

SESSION 5

Hilton Hotel: San Carlos I/II Room . . . . . Wed. 8:00 to 11:10 am

MEMS Adaptive Optics Devices II

Chair: **Scot S. Olivier**, Lawrence Livermore National Lab.

8:00 am: **A novel elevating structure design applied on the motion behavior analysis of micro-otical devices,** C. Tsai, Z. Fan, J. Chen, P. Lin, Ming Hsin Univ. of Science and Technology (Taiwan) . . . . . [6113-35]

8:20 am: **Design and development of a 329-segment tip-tilt piston mirror array for space-based adaptive optics,** J. Stewart, Boston Univ.; S. Cornelissen, Boston Micromachines Corp.; T. Bifano, Boston Univ. [6113-24]

8:40 am: **MEMS-actuated nanolaminate deformable mirror,** A. P. Papavasiliou, Lawrence Livermore National Lab. . . . . [6113-25]

9:00 am: **Large-scale nanolaminate deformable mirror,** A. P. Papavasiliou, Lawrence Livermore National Lab. . . . . [6113-26]

9:20 am: **Polymer-based micro-deformable mirror for adaptive optics,** A. Liotard, F. Zamkotsian, Lab. d'Astrophysique de Marseille (France); V. Conedera, N. Fabre, Lab. d'Analyse et d'Architecture des Systèmes (France); P. Lanzoni, Lab. d'Astrophysique de Marseille (France); H. Camon, Lab. d'Analyse et d'Architecture des Systèmes (France); D. Rabaud, SHAKTIWARE (France) . . . . . [6113-27]

9:40 am: **Poly-SiGe MEMS actuators for adaptive optics,** B. C. Lin, T. King, R. S. Muller, Univ. of California/Berkeley . . . . . [6113-28]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Large-stroke self-aligned vertical comb drive actuators for adaptive optics applications,** E. J. Carr, Lawrence Livermore National Lab. and Univ. of California/Davis; S. S. Olivier, Lawrence Livermore National Lab.; O. Solgaard, Stanford Univ. . . . . [6113-29]

10:50 am: **Large stroke actuators for adaptive optics,** B. Fernandez, J. A. Kubby, Univ. of California/Santa Cruz . . . . . [6113-30]

SESSION 6

Hilton Hotel: San Carlos I/II Room . . . Wed. 11:10 am to 12:10 pm

Electronics and Controls for MEMS Adaptive Optics

Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

11:10 am: **MEMS deformable mirror embedded wavefront sensing and control system,** D. Owens, M. Schoen, K. A. Bush, AgilOptics, Inc. . [6113-31]

11:30 am: **USB-based controller for generic MEM device deformable mirrors,** J. Andrews, C. C. Wilcox, S. R. Restaino, T. Martinez, Naval Research Lab.; D. Payne, Narrascape . . . . . [6113-32]

11:50 am: **Chip-scale integrated driver for electrostatic DM control,** D. J. Kim, T. G. Bifano, A. E. Hubbard, Boston Univ. . . . . [6113-33]

MOEMS-MEMS Round Table Discussion

Organizing a National Center for Optical MEMS

Wednesday 25 January · 5:30 to 6:30 pm · Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab.; **Albert Henning,** Redwood Microsystems, Inc.

See p. 19 for details.

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Microfabrication and test of pre-aligned fiber bundle couplers using UV-lithography of SU-8,** R. Yang, W. Wang, S. Soper, Louisiana State Univ. . . . . [6113-36]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6114

MOEMS Display, Imaging, and Miniaturized Microsystems IV

Conference Chairs: **Hakan Ürey**, Koç Univ. (Turkey); **David L. Dickensheets**, Montana State Univ./Bozeman; **Bishnu P. Gogoi**, Freescale Semiconductor

Program Committee: **Susanne Arney**, Lucent Technologies/Bell Labs.; **Christiaan Baert**, IMEC (Belgium); **Edwin T. Carlen**, Charles Stark Draper Lab., Inc.; **F. L. Degertekin**, Georgia Institute of Technology; **Claire Divoux**, CEA-LETI (France); **Jean-Christophe Eloy**, Yole Développment (France); **Kazuhiro Hane**, Tohoku Univ. (Japan); **Harald Schenk**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); **Joseph J. Talghader**, Univ. of Minnesota

Monday 23 January

Plenary Session . . . . . Mon. 9.00 am to Noon

Marriott Hotel: San Jose Ballroom, Salon IV

9:00 to 9:10 am	**Opening Remarks and Introduction**
9:10 to 10:00 am	**Fluidic Optics,** George Whitesides, Harvard Univ.
10:00 to 10:20 am	Coffee Break
10:20 to 11:10 am	**Genetic Engineered Proteins in MEMS and NEMS Sensing Platforms: Icarus Revisited?** Marc Madou, Univ. of California/Irvine
11:10 am to Noon	**Tunable Micro-optics,** IMTEK—Dept. of Microsystems Technology, Univ. of Freiburg (Germany)

See p. 18-19 for details.

Panel Discussion

Progress and Prospects in Microfluidics

Monday 23 January · 7:30 to 9:30 pm · Fairmont Hotel: Gold

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.; **Ian Papautsky,** Univ. of Cincinnati

Panelists: **Abraham P. Lee,** Univ. of Caliifornia/Irvine; **Eric Mounier,** Yole Développment; **Stephen R. Quake,** Stanford Univ.; **Steve Sundberg,** Intel Corp.; **George M. Whitesides,** Harvard Univ.

See p. 19 for details.

Wednesday 25 January

SESSION 1

Hilton Hotel: San Carlos I/II Room . . . . . Wed. 2:00 to 3:10 pm

Displays and Spatial Light Modulators I

Chair: **Hakan Urey**, Koç Univ. (Turkey)

2:00 pm: **High-performance blazed GxLTM device for large-area laser projector** *(Invited Paper)***,** Y. Ito, Sony Corp. (Japan) . . . . . [6114-01]

2:30 pm: **Large-scale drift-free monocrystalline silicon micromirror arrays made by wafer bonding,** T. Bakke, B. Voelker, D. Rudloff, M. Friedrichs, H. Schenk, H. K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-03]

2:50 pm: **Global flatness of spatial light modulators,** M. Wagner, U. Künzelmann, H. Schenk, H. K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-06]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 2

Hilton Hotel: San Carlos I/II Room . . . . . Wed. 3:40 to 4:50 pm

Displays and Spatial Light Modulators II

Chair: **Bishnu P. Gogoi**, Freescale

3:40 pm: **Perspective of MEMS-based raster scanning display and its requirements for success** *(Invited Paper)***,** Y. Park, J. Lee, S. Shin, J. Sunu, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6114-05]

4:10 pm: **New applications for DMD,** E. Mounier, Yole Développment (France) . . . . . [6114-07]

4:30 pm: **MEMS microdisplays: overview and markets,** J. Bouchaud, Wicht Technologie Consulting (Germany) . . . . . [6114-08]

MOEMS-MEMS Round Table Discussion

Organizing a National Center for Optical MEMS

Wednesday 25 January · 5:30 to 6:30 pm · Hilton Hotel: Santa Clara I

Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab.; **Albert Henning,** Redwood Microsystems, Inc.

See p. 19 for details.

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✔ **Laterally driven electrostatic actuators with extended travel range,** J. Su, H. Yang, W. Porod, P. J. Fay, G. H. Bernstein, Univ. of Notre Dame [6114-28]

✔ **Using MEMS in spectroscopy applications** *(Presentation Only),* M. Ramani, Polychromix . . . . . [6114-29]

Thursday 26 January

SESSION 3

Hilton Hotel: San Carlos I/II Room . . . . . Thurs. 8:00 to 9:20 am

Spectrometers and Diffractive Elements

Chair: **Hans Peter Herzig**, Univ. de Neuchâtel (Switzerland)

8:00 am: **Development of high-efficient NIR-scanning gratings for spectroscopic applications,** F. Zimmer, T. Sandner, H. Grueger, A. Heberer, A. Wolter, H. Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-09]

8:20 am: **High-fill factor micromirror array for multi-object spectroscopy,** S. Waldis, P. Clerc, W. Noell, Univ. de Neuchâtel (Switzerland); F. Zamkotsian, Lab. d'Astrophysique de Marseille (France); M. Zickar, N. F. de Rooij, Univ. de Neuchâtel (Switzerland) . . . . . [6114-10]

8:40 am: **Principle and applications of a new MOEMS spectrometer,** R. Saupe, Technische Univ. Chemnitz (Germany); T. Otto, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) . . . . . [6114-11]

9:00 am: **Design and fabrication of a tunable Fabry-Perot interferometer/ photodiode (FPI/PD) spectral image sensor for visible wavelengths,** H. Yang, J. Su, W. Porod, P. J. Fay, G. H. Bernstein, Univ. of Notre Dame . . . . . [6114-12]

SESSION 4

Hilton Hotel: San Carlos I/II Room . . . Thurs. 9:20 am to 12:00 pm

Telecom and Other Applications

Chair: **David L. Dickensheets**, Montana State Univ./Bozeman

9:20 am: **Tunable microcavities in planar photonic crystals** *(Invited Paper)***,** I. Marki, H. P. Herzig, Univ. de Neuchâtel (Switzerland) . . . . . [6114-13]

9:50 am: **Deformable MEMS grating for wide tunability and high-operating speed,** M. Tormen, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Y. Peter, École Polytechnique de Montréal (Canada); P. Niedermann, A. Hoogerwerf, R. P. Stanley, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) . . . . . [6114-14]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Integrated heterodyne optical system (IHOS),** N. Elman, M. Sternheim, Y. Y. Shacham-Diam, Tel Aviv Univ. (Israel) . . . . . [6114-15]

11:00 am: **Optical characterization of 9 x 9 optical cross connect utilizing silicon lens scanners with spider-leg actuators,** H. N. Kwon, J. Lee, Gwangju Institute of Science and Technology (South Korea); K. Takahashi, H. Toshiyoshi, The Univ. of Tokyo (Japan) . . . . . [6114-16]

11:20 am: **Performance optimization of MOEMS-based diffractive optical elements: new designs and theory results,** J. Castracane, G. Panaman, J. P. Verheggen, L. P. Clow, Jr., B. Altemus, SUNY/Univ. at Albany . . . [6114-17]

11:40 am: **Design, characterization, and control of a large aperture MOEMS Fabry-Perot tunable infrared filter,** J. A. Palmer, Sandia National Labs.; M. A. Quijada, W. Hsieh, B. Mott, E. Akpan, G. L. Brown, Jr., M. B. Jacobson, M. A. Greenhouse, NASA Goddard Space Flight Ctr. . . . . [6114-18]

Lunch/Exhibition . . . . . 12:00 to 1:30 pm

SESSION 5

Hilton Hotel: San Carlos I/II Room . . . . . Thurs. 1:30 to 3:00 pm

Scanners and Actuator Developments

Chair: **James Castracane**, SUNY/Univ. at Albany

1:30 pm: **Highly reflective optical coatings for high-power applications of micro scanning mirrors in the UV-VIS-NIR spectral region** *(Invited Paper)***,** T. Sandner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-19]

2:00 pm: **Micro-actuator with extended analog deflection at low-drive voltage,** P. Dürr, A. Gehner, J. U. Schmidt, D. Kunze, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-20]

2:20 pm: **Extended damping model for out-of-plane-comb driven micromirrors,** T. Klose, T. Sandner, H. Schenk, H. K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-21]

2:40 pm: **A new deformable mirror for adaptive optics,** R. Rousier, C. Divoux, H. B. Grange, CEA-LETI (France); J. Charton, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); M. H. Vaudaine, CEA-LETI (France); L. Jaucou, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); N. Raphoz, TRONIC'S Microsystems S.A. (France) . . . . . [6114-22]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 6

Hilton Hotel: San Carlos I/II Room . . . . . Thurs. 3:30 to 4:30 pm

Scanners and Imaging Systems

Chair: **Harald Schenk**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany)

3:30 pm: **Scanning 2D micromirror with enhanced flatness at high frequency,** A. Wolter, T. Klose, S. Hsu, H. Schenk, H. K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6114-24]

3:50 pm: **Digital photographic imaging using MOEMS,** V. T. Nasis, R. A. Hicks, T. P. Kurzweg, Drexel Univ. . . . . [6114-26]

4:10 pm: **Investigation of optical information for a single micro grating device combined with MATA by SMart process,** C. Tsai, Y. Huang, T. Yang, J. Chen, Ming Hsin Univ. of Science and Technology (Taiwan) . . . . . [6114-27]

SPIE International Symposium

OPTO 2006

Integrated Optoelectronic Devices

21–26 January 2006 *San Jose Convention Center • San Jose, California USA*

Optoelectronic Materials and Devices

Photonic Integration

Nanotechnologies in Photonics

Advanced Optoelectronic Applications

Semiconductor Lasers and LEDs

Displays and Holography

2006 Symposium Chair

Seppo Honkanen,
Optical Sciences Ctr./
Univ. of Arizona

2006 Symposium Cochair

Yakov Sidorin,
Photineer Technology
Group

Daily Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	22 January	23 January	24 January	25 January	26 January

Program on
Optoelectronic Materials and Devices

Program Track Chair: **James G. Grote,** Air Force Research Lab.

6115 **Physics and Simulation of Optoelectronic Devices XIV** *(Osiński, Henneberger, Arakawa)* p. 162

6122 **Zinc Oxide Materials and Devices** *(Hosseini Teherani, Litton)* p. 178

6116 **Optical Components and Materials III** *(Digonnet, Jiang)* p. 166

6117 **Organic Photonic Materials and Devices VIII** *(Grote, Kajzar, Kim)* p. 168

6118 **Ultrafast Phenomena in Semiconductors and Nanostructure Materials X** *(Tsen, Song, Jiang)* p. 171

6121 **Gallium Nitride Materials and Devices** *(Litton, Grote, Morkoc, Madhukar)* p. 176

6119 **Semiconductor Photodetectors III** *(Cohen, Dereniak)* p. 173

6120 **Terahertz and Gigahertz Electronics and Photonics V** *(Hwu, Linden)* p. 174

Program on
Photonic Integration

Program Track Chair: **Yakov Sidorin,** Photineer Technology Group

6123 **Integrated Optics: Devices, Materials, and Technologies X** *(Sidorin, Waechter)* p. 180

6124 **Optoelectronic Integrated Circuits X** *(Eldada, Lee)* p. 183

6125 **Silicon Photonics** *(Kubby, Reed)* p. 186

6126 **Photonics Packaging and Integration VIII** *(Earman, Chen)* p. 188

Program on
Nanotechnologies in Photonics

Program Track Chair: **Ali Adibi,** Georgia Institute of Technology

6127 **Quantum Sensing and Nanophotonic Devices III** *(Razeghi, Brown)* p. 189

6128 **Photonic Crystal Materials and Devices IV** *(Adibi, Lin, Scherer)* p. 192

6129 **Quantum Dots, Particles, and Nanoclusters III** *(Eyink, Huffaker)* p. 195

Program on
Advanced Optoelectronic Applications

Program Track Chair: **Zameer U. Hasan,** Temple University

6130 **Advanced Optical and Quantum Memories and Computing III** *(Coufal, Hasan, Craig)* p. 197

6131 **Nanomanipulation with Light II** *(Andrews)* p. 199

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
21 January	22 January	23 January	24 January	25 January	26 January

Program on

Semiconductor Lasers and LEDs

Program Track Chair: **Daniel K. Johnstone,** Virginia Commonwealth University

6104 **High-Power Diode Laser Technology and Applications IV** *(Zediker)* p. 103

6132 **Vertical-Cavity Surface-Emitting Lasers X** *(Lei, Choquette)* p. 200

6133 **Novel In-Plane Semiconductor Lasers V** *(Mermelstein, Bour)* p. 202

6134 **Light-Emitting Diodes: Research, Manufacturing, and Applications X** *(Streubel, Yao, Schubert)* p. 205

Program on

Displays and Holography

Program Track Chairs: **Liang-Chy Chien,** Kent State University; **Ming H. Wu,** Hamamatsu Corp.

6135 **Liquid Crystal Materials, Devices, and Applications XII** *(Chien)* p. 207

6136 **Practical Holography XX: Materials and Applications** *(Bjelkhagen, Lessard)* p. 210

Optoelectronics Special Events

PLENARY SESSION
8:30 to 10:00 am,
p. 20

8:30 am: *Introduction and Opening Remarks*

8:40 am: *Silicon Photonics*

9:20 am: *Silicon Optoelectronics: Opportunities, Applications, and Recent Results*

Technical Group Meeting: **Holography**
7:30 to 9:00 pm,
p. 20

OPTO

Sunday-Thursday 22-26 January 2006 • Proceedings of SPIE Vol. 6115

Physics and Simulation of Optoelectronic Devices XIV

Sunday 22 January

SESSION 1

RM: Conv. Ctr. Room B3 . . . . . Sun. 1:10 to 3:00 pm

Ultrafast and Mode-Locked Devices

Chair: **Athanasios Gavrielides**, Air Force Research Lab.

1:10 pm: **Ultrafast all-optical switching by gain competition in semiconductors** *(Invited Paper),* G. A. Vawter, A. Y. Hsu, E. J. Skogen, K. C. Baucom, G. M. Peake, W. W. Chow, G. R. Hadley, Sandia National Labs. . . . . [6115-01]

1:40 pm: **High-power low-jitter quantum-dot mode-locked lasers,** H. Li, L. Cheng, A. L. Gray, H. Huang, S. Kutty, F. Nabulsi, J. Nagyvary, L. Olona, E. A. Pease, K. Sun, P. M. Varangis, R.-H. Wang, C. Wiggins, L. Zhang, J. L. Zilko, J. Zou, Zia Laser, Inc. . . . . [6115-02]

2:00 pm: **Jitter influence in linear and nonlinear pulse compressors using gain switching laser sources,** H. Lamela, R. Sanz Mesa, C. de Dios Fernandez, Univ. Carlos III de Madrid (Spain) . . . . . [6115-03]

2:20 pm: **Scalable passively mode-locked semiconductor lasers for microprocessor clocking,** J. P. Siepmann, A. Rybaltowski, LightTime, LLC . . . . . [6115-04]

2:40 pm: **Mode-locked phenomena of hybrid soliton pulse source,** N. Dogru, Gaziantep Univ. (Turkey) . . . . . [6115-05]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 2

RM: Conv. Ctr. Room B3 . . . . . Sun. 3:30 to 5:30 pm

Optical Communication Components and Systems

Chair: **Hiroshi Amano**, Meijo Univ. (Japan)

3:30 pm: **Design and implementation of single-mode Fabry-Pérot lasers using non-periodic index patterns,** R. Fehse, S. O'Brien, S. Osborn, E. P. O'Reilly, Tyndall National Institute (Ireland); J. Patchell, D. Jones, J. O'Gorman, Eblana Photonics Ltd. (Ireland) . . . . . [6115-06]

3:50 pm: **Investigations of 14xx-nm pump lasers formed by active MMI waveguide,** A. Guermache, V. Voiriot, Avanex, Inc. (France); J. Jacquet, Supélec (France) . . . . . [6115-07]

4:10 pm: **Analysis of surface-normal coupled-quantum-well modulator at 1.55 μm,** Z. Q. Li, O. Shmatov, S. Z. Li, Crosslight Software Inc. (Canada) . . . . . [6115-08]

4:30 pm: **Jones matrix analytical models to evaluate higher-order polarized-mode dispersion effects,** M. F. Ferreira, Univ. de Aveiro (Portugal) . . [6115-09]

4:50 pm: **The numerical study of signal degree of polarization,** L.-Y. Wei, R. Zhang, Beijing Univ. of Posts and Telecommunications (China); L. Chen, Hunan Univ. (China); X.-G. Zhang, B.-J. Yang, Beijing Univ. of Posts and Telecommunications (China) . . . . . [6115-10]

5:10 pm: **Characteristics of long period grating written in 980-nm-pumped erbium-doped fiber,** E. K. Sharma, R. Singh, Univ. of Delhi (India) . . . [6115-11]

Monday 23 January

SESSION 3

RM: Conv. Ctr. Room B3 . . . . . Mon. 8:25 to 10:20 am

Nanowire Devices I

Chair: **Cun-Zheng Ning**, NASA Ames Research Ctr.

Keynote Presentation

8:25 am: Nanowire nanophotonics, Charles M. Lieber, Harvard Univ.[6115-12]

9:10 am: **One-dimensional nanostructures as subwavelength optical elements for photonics integration** *(Invited Paper),* P.-D. Yang, Univ. of California/Berkeley . . . . . [6115-13]

9:40 am: **Surface states of the wurtzite-semiconductor nanowires,** N. Malkova, C. Z. Ning, NASA Ames Research Ctr. . . . . [6115-14]

10:00 am: **Mechanisms of nucleation and growth of III- V compound nanowires in reactive vapor transport method,** S. Vaddiraju, Univ. of Louisville; A. Chin, C. Z. Ning, M. Meyyappan, NASA Ames Research Ctr.; M. K. Sunkara, Univ. of Louisville . . . . . [6115-15]

Coffee Break . . . . . 10:20 to 10:40 am

SESSION 4

RM: Conv. Ctr. Room B3 . . . . . Mon. 10:40 am to 12:20 pm

Nanowire Devices II

Chair: **Charles M. Lieber**, Harvard Univ.

10:40 am: **Semiconducting and piezoelectric nanoarchitectures of ZnO: Growth, structures, and properties** *(Invited Paper),* Z. L. Wang, Georgia Institute of Technology . . . . . [6115-16]

11:10 am: **Optoelectronic properties of Si and II-VI nanowires and nanoribbons** *(Invited Paper),* S. T. Lee, City Univ. of Hong Kong (Hong Kong China) . . . . . [6115-17]

11:40 am: **Radius-dependent polarization anisotropy in semiconductor nanowires,** A. V. Maslov, C. Z. Ning, NASA Ames Research Ctr. . . . . [6115-18]

12:00 pm: **Light emission and lasing from antimonide nanowires for infrared applications,** A. Chin, NASA Ames Research Ctr.; S. Vaddiraju, Univ. of Louisville; A. V. Maslov, C. Z. Ning, NASA Ames Research Ctr. . . . . [6115-19]

Lunch Break . . . . . 12:20 to 1:20 pm

SESSION 5

RM: Conv. Ctr. Room B3 . . . . . Mon. 1:20 to 3:20 pm

Diode Lasers with Optical Feedback and Frequency Stabilization

Chair: **Connie J. Chang-Hasnain**, Univ. of California/Berkeley

1:20 pm: **Semiconductor lasers subject to polarization-rotated optical feedback,** P. S. Spencer, R. Ju, Univ. of Wales/Bangor (United Kingdom) . . . . . [6115-20]

1:40 pm: **Coherence resonances in semiconductor lasers,** O. V. Ushakov, H. Wünsche, F. Henneberger, I. Khovanov, M. Zaks, L. Schimansky-Geier, Humboldt-Univ. zu Berlin (Germany) . . . . . [6115-21]

2:00 pm: **Square wave solutions in edge-emitting diode lasers with incoherent feedback,** A. Gavrielides, Air Force Research Lab.; D. W. Sukow, G. Burner, T. McLachlan, J. Miller, J. Amonette, Washington and Lee Univ.; T. Erneux, Univ. Libre de Bruxelles (Belgium) . . . . . [6115-22]

2:20 pm: **Characteristics of mutually coupled semiconductor lasers subject to optoelectronic feedback,** H.-F. Chen, National Yang-Ming Univ. (Taiwan) . . . . . [6115-23]

2:40 pm: **Evaluation of frequency stability in double optical feedback external-cavity diode laser systems,** K. Doi, Y. Kobayashi, S. Maehara, T. Sato, T. Maruyama, M. Ohkawa, Niigata Univ. (Japan); T. Tsubokawa, National Astronomical Observatory of Japan (Japan) . . . . . [6115-24]

3:00 pm: **Frequency stabilization of a semiconductor laser using the Rb saturated absorption spectroscopy,** Y. Ohta, S. Maehara, K. Hasebe, Y. Kurosaki, T. Sato, T. Maruyama, M. Ohkawa, Niigata Univ. (Japan); T. Tubokawa, National Astronomical Observatory of Japan (Japan) . . . . . [6115-25]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 6

RM: Conv. Ctr. Room B3 . . . . . Mon. 3:40 to 6:10 pm

Slow/Fast Light Propagation in Semiconductor Devices

Chairs: **Shun Lien Chuang**, Univ. of Illinois at Urbana-Champaign; **Hailin Wang**, Univ. of Oregon

3:40 pm: **Electromagnetically induced transparency in semiconductors** *(Invited Paper),* H. L. Wang, Univ. of Oregon . . . . . [6115-26]

4:10 pm: **Performance limits of delay lines based on "slow" light** *(Invited Paper),* R. W. Boyd, Univ. of Rochester . . . . . [6115-27]

4:40 pm: **Tunable ultraslow light in vertical-cavity surface-emitting laser** *(Invited Paper),* C. J. Chang-Hasnain, Univ. of California/Berkeley . . . [6115-28]

5:10 pm: **Slow light and fast light in quantum dot semiconductor optical amplifiers,** H. Su, S. L. Chuang, Univ. of Illinois at Urbana-Champaign [6115-29]

5:30 pm: **Nonlinear mode interaction as a mechanism to obtain slow/fast light in diode lasers,** P. G. Eliseev, H.-J. Cao, C.-Y. Liu, G. A. Smolyakov, M. Osiński, CHTM/Univ. of New Mexico . . . . . [6115-30]

5:50 pm: **Investigation of single-photon propagation velocity in optical fiber,** J. D. Ingham, J. E. Carroll, I. H. White, Univ. of Cambridge (United Kingdom) . . . . . [6115-31]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 7

RM: Conv. Ctr. Room B3 . . . . . Tues. 10:30 am to 12:00 pm

Physics of Low-Dimensional Structures and Devices

Chair: **Yasuhiko Arakawa**, Univ. of Tokyo (Japan)

10:30 am: **Nonequilibrium theory for semiconductor laser systems** *(Invited Paper),* A. Traenhardt, S. Becker, S. W. Koch, Philipps-Univ. Marburg (Germany); J. Hader, Univ. of Arizona and Nonlinear Control Strategies, Inc.; J. V. Moloney, Univ. of Arizona . . . . . [6115-32]

11:00 am: **Investigation of anomalously large band-filling effect in type-II InAs/GaSb superlattices,** X.-D. Mu, Y. J. Ding, Lehigh Univ.; J. W. Little, Army Research Lab. . . . . [6115-33]

11:20 am: **Type-II 450-550 nm InGaN-GaNAs active region for quantum well lasers and light emitters on GaN,** R. A. Arif, Y.-K. Ee, N. Tansu, Lehigh Univ. . . . . [6115-34]

11:40 am: **An investigation into changes observed in the oscillation characteristics of semiconductor lasers exposed to magnetic fields,** T. Miyamoto, T. Sato, M. Ohkawa, T. Maruyama, Niigata Univ. (Japan) [6115-35]

Lunch/Exhibition Break . . . . . 12:00 to 2:00 pm

SESSION 8

RM: Conv. Ctr. Room B3 . . . . . Tues. 2:00 to 3:00 pm

Physics and Modeling of Vertical-Cavity Surface-Emitting Lasers

Chair: **Joachim Piprek**, Univ. of California/Santa Barbara

2:00 pm: **All-optical signal processing based on optical injection-locked two-mode vertical-cavity surface-emitting laser,** K. Hasebe, F. Koyama, Tokyo Institute of Technology (Japan) . . . . . [6115-36]

2:20 pm: **Nonlinear RIN modeling of oxide-aperture vertical-cavity surface-emitting lasers,** J. Perchoux, A. Rissons Blanquet, J.-C. Mollier, École Nationale Supérieure de l'Aéronautique et de l'Espace (France) . . . . . [6115-37]

2:40 pm: **Analysis of the static and dynamic characteristics of 1310 nm vertical-cavity surface-emitting lasers,** A. Baecker, S. Odermatt, ETH Zürich (Switzerland); M. Streiff, Sensirion AG (Switzerland); B. Witzigmann, ETH Zürich (Switzerland) . . . . . [6115-38]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 9

RM: Conv. Ctr. Room B3 . . . . . Tues. 3:30 to 5:30 pm

Novel Optoelectronic Devices

Chair: **Claude Weisbuch**, École Polytechnique (France)

3:30 pm: **Longitudinal photonic bandgap crystal laser diodes with ultra-narrow vertical beam divergence** *(Invited Paper),* M. V. Maximov, Y. M. Shernyakov, I. I. Novikov, S. M. Kuznetsov, L. Y. Karachinsky, N. Y. Gordeev, A. F. Ioffe Physical-Technical Institute (Russia); V. A. Shchukin, N. N. Ledentsov, NL Nanosemiconductor GmbH (Germany) and Technical Univ. of Berlin (Germany) and A. F. Ioffe Physical-Technical Institute (Russia); A. Sharon, PBC-Lasers Ltd. (Israel); V. P. Kalosha, Univ. of Ottawa (Canada) and PBC-Lasers Ltd. (Israel) . . . . . [6115-39]

4:00 pm: **Emission from an active photonic lattice: Does it exceed that of the blackbody?** *(Invited Paper),* W. W. Chow, I. F. El-Kady, Sandia National Labs. . . . . [6115-40]

4:30 pm: **Advanced FEM analysis of nano-resonators,** S. Burger, B. Kettner, F. Schmidt, L. W. Zschiedrich, Zuse Institute Berlin (Germany) . . . . . [6115-41]

4:50 pm: **Pattern formation and cavity solitons in a quantum dot semiconductor microcavity: Microscopic model,** T. Maggipinto, M. Brambilla, I. M. Perrini, Univ. e Politecnico di Bari (Italy); R. Kuszelewicz, S. Barbay, Ctr. National de la Recherche Scientifique/UPR20 (France) . . . . . [6115-42]

5:10 pm: **Phase and polarization control as a route to plasmonic nanodevices,** M. E. Sukharev, T. Seideman, Northwestern Univ. . . . . [6115-43]

Wednesday 25 January

SESSION 10

RM: Conv. Ctr. Room B3 . . . . . Wed. 8:00 to 10:40 am

Light-Induced Refrigeration

Chair: **Mansoor Sheik-Bahae**, Univ. of New Mexico

8:00 am: **Laser cooling of semiconductors** *(Invited Paper),* M. Sheik-Bahae, B. Imangholi, M. P. Hasselbeck, Univ. of New Mexico; R. I. Epstein, Los Alamos National Lab.; S. R. Kurtz, National Renewable Energy Lab. . . . . [6115-56]

8:30 am: **Band gap engineering for laser cooling of semiconductors** *(Invited Paper),* J. B. Khurgin, Johns Hopkins Univ. . . . . [6115-57]

9:00 am: **Theory of semiconductor laser cooling at low temperatures** *(Invited Paper),* G. Rupper, N. H. Kwong, R. H. Binder, Univ. of Arizona [6115-58]

9:30 am: **Theoretical limits of electroluminescence refrigeration in semiconductors** *(Invited Paper),* Y.-H. Zhang, J.-B. Wang, D. Ding, S.-Q. Yu, S. R. Johnson, Arizona State Univ. . . . . [6115-59]

10:00 am: **Differential luminescence thermometry in semiconductor laser cooling,** B. Imangholi, M. P. Hasselbeck, M. Sheik-Bahae, Univ. of New Mexico; R. I. Epstein, Los Alamos National Lab.; S. R. Kurtz, National Renewable Energy Lab. . . . . [6115-60]

10:20 am: **Electroluminescence refrigeration in semiconductor light emitting diodes,** S. Q. Yu, J. B. Wang, D. Ding, S. R. Johnson, Y. H. Zhang, Arizona State Univ. . . . . [6115-61]

Coffee Break . . . . . 10:40 to 11:00 am

SESSION 11

RM: Conv. Ctr. Room B3 . . . . . Wed. 11:00 am to 12:40 pm

Physics of Quantum Dot Lasers and Amplifiers

Chair: **Nikolai N. Ledentsov**, NL Nanosemiconductor GmbH (Germany) and A. F. Ioffe Physical-Technical Institute (Russia)

11:00 am: **Recent progress in quantum-dot optical devices: Lasers, amplifiers, and high-speed optical switches** *(Invited Paper),* M. Sugawara, Fujitsu Labs. (Japan) . . . . . [6115-52]

11:30 am: **Analysis of spatially-localized recombination in quantum dot lasers** *(Invited Paper),* H. D. Summers, H. J. Pask, P. Blood, I. C. Sandall, P. M. Smowton, Cardiff Univ. (United Kingdom) . . . . . [6115-53]

12:00 pm: **Investigation of phonon bottleneck effect on quantum dot lasers,** Y.-S. Su, C.-F. Lin, Y. Ho, W.-C. Chang, National Taiwan Univ. (Taiwan) [6115-54]

12:20 pm: **All optical logic performance of quantum dot semiconductor amplifier based devices,** H. Z. Sun, N. K. Dutta, Univ. of Connecticut [6115-55]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSION 12

RM: Conv. Ctr. Room B3 . . . . . Wed. 1:40 to 3:20 pm

Minisymposium on Photonics with Single-Quantum-Dot Devices I

Chairs: **Keiichi Edamatsu**, Tohoku Univ. (Japan); **Fritz Henneberger**, Humboldt-Univ. zu Berlin (Germany)

1:40 pm: **Sub-millisecond spin memory in negatively charged InP quantum dots** *(Invited Paper),* Y. Matsumoto, B. Pal, M. Ikezawa, Univ. of Tsukuba (Japan); S. Y. Verbin, I. V. Ignatiev, Univ. of Tsukuba (Japan) and St.-Petersburg Univ. (Russia) . . . . . [6115-48]

2:10 pm: **Anomalous photon echoes and Rabi oscillations of quantum dot excitons** *(Invited Paper),* Y. Mitsumori, Tohoku Univ. (Japan); A. Hasegawa, M. Sasaki, National Institute of Information and Communications Technology (Japan); F. Minami, Tokyo Institute of Technology (Japan) . . . . . [6115-49]

2:40 pm: **Single-electron spin switching with quantum dots,** I. A. Akimov, D.-H. Feng, F. Henneberger, Humboldt-Univ. zu Berlin (Germany) . . . . [6115-50]

3:00 pm: **Single quantum dot emission after resonant excitation,** T. Kuroda, National Institute for Materials Science (Japan) and PRESTO-JST (Japan); K. Kuroda, K. Sakoda, G. Kido, N. Koguchi, National Institute for Materials Science (Japan) . . . . . [6115-51]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 13

RM: Conv. Ctr. Room B3 . . . . . Wed. 3:40 to 5:40 pm

Minisymposium on Photonics with Single-Quantum-Dot Devices II

Chairs: **Fritz Henneberger**, Humboldt-Univ. zu Berlin (Germany); **Keiichi Edamatsu**, Tohoku Univ. (Japan)

3:40 pm: **Strong coupling in a single quantum dot-semiconductor microcavity system** *(Invited Paper),* A. W. Forchel, Univ. of Würzburg (Germany) . . . . . [6115-44]

4:10 pm: **Strong light-matter coupling with a single quantum dot in a planar photonic crystal nanocavity** *(Invited Paper),* T. Yoshie, Duke Univ.; G. Khitrova, H. M. Gibbs, Univ. of Arizona . . . . . [6115-45]

4:40 pm: **Exciton dephasing in strain-compensated self-assembled InAs quantum dots,** J. Ishi-Hayase, K. Akahane, N. Yamamoto, National Institute of Information and Communications Technology (Japan); M. Kujiraoka, National Institute of Information and Communications Technology (Japan) and Sophia Univ. (Japan); K. Ema, Sophia Univ. (Japan); M. Sasaki, National Institute of Information and Communications Technology (Japan) . . . . . [6115-46]

5:00 pm: **Dephasing effect of single In0.4Ga0.6As QD exciton with interaction between QDs,** T. Kutsuwa, H. Gotoh, H. Kamada, NTT Basic Research Labs. (Japan); J. Temmyo, Shizuoka Univ. (Japan); H. Ando, Konan Univ. (Japan) . . . . . [6115-89]

5:20 pm: **Cavity-QED effect on nonlinear spectra via biexciton of a quantum dot,** H. Ajiki, H. Ishihara, Osaka Univ. (Japan) . . . . . [6115-47]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Ultrafast lasing dynamics in ZnO nanolasers,** J. K. Song, Univ. of California/Berkeley . . . . . [6115-74]

✔ **A simple analytic approach to understanding semiconductor quantum dot lasers,** P. Rees, Univ. of Wales Swansea (United Kingdom); H. D. Summers, Cardiff Univ. (United Kingdom) . . . . . [6115-75]

✔ **Optimization study on active layers and optical performance for 1.3-μm AlGaInAs and InGaAsN semiconductor lasers,** Y.-K. Kuo, S.-H. Yen, M.-W. Yao, National Changhua Univ. of Education (Taiwan) . . . . . [6115-76]

✔ **Self-mixing modulation of semiconductor laser wavelength for detection of motion direction,** K.-T. Ma, C.-K. Li, V. Chiu, M. Yen, W. Wang, K. Lee, BenQ Corp. (Taiwan) . . . . . [6115-77]

✔ **Characterization of the noise spectrum of laterally coupled diode lasers,** H. Lamela, R. Santos, C. Roda, P. Acedo, Univ. Carlos III de Madrid (Spain) . . . . . [6115-78]

✔ **Frequency stabilization of laser diode light-sources in satellite-to-satellite laser interferometers,** S. Maehara, Y. Kurosaki, T. Sato, M. Ohkawa, T. Maruyama, Niigata Univ. (Japan); T. Yoshino, H. Kunimori, M. Hosokawa, H. Ito, Y. Li, S. Nagano, National Institute of Information and Communications Technology (Japan); S. Kawamura, National Astronomical Observatory of Japan (Japan) . . . . . [6115-79]

✔ **Improving by simulation the pattern dependence response of a semiconductor optical amplifier wavelength converter using a fiber Bragg grating,** M. de Pinho Alho, Jr., M. T. M. Rocco Giraldi, Instituto Militar de Engenharia (Brazil) . . . . . [6115-80]

✔ **Modeling of electroluminescent structures based on variable-gap semiconductors,** B. S. Sokolovsky, R. M. Kovtun, V. K. Pysarevsky, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [6115-81]

✔ **Photoluminescence refrigeration in semiconductors,** J.-B. Wang, D. Ding, S.-Q. Yu, S. R. Johnson, Y.-H. Zhang, Arizona State Univ. . . . . [6115-82]

✔ **Laser cooling with next-generation crystal hosts,** W. M. Patterson, A. Mocofanescu, B. Imangholi, D. V. Seletskiy, M. Sheik-Bahae, Univ. of New Mexico; J. Thiede, R. I. Epstein, Los Alamos National Lab.; S. Bigotta, D. Parisi, A. Toncelli, M. Tonelli, Univ. di Pisa (Italy) . . . . . [6115-83]

✔ **Single mode criterion for rib waveguides with small cross sections,** P. Müllner, R. Hainberger, ARC Seibersdorf Research GmbH (Austria) . . . . . [6115-84]

✔ **A scalar coupled-mode theory with birefringence coupling correction for the anisotropic waveguide,** Y.-S. Qiu, Fujian Normal Univ. (China) [6115-85]

✔ **Rigorous vectorial coupled-mode theory for the isotropic waveguide under anisotropic disturbance,** Y.-S. Qiu, Fujian Normal Univ. (China) . . . . . [6115-86]

✔ **Numerical analysis of laterally shifted periodic structures using a modified fitting-based effective medium theory,** S.-Y. Moon, D.-H. Kim, Yonsei Univ. (South Korea) . . . . . [6115-87]

✔ **Timing jitter in dispersion-managed soliton transmission systems,** M. F. Ferreira, M. H. Sousa, Univ. de Aveiro (Portugal) . . . . . [6115-88]

Thursday 26 January

SESSION 14

RM: Conv. Ctr. Room B3 . . . . . Thurs. 8:20 to 10:00 am

Semiconductor Laser Modeling and Simulation

Chair: **Weng W. Chow**, Sandia National Labs.

8:20 am: **Modeling of (GaIn)(NAs) and related laser media,** I. Kuznetsova, A. D. Thraenhardt, C. Schlichenmaier, S. W. Koch, Philipps-Univ. Marburg (Germany); J. Hader, Univ. of Arizona and Nonlinear Control Strategies, Inc.; J. V. Moloney, Univ. of Arizona . . . . . [6115-62]

8:40 am: **Numerical studies of effective masses and optical gain in InGaAsN quantum-well structures with self-consistent effects,** M. S. Wartak, P. C. Weetman, Wilfrid Laurier Univ. (Canada) . . . . . [6115-90]

9:00 am: **Beyond the ABC: Carrier recombination in semiconductor lasers,** J. Hader, Univ. of Arizona and Nonlinear Control Strategies, Inc.; J. V. Moloney, Univ. of Arizona; S. W. Koch, Philipps-Univ. Marburg (Germany) . . . . . [6115-63]

9:20 am: **Single-lateral-mode broad-area laser diodes by thermally profiled lateral refractive index: Modeling and simulation,** J. Mukherjee, J. G. McInerney, National Univ. of Ireland/Cork (Ireland) . . . . . [6115-64]

9:40 am: **Novel approach for efficient mid-infrared coherent emitters based on continuously phase-matched 'W' optical waveguide,** Z. Jin, N. Tansu, Lehigh Univ. . . . . [6115-65]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 15

RM: Conv. Ctr. Room B3 . . . . . Thurs. 10:20 am to 12:00 pm

Modeling and Characterization of LEDs and OLEDs

Chair: **Peter Blood**, Cardiff Univ. (United Kingdom)

10:20 am: **Electromagnetic modeling of organic light-emitting devices** *(Invited Paper),* H.-C. Chen, J.-H. Lee, C.-C. Shiau, Y.-W. Kiang, C.-C. Yang, National Taiwan Univ. (Taiwan) . . . . . [6115-66]

10:50 am: **Optimized photonic crystal GaN LEDs with tailored guided modes and Archimedean lattices** *(Invited Paper),* C. Weisbuch, École Polytechnique (France); A. David, Univ. of California/Santa Barbara . . [6115-67]

11:20 am: **Simulation and fabrication of nitride-based moth-eye light-emitting diodes from UV to red region,** M. Nakashima, H. Kasugai, A. Deguchi, M. Iwaya, S. Kamiyama, H. Amano, I. Akasaki, Meijo Univ. (Japan) . . . . . [6115-68]

11:40 am: **Accurate modeling of gain and amplified spontaneous emission in super-luminescent LEDs,** M. Loeser, F. Römer, M. Luisier, V. Laino, B. Witzigmann, ETH Zürich (Switzerland); L. Occhi, C. Velez, Exalos AG (Switzerland) . . . . . [6115-69]

Lunch/Exhibition Break . . . . . 12:00 to 1:40 pm

SESSION 16

RM: Conv. Ctr. Room B3 . . . . . Thurs. 1:40 to 3:00 pm

Ring Semiconductor Lasers and Microring Devices

Chair: **Silvano Donati**, Univ. degli Studi di Pavia (Italy)

1:40 pm: **On the dynamics of rapidly tuned ring semiconductor lasers,** A. Bilenca, S. Yun, G. J. Tearney, B. E. Bouma, Harvard Medical School . . . . . [6115-70]

2:00 pm: **Monolithically integrated twin ring diode lasers with quantum-dot active region,** H.-J. Cao, CHTM/Univ. of New Mexico; A. L. Gray, Zia Laser, Inc.; L. F. Lester, M. Osiński, CHTM/Univ. of New Mexico . . . . . [6115-71]

2:20 pm: **Influence of straight waveguide back reflection in the dynamics of semiconductor microring lasers,** S. S. Mikroulis, I. G. Stamataki, E. Roditi, D. Syvridis, Univ. of Athens (Greece) . . . . . [6115-72]

2:40 pm: **Spectral properties of all-active InP-based microring resonator devices,** A. Kapsalis, D. Alexandropoulos, S. S. Mikroulis, D. Syvridis, Univ. of Athens (Greece); M. Hamacher, U. Troppenz, H. Heidrich, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) . . . . . [6115-73]

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6116

Optical Components and Materials III

Conference Chairs: **Michel J. F. Digonnet**, Stanford Univ.; **Shibin Jiang**, NP Photonics, Inc.

Program Committee: **Jean-Luc Adam**, Univ. de Rennes 1 (France); **John M. Ballato**, Clemson Univ.; **Robert P. Dahlgren**, Silicon Valley Photonics, Ltd.; **J. Gary Eden**, Univ. of Illinois at Urbana-Champaign; **Simon C. Fleming**, The Univ. of Sydney (Australia); **Almantas Galvanauskas**, Univ. of Michigan; **Francois Gonthier**, ITF Optical Technologies, Inc. (Canada); **Joseph S. Hayden**, SCHOTT North America, Inc.; **Markus P. Hehlen**, Gemfire Corp.; **Jong Heo**, Pohang Univ. of Science and Technology (South Korea); **Steven T. Johns**, Air Force Research Lab.; **Jacques Lucas**, Univ. de Rennes 1 (France); **Barrett G. Potter, Jr.**, Univ. of Arizona; **David Pureur**, HighWave Optical Technologies (France); **Kathleen A. Richardson**, Clemson Univ.; **Giancarlo C. Righini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Stan M. Smith**, U.S. Army Space and Missile Defense Command; **Feng Song**, Nankai Univ. (China); **Setsuhisa Tanabe**, Kyoto Univ. (Japan); **Ji Wang**, Corning Inc.

Monday 23 January

SESSION 1

RM: Marriott: San Jose Ballroom Salon V . Mon. 8:00 to 10:10 am

Optical Components

Chair: **Michel J. F. Digonnet**, Stanford Linear Accelerator Center

8:00 am: **Progress in non-silica microstructured fibres** *(Invited Paper),* T. M. Monro, The Univ. of Adelaide (Australia) . . . . . [6116-01]

8:30 am: **Changing gears in glass poling: from second-order nonlinearity to engineering of glass-metal nano-composites** *(Invited Paper),* P. G. Kazansky, Univ. of Southampton (United Kingdom) . . . . . [6116-02]

9:00 am: **Waveguide formation in Nd doped YVO4 using multiple implants** *(Invited Paper),* G. V. Vázquez, M. E. Sánchez-Morales, Ctr. de Investigaciones en Óptica, A.C. (Mexico); H. Márquez, Ctr. de Investigación Científica y de Educación Superior de Ensenada (Mexico); P. Moretti, Univ. Claude Bernard Lyon 1 (France) . . . . . [6116-03]

9:30 am: **Tellurite photonic crystal fiber for amplifier for broadband optical amplifiers of Er^{3+}-Tm^{3+} emission around 1550nm band,** L. C. Barbosa, E. F. Chillcce, C. M. B. Cordeiro, C. H. Brito Cruz, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6116-04]

9:50 am: **Theoretical characteristics of optical polarizing films using oblique metal island films,** K. Baba, Sendai National College of Technology (Japan) . . . . . [6116-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Marriott: San Jose Ballroom Salon V Mon. 10:30 to 11:30 am

Fiber Bragg Grating

Chair: **Shibin Jiang**, NP Photonics, Inc.

10:30 am: **Characterization of fiber Bragg gratings using spectral interferometry based on minimum-phase functions,** A. Ozcan, M. J. F. Digonnet, G. S. Kino, Stanford Univ. . . . . [6116-06]

10:50 am: **High-speed interrogation of fiber grating sensor arrays with a wavelength-swept laser,** E. C. W. Lee, Massachusetts Institute of Technology and Wellman Ctr. for Photomedicine; S. Yun, W. Oh, B. E. Bouma, Harvard Medical School . . . . . [6116-07]

11:10 am: **Tunable optical delay generator for phased array antennas,** O. K. Okusaga, W. Zhou, Army Research Lab.; G. M. Carter, Univ. of Maryland/ Baltimore County . . . . . [6116-08]

Lunch Break . . . . . 11:30 am to 1:00 pm

SESSION 3

RM: Marriott: San Jose Ballroom Salon V . . Mon. 1:20 to 3:50 pm

Rare-Earth-Doped Materials

Chair: **Robert Dahlgren**, Silicon Valley Photonics, Ltd.

1:20 pm: **An hybrid organic-inorganic approach to erbium-functionalized nanodots for emission in the telecom window,** A. Q. Le Quang, J. Zyss, I. N. Ledoux-Rak, École Normale Supérieure de Cachan (France); V. G. Truong, A. Jurdyc, B. Jacquier, Univ. Claude Bernard Lyon 1 (France) . . . . . [6116-09]

1:40 pm: **Er-doped InAlP native oxides on GaAs: photoluminescence characterization and annealing optimization** *(Invited Paper),* M. Huang, D. C. Hall, Univ. of Notre Dame . . . . . [6116-10]

2:10 pm: **Optical properties of rare-earth-doped chalco-halide glass-ceramics,** V. Seznec, H. Ma, X. Zhang, V. Nazabal, J. Adam, Univ. de Rennes I (France) . . . . . [6116-11]

2:30 pm: **Time resolve spectroscopy and energy transfer in Tm3+- Ho3+ and Tm3+-Tb3+ doped tellurite glasses,** A. Jha, S. Shen, Univ. of Leeds (United Kingdom) . . . . . [6116-12]

2:50 pm: **Spectroscopy and frequency up-conversion in KPb2Br5:Nd3+ crystal,** R. Balda, Univ. del Pais Vasco (Spain); U. Hommerich, E. E. Nyein, Hampton Univ.; J. M. Fernández, Univ. del Pais Vasco (Spain) . . . . . [6116-13]

3:10 pm: **The effect of controlled stretch on the luminescent properties of Eu(III)-complex doped polyvinylidene fluoride film,** R. M. Pogreb, The College of Judea and Samaria (Israel); V. G. Lirtsman, The Hebrew Univ. of Jerusalem (Israel) . . . . . [6116-14]

3:30 pm: **Significant increment of photoluminescence quantum yield by efficiently prohibiting fluorescence quenching in erbium (III) organic complexes,** Y. Li, H. Yang, Z. He, L. Liu, W. Wang, F. Li, L. Xu, Fudan Univ. (China) . . . . . [6116-15]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 4

RM: Marriott: San Jose Ballroom Salon V . . Mon. 3:50 to 5:50 pm

Fiber Lasers and Amplifiers

Chair: **Shibin Jiang**, NP Photonics, Inc.

3:50 pm: **The potential of direct nanoparticle deposition for the next generation active fibers** *(Invited Paper),* S. K. T. Tammela, V. N. Philippov, M. J. Söderlund, J. J. Koponen, P. J. Stenius, Liekki Oy (Finland) . . . . [6116-16]

4:20 pm: **High brightness pumps for fiber lasers** *(Invited Paper),* S. H. Keeney, nLight Photonics . . . . . [6116-17]

4:50 pm: **Thulium doped germanate glasses and fibers for 2 micron fiber lasers,** S. Jiang, NP Photonics, Inc. . . . . [6116-18]

5:10 pm: **All-optical regeneration based on pump-depletion effect in fiber parametric amplification,** A. Bogris, H. A. Simos, D. Alexandropoulos, D. Syvridis, Univ. of Athens (Greece) . . . . . [6116-19]

5:30 pm: **Amplifications S-, C-, and L-bands in RE-ion tellurite glass fibres using 800 nm and 980 nm pump wavelengths,** A. Jha, S. Shen, P. V. Joshi, Univ. of Leeds (United Kingdom) . . . . . [6116-20]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

RM: Marriott: San Jose Ballroom Salon V . Tues. 10:30 am to 12:30 pm

Semiconductor Devices

Chair: **Michel J. F. Digonnet**, Stanford Linear Accelerator Center

10:30 am: **Semiconductor photonic integrated circuits for wavelength division multiplexing** *(Invited Paper),* A. R. Kost, College of Optical Sciences/ The Univ. of Arizona . . . . . [6116-21]

11:00 am: **High-power distributed Bragg reflector lasers for green-light generation** *(Invited Paper),* M. H. Hu, H. K. Nguyen, K. Song, Y. Li, N. J. Visovsky, X. Liu, N. Nishiyama, S. Coleman, L. C. Hughes, Jr., J. Gollier, W. Miller, R. J. Bhat, C. Zah, Corning Inc. . . . . [6116-22]

11:30 am: **Side-coupled in-line fiber-semiconductor modulator,** A. Khalili, Stanford Univ. . . . . [6116-23]

11:50 am: **Multimode interference couplers for 2x2 high speed GaAs-GaAlAs electro-optic switches,** S. Cao, L. Sun, J. P. Noad, R. James, D. Coulas, G. Lovell, E. Higgins, K. Laliberté, Communications Research Ctr. Canada (Canada) . . . . . [6116-24]

12:10 pm: **All-optical wavelength conversion in a vertical cavity semiconductor switch,** C. Porzi, Sant'Anna School for Advanced Studies (Italy); L. Poti, A. Bogoni, Consorzio Nazionale Interuniv. per le Telecomunicazioni (Italy); M. Guina, O. G. Okhotnikov, Tampereen Teknillinen Yliopisto (Finland) . . . . . [6116-25]

Wednesday 25 January

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Optical properties and energy-transfer frequency upconversion of Yb3+-sensitized Ho3+- and Tb3+-doped lead-cadmium-germanate glass and glass ceramic,** A. S. Gouveia-Neto, A. C. M. Afonso, J. F. Nascimento, E. B. Costa, Univ. Federal Rural de Pernambuco (Brazil); L. A. Bueno, Univ. do Oeste de Santa Catarina/Videira (Brazil); S. S. J. Ribeiro, Y. Messaddeq, Univ. Estadual Paulista (Brazil) . . . . . [6116-27]

✔ **Phonon-assisted blue upconversion luminescence in NaY(WO4)2 crystals co-doped with Tm3+ and Yb3+,** J. Su, F. Song, H. Tan, J. Tian, G. Zhang, Nankai Univ. (China) . . . . . [6116-28]

✔ **1550 nm emission from Dy3+ and Nd3+ doped PbBr2, KPb2Br5, and TlPb2Br5,** U. Hommerich, J. Freeman, E. E. Nyein, A. Phillips, I. Noor, Hampton Univ.; S. B. Trivedi, Brimrose Corp. of America; J. M. Zavada, U.S. Army Research Office . . . . . [6116-29]

✔ **Cathode luminescence of epitaxial layers Ga1-xAlxP,** T. Jakhutashvili, B. Mikhelashvili II, N. P. Kekelidze, E. Tulashvili, M. Chkhaidze, Tbilisi State Univ. (Georgia); R. Chikovani, Georgian Technical Univ. (Georgia) . . [6116-30]

✔ **Measurements of non-elastic frozen-in residual stress near the cleaved end of an optical fiber by the inverse linear polarizing method,** I. H. Shin, B.-H. Kim, W.-T. Han, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6116-31]

✔ **Gradient of the residual stress distribution in the mechanical defect on the optical fiber surface,** I. H. Shin, T.-J. Ahn, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6116-32]

✔ **Simplified transformation circle theory in analyzing laser resonator,** Y. Wu, Nankai Univ. (China) . . . . . [6116-33]

✔ **Photothermal spectroscopic characterization in tellurite glasses codoped with rare-earth ions,** V. Pilla, E. Rodriguez, E. F. Chillcce, C. L. Cesar, L. C. Barbosa, Univ. Estadual de Campinas (Brazil) . . . [6116-34]

✔ **Temperature dependences of optical path length in fluorine-doped silica glass and bismuthate glass,** A. Koike, N. Sugimoto, Asahi Glass Co., Ltd. (Japan) . . . . . [6116-35]

✔ **Glass waveguides produced by ion-exchange in Er3+-doped tellurite glass,** L. C. Barbosa, V. V. Anthony Garcia Rivera, E. F. Chillcce, E. Rodriguez, Univ. Estadual de Campinas (Brazil) . . . . . [6116-36]

✔ **Er3+-doped tellurite glass waveguides produced,** V. V. Anthony Garcia Rivera, E. F. Chillcce, C. L. Cesar, L. C. Barbosa, Univ. Estadual de Campinas (Brazil) . . . . . [6116-37]

✔ **Optical backplane based on substrate optical interconnects technology,** M. B. Tayahi, Univ. of Nevada/Reno . . . . . [6116-38]

Monday-Thursday 23-26 January 2006 • Proceedings of SPIE Vol. 6117

Organic Photonic Materials and Devices VIII

Conference Chairs: **James G. Grote**, Air Force Research Lab.; **Francois Kajzar**, CEA Saclay (France); **Nakjoong Kim**, Hanyang Univ. (South Korea)

Program Committee: **Chantal Andraud**, École Normale Supérieure de Lyon (France); **Werner J. Blau**, The Univ. of Dublin, Trinity College (Ireland); **Sophie Brasselet**, Ecole Normale Superieure de Cachan (France); **Christoph Bubeck**, Max-Planck Institute for Polymer Research (Germany); **Darnell E. Diggs**, Air Force Research Lab.; **Susan P. Ermer**, Lockheed Martin Advanced Technology Ctr.; **Makoto Hikita**, NTT Advanced Technology Corp. (Japan); **Frank K. Hopkins**, Air Force Research Lab.; **Andrew Hutchinson**, DARPA; **Alex K. Jen**, Univ. of Washington; **Toshikuni Kaino**, Tohoku Univ. (Japan); **Junji Kido**, Yamagata Univ. (Japan); **Jang-Joo Kim**, Seoul National Univ. (South Korea); **Isabelle N. Ledoux-Rak**, ENS Cachan (France); **Charles Y. C. Lee**, Air Force Office of Scientific Research; **Kwang-Sup Lee**, Hannam Univ. (South Korea); **Emisoon Mah**, Air Force Research Lab.; **Seth R. Marder**, Georgia Institute of Technology; **Robert A. Norwood**, The Univ. of Arizona; **Jean-Michel Nunzi**, Univ. d'Angers (France); **Susanna Orlic**, Technische Univ. Berlin (Germany); **Kenneth D. Singer**, Case Western Reserve Univ.; **Rebecca E. Taylor**, Lockheed Martin Corp.; **Toshiyuki Watanabe**, Sumiden Opcom (Japan); **Jeong Weon Wu**, Ewha Womans Univ. (South Korea)

Monday 23 January

WELCOME AND OPENING REMARKS

RM: Marriott Hotel: San Jose Ballroom Salon I . . . . Mon. 8:30 am

James Grote, Air Force Research Lab.

SESSION 1

RM: Marriott: San Jose Ballroom Salon I . Mon. 8:40 am to 4:50 pm

Keynote Addresses

8:40 am: **Advances in third-order NLO materials,** S. R. Marder, S. Chung, S. Zhang, T. Odani, J. Cho, S. Barlow, Georgia Institute of Technology; E. W. Van Stryland, D. J. Hagan, J. Fu, College of Optics and Photonics/Univ. of Central Florida; J. M. Hales, M. Rumi, A. Biesso, S. Chi, J. W. Perry, Georgia Institute of Technology . . . . . [6117-01]

9:20 am: **Merging quantum dots, biomolecules, and polymers for record performance from solution-processed optoelectronics,** E. H. Sargent, Univ. of Toronto (Canada) . . . . . [6117-02]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Unprecedented electro-optic activities through molecular design and controlled assembly,** A. K. Jen, Univ. of Washington . . . . . [6117-03]

11:10 am: **Advances in nonlinear molecular photonics at the nanoscale,** J. Zyss, École Normale Supérieure de Cachan (France) . . . . . [6117-04]

Lunch Break . . . . . 11:50 am to 1:30 pm

1:30 pm: **To be announced,** T. Wada, Riken Electric Wire Co.,Ltd. (Japan) . . . . . [6117-05]

2:10 pm: **Recent advances in organic photorefractives and organic nonlinear optics and their applications,** N. N. Peyghambarian, College of Optical Sciences/The Univ. of Arizona . . . . . [6117-06]

Coffee Break . . . . . 2:50 to 3:30 pm

3:30 pm: **Liquid crystals for optoelectronics** *(Invited Paper),* K. D. Singer, Case Western Reserve Univ. . . . . [6117-07]

4:10 pm: **Organic light-emitting diodes for displays and solid-state lighting,** Z. H. Kafafi, Naval Research Lab. . . . . [6117-08]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

RM: Marriott: San Jose Ballroom Salon I . Tues. 10:30 to 11:50 am

Third-Order Effects and Logic Systems I

10:30 am: **Fluorescence modulation by photoisomerization of diarylethene** *(Invited Paper),* E. Kim, Yonsei Univ. (South Korea) . . . . . [6117-52]

11:00 am: **Novel two-photon absorbing styrylpyridine-based multibranched dyes** *(Invited Paper),* A. Attias, F. Mathevet, D. Kreher, Univ. Pierre et Marie Curie (France); P. L. Baldeck, Univ. Joseph Fourier (France) . . . . . [6117-10]

11:30 am: **A large aperture laser beam variable attenuator using electro-optic Bragg gratings,** J. J. Foshee, Air Force Research Lab.; S. Tang, Y. Tang, X. Wang, Crystal Research, Inc. . . . . [6117-11]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 3

RM: Marriott Hotel: San Jose Ballroom ITues. 1:30 to 3:00 pm

Third-Order Effects and Logic Systems II

1:30 pm: **Functionalized photopolymers for integrated optical components** *(Invited Paper),* A. F. Fort, S. Klein, J. Bombenger, K. Dorkenoo, A. Barsella, L. Mager, D. Gindre, Institut de Physique et Chimie des Matériaux de Strasbourg (France) . . . . . [6117-12]

2:00 pm: **Fabrication and evaluation of dye doped polymer strip waveguides,** B. Coleman, M. A. Reilly, Univ. of Cambridge (United Kingdom); E. Y. Pun, City Univ. of Hong Kong (Hong Kong China); R. V. Penty, I. H. White, Univ. of Cambridge (United Kingdom) . . . . . [6117-13]

2:20 pm: **Tailoring of organic nanofiber growth for a new type of waveguides,** F. Balzer, L. Kankate, H. Niehus, Humboldt-Univ. zu Berlin (Germany); H. Rubahn, Syddansk Univ. (Denmark) . . . . . [6117-14]

2:40 pm: **Refractive index imaging via a chemically amplified process in a solid polymeric medium,** D. R. Robello, Eastman Kodak Co.; S. Farid, J. P. Dinnocenzo, T. G. Brown, Univ. of Rochester . . . . . [6117-15]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4
RM: Marriott: San Jose Ballroom Salon I . . . Tues. 3:30 to 4:40 pm

Third-Order Effects and Logic Systems III

3:30 pm: **Strong photomechanical effects with diarylethene microcrystals** *(Invited Paper),* P. L. Baldeck, I. Colombier, S. Spagnoli, Univ. Joseph Fourier (France) . . . . . [6117-16]

4:00 pm: **Widely electrically tunable long-period fiber gratings with ferroelectric relaxor poly(vinylidene fluoride – trifluoroethylene - chlorofluoroethylene) terpolymer as second cladding,** Q. Chen, J. E. Lee, Y. Wang, Q. M. Zhang, S. Yin, The Pennsylvania State Univ. . . . . [6117-53]

4:20 pm: **Measuring of high nonlinear optical properties in novel liquid crystals by Z-scan technique,** R. F. Dominguez-Cruz, A. L. Mendez-Perez, M. A. Panduro-Mendoza, G. Romero-Galvan, Univ. Autónoma de Tamaulipas (Mexico); R. Ramos-Garcia, D. Iturbe-Castillo, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6117-18]

Wednesday 25 January

SESSION 5
RM: Marriott: San Jose Ballroom Salon I . . Wed. 8:40 to 10:00 am

Bio-Polymer Photonics

8:40 am: **DNA: new class of polymer** *(Invited Paper),* J. G. Grote, Air Force Research Lab. . . . . [6117-19]

9:20 am: **Development of an all-DNA-surfactant electro-optic modulator** *(Invited Paper),* E. M. Heckman, Univ. of Dayton and Anteon Corp.; P. P. Yaney, Univ. of Dayton; J. G. Grote, F. K. Hopkins, Air Force Research Lab. . [6117-21]

9:50 am: **Optically controlled photonic switches based on spiropyran-doped marine-biopolymer DNA-lipid complex films,** J. Yoshida, A. Watanuki, H. Takano, S. Kobayashi, H. Ikeda, N. Ogata, Chitose Institute of Science and Technology (Japan) . . . . . [6117-22]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6
RM: Marriott: San Jose Ballroom Salon I . Wed. 10:30 am to 12:10 pm

Light Emission and Solar Energy Conversion I

10:30 am: **Red photoluminescence emission of laser dye doped DNA,** Z. Yu, J. A. Hagen, W. Li, Univ. of Cincinnati; J. G. Grote, Air Force Research Lab.; A. J. Steckl, Univ. of Cincinnati . . . . . [6117-23]

10:50 am: **Development of the BioLED: Electroluminescence from organic light emitting diodes using marine derived DNA,** J. A. Hagen, Univ. of Cincinnati; J. G. Grote, Air Force Research Lab.; A. J. Steckl, W. Li, Z. Yu, Univ. of Cincinnati; F. K. Hopkins, Air Force Research Lab. . . . . [6117-24]

11:10 am: **Photoluminescence and amplified spontaneous emission studies of [2- methoxy-5-(2'-ethylhexyloxy)-1,4-phenylenevinylene] in solution and films,** A. Mahfoud, Univ. of Dayton; T. R. Nelson, Jr., Air Force Research Lab.; A. M. Sarangan, Univ. of Dayton . . . . . [6117-25]

11:30 am: **Investigating conformational dependent energy transfer in photoluminescent conjugated polymers with time-correlated single molecule spectroscopy,** S. Fore, Y. Yeh, Univ. of California/Davis; C. W. Hollars, T. R. Huser, S. M. Lane, Lawrence Livermore National Lab. . . [6117-26]

11:50 am: **Ambipolar transport in semiconducting polymer transistors through the engineering the top contact device geometry as a platform for a light emitting transistor,** J. S. Swensen, A. J. Heeger, Univ. of California/ Santa Barbara . . . . . [6117-27]

Lunch/Exhibition Break . . . . . 12:10 to 1:50 pm

SESSION 7
RM: Marriott Hotel: San Jose Ballroom Salon IWed. 1:50 to 3:00 pm

Light Emission and Solar Energy Conversion II

1:50 pm: **Photolithographic patterning of conjugated electroluminescent liquid crystalline materials for full-color organic light emitting diode displays,** A. J. McGlashon, A. J. Campbell, D. D. Bradley, K. S. Whitehead, Imperial College London (United Kingdom); I. A. McCulloch, M. J. Heeney, Merck Chemicals Ltd. (United Kingdom) . . . . . [6117-28]

2:10 pm: **New architecture for high-efficiency polymer photovoltaic cells using solution-based titanium oxide layer,** K. Lee, Pusan National Univ. (South Korea); J. Y. Kim, A. J. Heeger, Univ. of California/Santa Barbara . . . . . [6117-29]

2:30 pm: **To be announced** *(Invited Paper),* M. F. Durstock, Air Force Research Lab. . . . . [6117-31]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8
RM: Marriott Hotel: San Jose Ballroom Salon IWed. 3:30 to 5:00 pm

Second-Order NLO Materials and Applications I

3:30 pm: **Novel functionalized polymers for applications in quadratic nonlinear optics** *(Invited Paper),* I. Rāu, P. Chollet, P. Armatys, F. Kajzar, CEA Saclay (France); R. Centore, A. Carella, Univ. degli Studi di Napoli Federico II (Italy); A. Attias, Univ. Pierre et Marie Curie (France) . . . . . [6117-32]

4:00 pm: **Characterization of NLO polymer materials for optical waveguide structures** *(Invited Paper),* P. P. Yaney, E. M. Heckman, Univ. of Dayton and Anteon Corp.; A. A. Davis, Univ. of Dayton; J. A. Hagen, Univ. of Cincinnati; C. M. Bartsch, G. Subramanyam, Univ. of Dayton; J. G. Grote, F. K. Hopkins, Air Force Research Lab. . . . . [6117-33]

4:30 pm: **Electrooptic polymer grating and its applications** *(Invited Paper),* D. Y. Zang, IPITEK, Inc. . . . . [6117-34]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Observation of defects in polymeric optical waveguide using polarized guide-collection-mode near-field scanning optical microscopy,** T. Mitsui, K. Sakoda, G. Kido, National Institute for Materials Science (Japan) [6117-45]

✔ **Fabrication of waveguide core by a simple vacuum method,** H. Mochizuki, T. Mizokuro, N. Tanigaki, T. Hiraga, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6117-46]

✔ **Stabilization of the bias point of an electro-optic modulator based on polymer material,** C. Nguyen, A. Clouqueur, R. Hierle, B. A. Journet, École Normale Supérieure de Cachan (France); P. Labbe, Motorola, Inc. (France); J. Zyss, École Normale Supérieure de Cachan (France) . . . . . [6117-47]

✔ **Influence of various doping consistence in EML on the optical and electronic performance of multilayer structure OLED,** J. Zhong, J. Cheng, W. Chen, Y. Gang, J. Quan, Univ. of Electronic Science and Technology of China (China) . . . . . [6117-48]

✔ **Enhanced electron injection in organic light emitting diodes,** J. Lee, Pohang Univ. of Science and Technology (South Korea) . . . . . [6117-49]

Thursday 26 January

SESSION 9

RM: Marriott: San Jose Ballroom Salon I . Thurs. 8:50 to 10:00 am

Second-Order NLO Materials and Applications II

8:50 am: **Synthesis of well-defined NLO polymers by controlled radical polymerization (RAFT process),** A. Attias, D. Kreher, M. Save, B. Charleux, C. Bui, J. Buffet, Univ. Pierre et Marie Curie (France); F. Kajzar, I. Rau, CEA Saclay (France) . . . . . [6117-37]

9:10 am: **Organic Chiral salts for optical second harmonic generation,** M. Sylla, Univ. d'Angers (France); O. Castellano, Univ. del Zulia (Venezuela); M. Giffard, G. Mabon, Univ. d'Angers (France); H. Soscun, Univ. del Zulia (Venezuela); N. P. Xuan, Univ. d'Angers (France) . . . . . [6117-38]

9:30 am: **Optical to microwave conversion in a traveling wave electro-optic polymer based device,** F. Duport, C. Nguyen, R. Hierle, B. A. Journet, École Normale Supérieure de Cachan (France); P. Labbe, Motorola, Inc. (France); J. Zyss, École Normale Supérieure de Cachan (France) . . . . . [6117-39]

9:50 am: **Broadband electric field sensor with electro-optic polymer micro-ring resonators on side-polished optical fiber,** H. Sun, A. Pyayt, J. Luo, A. K. Jen, L. R. Dalton, A. Chen, Univ. of Washington . . . . . [6117-40]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 10

RM: Marriott: San Jose Ballroom Salon I Thurs. 10:30 am to 12:30 pm

Molecular and Material Engineering

10:30 am: **Photonic engineering of molecular materials** *(Invited Paper),* F. Kajzar, CEA Saclay (France); J. G. Grote, Air Force Research Lab. . [6117-41]

11:00 am: **Molecular engineering for two-photon absorption** *(Invited Paper),* C. Girardot, C. Barsu, G. Lemercier, C. Andraud, École Normale Supérieure de Lyon (France); P. L. Baldeck, Univ. Joseph Fourier (France) . . . . . [6117-42]

11:30 am: **Synthesis of a zero-birefringence polymer by doping with a nano-size birefringent crystal,** H. Ohkita, A. Tagaya, Y. Koike, Japan Science and Technology Agency (Japan) and Keio Univ. (Japan) . . . . . [6117-43]

11:50 am: **Light-modulated interactions of azobenzene-derivative molecules in polymer films and liquid crystalline matrices,** K. Matczyszyn, Politechnika Wroclawska (Poland) and CEA Saclay (France); L. Rocha, CEA Saclay (France); C. Hubert, Univ. de Technologie de Troyes (France); C. Fiorini-Debuisschert, P. Raimond, CEA Saclay (France); S. J. Bartkiewicz, Politechnika Wroclawska (Poland) . . . . . [6117-44]

12:10 pm: **Low sheet resistivity patternable conducting coating on textile by inkjet in-situ polymerization,** Y. Yoshioka, G. E. Jabbour, Arizona State Univ. . . . . [6117-51]

Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6118

Ultrafast Phenomena in Semiconductors and Nanostructure Materials X

Conference Chairs: **Kong-Thon Tsen**, Arizona State Univ.; **Jin-Joo Song**, Univ. of California/San Diego; **Hongxing Jiang**, Kansas State Univ.

Program Committee: **Alexander N. Cartwright**, SUNY/Univ. at Buffalo; **Chan-Kyung Choi**, Xepix Corp.; **Yujie J. Ding**, Lehigh Univ.; **Abdulhakem Y. Elezzabi**, Univ. of Alberta (Canada); **Jan A. Gaj**, Warsaw Univ. (Poland); **Jing Yu Lin**, Kansas State Univ.; **Mohamed A. Osman**, Washington State Univ.; **Ci-Ling Pan**, National Chiao Tung Univ. (Taiwan); **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan); **Fabrice Vallee**, Univ. Bordeaux I (France)

Monday 23 January

SESSION 1

RM: Conv. Ctr. Room D . . . . . Mon. 8:00 to 11:00 am

Spin Dynamics in Semiconductors

Chair: **Abdulhakem Y. Elezzabi**, Univ. of Alberta (Canada)

8:00 am: **Photoinduced magnetization wave in diluted magnetic semiconductors** *(Invited Paper),* V. A. Stephanovich, Univ. Opolski (Poland); Y. G. Semenov, North Carolina State Univ. . . . . [6118-01]

8:30 am: **Spontaneous magnetization patterning in paramagnetic diluted magnetic semiconductors: theory and experiment** *(Invited Paper),* M. Vladimirova, F. Teppe, D. Scalbert, Univ. Montpellier II (France); C. Misbah, Univ. Joseph Fourier (France); T. Wojtowicz, J. Kossut, Instytut Fizyki (Poland) . . . . . [6118-02]

9:00 am: **Sub-picosecond exciton spin-relaxation in GaN** *(Invited Paper),* A. Tackeuchi, T. Kuroda, H. Otake, Waseda Univ. (Japan); K. Taniguchi, T. Chinone, N. Horio, Stanley Electric Co., Ltd. (Japan) . . . . . [6118-03]

9:30 am: **Spin depolarization in semiconductor spin detectors** *(Invited Paper),* W. M. Chen, I. A. Buyanova, Linköpings Univ. (Sweden); Y. Oka, Tohoku Univ. (Japan); C. R. Abernathy, S. J. Pearton, Univ. of Florida . . . . . [6118-04]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Subpicosecond Faraday effect in Cd(Mn)Te diluted magnetic semiconductors** *(Invited Paper),* R. Sobolewski, D. Wang, Univ. of Rochester; A. Mycielski, Instytut Fizyki (Poland) . . . . . [6118-05]

SESSION 2

RM: Conv. Ctr. Room D . . . . . Mon. 11:00 am to 12:00 pm

Ultrafast Lasers and Applications I

Chair: **Hongxing Jiang**, Kansas State Univ.

11:00 am: **Detection of high frequency acoustic transients using coherent EUV light** *(Invited Paper),* R. I. Tobey, M. E. Siemens, M. M. Murnane, H. C. Kapteyn, Univ. of Colorado at Boulder; K. A. Nelson, Massachusetts Institute of Technology . . . . . [6118-06]

11:30 am: **Thermal effects in 3D recording by femto/picosecond pulses** *(Invited Paper),* S. Juodkazis, H. Misawa, Hokkaido Univ. (Japan) . . . . [6118-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room D . . . . . Mon. 1:30 to 3:00 pm

Ultrafast Lasers and Applications II

Chair: **Hongxing Jiang**, Kansas State Univ.

1:30 pm: **Thermal effects in femtosecond laser ablation of metals** *(Invited Paper),* C. Guo, Univ. of Rochester . . . . . [6118-08]

2:00 pm: **Efficient frequency conversion of femtosecond and picosecond pulses into the visible and ultraviolet in novel quasi-phase-matched and birefringent materials** *(Invited Paper),* M. Ebrahim-Zadeh, Institut de Ciències Fotòniques (Spain) and ICREA-InstitucioCatalana de Recerca i Estudis Avancats (Spain) . . . . . [6118-09]

2:30 pm: **GHz repetition-rate femtosecond sources with desired repetition-rate and wavelength** *(Invited Paper),* T. Liu, C. Yu, C. Sun, National Taiwan Univ. (Taiwan); F. X. Kartner, J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6118-10]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room D . . . . . Mon. 3:30 to 5:30 pm

Ultrafast Dynamics in Nitride-Based Semiconductors

Chair: **Jin-Joo Song**, Univ. of California/San Diego

3:30 pm: **Ultrafast carrier dynamics in nano-clustered InGaN** *(Invited Paper),* H. Wang, Y. Lu, C. Chen, F. Jen, C. Yang, National Taiwan Univ. (Taiwan) . . . . . [6118-11]

4:00 pm: **Ultrafast intersubband relaxation dynamics and coherent nonlinearity in GaN/AlN multiple quantum wells** *(Invited Paper),* J. Hamazaki, Sophia Univ. (Japan) and Hokkaido Univ. (Japan); K. Ikuno, H. Kunugita, K. Ema, A. Kikuchi, K. Kishino, Sophia Univ. (Japan) . . . . . [6118-12]

4:30 pm: **Ultrafast Raman scattering studies of electron transport in a thick InN film grown on GaN** *(Invited Paper),* K. Tsen, D. K. Ferry, Arizona State Univ.; W. J. Schaff, H. Lu, Cornell Univ. . . . . [6118-13]

5:00 pm: **Time-resolved photoluminescence of Mg-doped AlN epilayers** *(Invited Paper),* N. Nepal, M. L. Nakarmi, J. Y. Lin, H. Jiang, Kansas State Univ. . . . . [6118-14]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

RM: Conv. Ctr. Room D . . . . . Tues. 10:30 am to 12:00 pm

Ultrafast Dynamics of Carriers, Excitons, and Photons in Semiconductors

Chair: **Kong-Thon Tsen**, Arizona State Univ.

10:30 am: **Femtosecond spectroscopy of unipolar nanometer-scale high-field transport in GaAs** *(Invited Paper),* M. Betz, Technische Univ. München (Germany) . . . . . [6118-15]

11:00 am: **Analysis of photoluminescence decay of excitons in CuInS2 crystals** *(Invited Paper),* K. Wakita, Osaka Prefecture Univ. (Japan) . . [6118-16]

11:30 am: **Study of the dynamics of cold excitons in Cu2O** *(Invited Paper),* M. Kuwata-Gonokami, The Univ. of Tokyo (Japan) . . . . . [6118-17]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6

RM: Conv. Ctr. Room D . . . . . Tues. 1:30 to 5:00 pm

THz Spectroscopy

Chair: **Hongxing Jiang**, Kansas State Univ.

1:30 pm: **Femtosecond buildup of phonon-plasmon coupling in photoexcited InP observed by ultrabroadband THz probe** *(Invited Paper),* R. Huber, Technische Univ. München (Germany); C. Kübler, Univ. Konstanz (Germany); S. Tübel, Technische Univ. München (Germany); A. Leitenstorfer, Univ. Konstanz (Germany) . . . . . [6118-18]

2:00 pm: **Terahertz radiation from semiconductor surfaces in magnetic fields at high-density excitation** *(Invited Paper),* M. Nakajima, The Univ. of Tokyo (Japan) . . . . . [6118-19]

2:30 pm: **Carrier dynamics in ion-implanted semiconductors studied via simulation and observation of terahertz emission** *(Invited Paper),* J. Lloyd-Hughes, E. Castro-Camus, Univ. of Oxford (United Kingdom); M. D. Fraser, H. H. Tan, C. Jagadish, The Australian National Univ. (Australia); M. B. Johnston, Univ. of Oxford (United Kingdom) . . . . . [6118-21]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Extraordinary single cycle terahertz transmission through ensembles of sub-wavelength size metal particles** *(Invited Paper),* A. Y. Elezzabi, K. J. Chau, Univ. of Alberta (Canada) . . . . . [6118-22]

4:00 pm: **Photonic anisotropic magnetoresistance in sub-wavelength size Co particles** *(Invited Paper),* K. J. Chau, A. Y. Elezzabi, Univ. of Alberta (Canada) . . . . . [6118-23]

4:30 pm: **Photon-excited fluorescence of rare-earth ions-doped gasses by femtosecond laser irradiation** *(Invited Paper),* M. Nogami, Nagoya Institute of Technology (Japan) . . . . . [6118-41]

Wednesday 25 January

SESSION 7

RM: Conv. Ctr. Room D . . . . . Wed. 8:00 to 11:30 am

Ultrafast Dynamics in Quantum Dots and Nanoparticles

Chair: **Kong-Thon Tsen**, Arizona State Univ.

8:00 am: **Optical nonlinearities and the ultrafast phase transition of VO2 nanoparticles** *(Invited Paper),* R. Lopez, R. F. Haglund, Jr., L. C. Feldman, Vanderbilt Univ.; L. A. Boatner, T. E. Haynes, Oak Ridge National Lab.; M. Rini, A. Cavalleri, R. W. Schoenlein, Lawrence Berkeley National Lab. . . . . [6118-24]

8:30 am: **Time-resolved and time-integrated spectroscopy studies of the optical properties of silicon quantum dots** *(Invited Paper),* D. V. Lap, X. Wen, P. Hannaford, Swinburne Univ. of Technology (Australia) . . . . . [6118-25]

9:00 am: **Direct observation of the electron spin relaxation induced by nuclei in quantum dots** *(Invited Paper),* X. Marie, Institut National des Sciences Appliquées de Toulouse (France) . . . . . [6118-26]

9:30 am: **Ultrafast deformation dynamics of silver nanoparticles in glass induced by femtosecond laser pulses** *(Invited Paper),* G. Seifert, A. V. Podlipensky, H. Graener, Martin-Luther Univ. Halle-Wittenberg (Germany) . . . . . [6118-27]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Time-resolved spectroscopy of metal nanoellipsoid** *(Invited Paper),* L. H. Acioli, M. H. G. Miranda, E. L. Falcão-Filho, J. J. Rodrigues, Jr., C. B. de Araújo, Univ. Federal de Pernambuco (Brazil) . . . . . [6118-28]

11:00 am: **Magnetization-induced second-harmonic generation of cobalt and cobalt oxide nanoparticles** *(Invited Paper),* Y. Chang, National Taiwan Univ. (Taiwan) . . . . . [6118-29]

SESSION 8

RM: Conv. Ctr. Room D . . . . . Wed. 11:30 am to 12:00 pm

Ultrafast Coherent Spectroscopy in Semiconductors I

Chair: **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan)

11:30 am: **Nanoscale coherent acoustic phonon imaging** *(Invited Paper),* B. C. Daly, T. B. Norris, Univ. of Michigan; S. Pau, College of Optical Sciences/ The Univ. of Arizona; D. M. Tennant, J. A. Taylor, J. E. Bower, Lucent Technologies . . . . . [6118-30]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 9

RM: Conv. Ctr. Room D . . . . . Wed. 1:30 to 4:00 pm

Ultrafast Coherent Spectroscopy in Semiconductors II

Chair: **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan)

1:30 pm: **Picosecond x-ray studies of coherent folded acoustic phonons in a multiple quantum well** *(Invited Paper),* P. Sondhauss, J. Larsson, M. Harbst, O. Synnergren, Lunds Univ. (Sweden); A. Plech, Univ. of Konstanz (Germany); G. A. Naylor, K. Scheidt, M. Wulff, European Synchrotron Radiation Facility (France); J. S. Wark, Univ. of Oxford (United Kingdom) . . . . . [6118-31]

2:00 pm: **Engineering quantum evolution in nanostructures: from ultrafast control to sustainability** *(Invited Paper),* A. Matos Abiague, A. S. Moskalenko, J. Berakdar, Max-Planck-Institut für Mikrostrukturphysik (Germany) . . [6118-32]

2:30 pm: **Coherent plasmons in InSb** *(Invited Paper),* M. P. Hasselbeck, D. V. Seletskiy, M. Sheik-Bahae, R. Dawson, The Univ. of New Mexico [6118-33]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Optical quantum control using quantum dots** *(Invited Paper),* F. Henneberger, Humboldt-Univ. zu Berlin (Germany) . . . . . [6118-34]

SESSION 10

RM: Conv. Ctr. Room D . . . . . Wed. 4:00 to 5:30 pm

Ultrafast Dynamics in Quantum Well Structures

Chair: **Chih-Chung Yang**, National Taiwan Univ. (Taiwan)

4:00 pm: **Nonradiative recombination effect on photoluminescence decay process in GaInNAs/GaAs quantum wells at low temperature** *(Invited Paper),* Z. Y. Xu, Z. Sun, B. Sun, Y. Ji, H. Ni, Z. Niu, Institute of Semiconductors (China) . . . . . [6118-35]

4:30 pm: **Time-resolved photocurrent spectroscopy of optically excited superlattices and the prospects for Bloch gain** *(Invited Paper),* A. Lisauskas, C. Blöser, R. Sachs, H. G. Roskos, Johann Wolfgang Goethe-Univ. (Germany); A. Juozapavicius, G. Valusis, Puslaidininkiu fizikos institutas (Lithuania); N. Demarina, Nizhny Novgorod State Univ. (Russia); K. Köhler, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6118-36]

5:00 pm: **Dynamic quantum wells on highly electronically excited surfaces of crystalline semiconductors and semimetals** *(Invited Paper),* S. I. Kudryashov, Arkansas State Univ. . . . . [6118-37]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Ultrafast frequency dynamics of coherent phonons in Te under high density photoexcitation,** M. Kandyla, C. A. Roeser, E. Mazur, Harvard Univ. . . . . [6118-38]

✔ **Effects of spatial reproduction at the interference of the electron waves in semiconductor 1D nanostructures with parabolic quantum wells,** V. A. Petrov, A. V. Nikitin, Institute of Radio Engineering and Electronics (Russia) . . . . . [6118-39]

✔ **Contact resistance dynamics at bimetallic interfaces investigated by ultrafast terahertz surface plasmon-mediated transmission spectroscopy,** K. J. Chau, A. Y. Elezzabi, Univ. of Alberta (Canada) [6118-40]

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Semiconductor Photodetectors III

Conference Chairs: **Marshall J. Cohen**, Sensors Unlimited, Inc.; **Eustace L. Dereniak**, College of Optical Sciences/The Univ. of Arizona

Program Committee: **Joe C. Campbell**, The Univ. of Texas at Austin; **Joseph P. Estrera**, Northrop Grumman Corp.; **Barbara G. Grant**, Lines and Lights Technology; **Nan M. Jokerst**, Duke Univ.; **Kurt J. Linden**, Spire Corp.; **Frederick S. Perry**, Boston Electronics Corp.; **William H. Pinkston**, Electro-Optical Systems Inc.; **M. Selim Unlu**, Boston Univ.

Wednesday 25 January

SESSION 1

RM: Conv. Ctr. Room B4 . . . . . Wed. 8:20 to 10:10 am

Gallium Based Photodetectors

Chair: **Marshall J. Cohen**, Sensors Unlimited, Inc.

8:20 am: **Solar-blind AlGaN 256x256 p-i-n detectors and focal plane arrays** *(Invited Paper),* M. B. Reine, A. W. Hairston, P. Lamarre, K. Wong, S. P. Tobin, A. K. Sood, C. Cooke, BAE Systems; M. Pophristic, S. Guo, B. Perez, EMCORE Corp.; R. Singh, C. R. Eddy, Jr., Boston Univ.; U. Chowdhury, M. M. Wong, R. D. Dupuis, The Univ. of Texas at Austin; T. Li, S. P. DenBaars, Cree Lighting . . . . . [6119-01]

8:50 am: **Long wavelength MSM photodetectors fabricated on InGaNAs,** F. L. Gouin, J. P. Noad, E. Higgins, D. Coulas, Communications Research Ctr. Canada (Canada) . . . . . [6119-02]

9:10 am: **Enhancement of the D* of quaternary GaInAsSb 2.0-2.5 micron P-I-N detectors by light doping of the absorbing region,** J. Yager, C. Cao, M. Reddy, J. Olesberg, J. P. Prineas, The Univ. of Iowa; M. Santilli, L. Olafsen, Univ. of Kansas . . . . . [6119-03]

9:30 am: **Influence of nonradiative surface recombination on the performance of superlattice InAs/InGaSb mid- to long-wave infrared P-I-N mesa diode detectors,** J. P. Prineas, J. Olesberg, C. Cao, M. Reddy, J. Yager, M. E. Flatte, The Univ. of Iowa; M. Itzler, M. Maiorov, Princeton Lightwave, Inc . . . . . [6119-04]

9:50 am: **Electronic characteristics of doped InAs/GaAs quantum dot photodetector: temperature dependent dark current and noise density,** C. Liau, Chung-Cheng Institute of Technology (Taiwan); S. Tang, Chung-Shan Institute of Science and Technology (Taiwan); T. Chen, Chung Cheng Institute of Technology (Taiwan); C. Chiang, S. Yang, Chung-Shan Institute of Science and Technology (Taiwan) . . . . . [6119-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room B4 . . . . . Wed. 10:30 am to 12:10 pm

Geiger Mode and Single Photon Detectors

Chair: **Joseph P. Estrera**, Northrop Grumman Corp.

10:30 am: **Development of a solid state photomultiplier based on an array of Geiger mode CMOS avalanche photodiodes,** W. G. Lawrence, C. Stapels, Radiation Monitoring Devices, Inc.; F. Augustine, Augustine Engineering; J. F. Christian, Radiation Monitoring Devices, Inc. . . . . [6119-06]

10:50 am: **Developments in single photon avalanche photodiodes with fast timing resolution,** N. Bertone, OptoElectronic Components (Canada) [6119-07]

11:10 am: **Design and development of scalable 4096x4096 single photon detection UV focal plane array with high quantum efficiency,** A. K. Sood, E. J. Egerton, Y. R. Puri, Magnolia Optical Technologies, Inc.; T. A. Cook, Boston Univ. . . . . [6119-08]

11:30 am: **Scalable Geiger/APD/PIN multichannel sensing platform,** S. Buckley, R. Wilcock, A. Mathewson, J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . . [6119-09]

11:50 am: **Study of the properties of new SiPM detectors,** F. Quinlan, L. Wall, A. Mathewson, J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . [6119-10]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room B4 . . . . . Wed. 1:30 to 3:30 pm

Silicon Based Photodetector

Chair: **Eustace L. Dereniak**, The Univ. of Arizona

1:30 pm: **Novel black silicon PIN photodiodes,** A. M. Moloney, Dublin Institute of Technology (Ireland); L. Wall, A. Mathewson, G. Healy, J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . . [6119-11]

1:50 pm: **Noise performance and temperature coefficients studies for the back-illuminated, thin silicon pin photodiode arrays,** A. O. Goushcha, B. Tabbert, I. Goushcha, Semicoa . . . . . [6119-12]

2:10 pm: **CID25- radiation hardened color video camera,** D. A. Baiko, Thermo Electron, CIDTEC and Rochester Institute of Technology and Ioffe Physical Technical Institute (Russia); S. K. Bhaskaran, S. W. Czebiniak, Thermo Electron, CIDTEC . . . . . [6119-13]

2:30 pm: **Development of a 300,000-pixel ultrahigh-speed, high-sensitivity CCD,** H. Ohtake, T. Hayashida, K. Kitamura, T. Arai, J. Yonai, K. Tanioka, H. Maruyama, Japan Broadcasting Corp. (Japan); T. G. Etoh, Kinki Univ. (Japan); D. Poggemann, A. Ruckelshausen, Univ. of Applied Sciences Osnabrück (Germany); H. van Kuijk, J. Bosiers, DALSA BV. (Netherlands) . . . . . [6119-14]

2:50 pm: **The photoelectric characteristics semiconductor nanostructures on a basis c-Si and GaAs,** R. S. Udovitska, O. V. Vakulenko, S. V. Kondratenko, National Taras Shevchenko Univ. of Kyiv (Ukraine) . . . . [6119-15]

3:10 pm: **Characterization of the high speed CMOS image sensor,** D. Raghu, J. D. Rogers, T. S. Tkaczyk, E. L. Dereniak, M. R. Descour, College of Optical Sciences/The Univ. of Arizona; T. Erickson, Black Forest Engineering [6119-16]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 4

RM: Conv. Ctr. Room B4 . . . . . Wed. 3:50 to 5:30 pm

Special Spectral Region/ Unique Materials/ Architectures

Chair: **Kurt J. Linden**, Spire Corp.

3:50 pm: **Progress in development on CdZnTe x-ray detector,** Y. Zhou, MicroPho Corp.; Y. Chen, Optics Innovation LC; J. Wang, A. Wan, MicroPho Corp. . . . . [6119-17]

4:10 pm: **Room temperature narrow band photodetectors for the midinfrared,** M. Boeberl, Johannes Kepler Univ. Linz (Austria); T. Schwarzl, J. Roither, T. Fromherz, G. Springholz, W. Heiss, Johannes Kepler Univ. Linz . . . . . [6119-18]

4:30 pm: **Birefringence of yttrium vanadate single crystals in the middle wavelength infrared,** H. Luo, T. Tomasz, E. L. Dereniak, The Univ. of Arizona; R. E. Sampson, I Technology Applications . . . . . [6119-19]

4:50 pm: **Room temperature solid state photomultiplier,** K. R. Linga, E. E. Godik, J. Krutov, Amplification Technologies, Inc. . . . . [6119-20]

5:10 pm: **Metamorphic InGaP buffered In0.53Ga0.47As p-i-n photodetector grown on GaAs substrate for 10Gbit/s and beyond,** G. Lin, Y. Liao, H. Kuo, National Chiao Tung Univ. (Taiwan); M. Feng, Univ. of Illinois at Urbana-Champaign . . . . . [6119-21]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6120

Terahertz and Gigahertz Electronics and Photonics V

Conference Chairs: **R. Jennifer Hwu**, Innosys, Inc.; **Kurt J. Linden**, Spire Corp.

Program Committee: **Alexander G. Davies**, Univ. of Leeds (United Kingdom); **Edmund H. Linfield**, Univ. of Leeds (United Kingdom); **Shenggang Liu**, Univ. of Electronic Science and Technology of Chin (China); **John A. Murphy**, National Univ. of Ireland/Maynooth (Ireland)

Wednesday 25 January

SESSION 1

RM: Conv. Ctr. Room A1/A2 . . . . . Wed. 8:50 to 10:20 am

Terahertz and Gigahertz Sources

Chair: **R. Jennifer Hwu**, Innosys, Inc.

8:50 am: **A novel scheme for THz detection at room temperature** *(Invited Paper),* Y. J. Ding, Lehigh Univ. . . . . [6120-01]

9:20 am: **Generation of intense short pulses of THz radiation via coherent scattering in atomic and molecular gases,** N. G. Kalugin, Y. V. Rostovtsev, Texas A&M Univ.; M. O. Scully, Princeton Univ. and Texas A&M Univ. . [6120-02]

9:40 am: **Generation of multi-cycle THz pulses via optical rectification in periodically inverted GaAs,** Y. Lee, Oregon State Univ.; K. L. Vodopyanov, Stanford Univ.; W. C. Hurlbut, J. R. Danielson, Oregon State Univ.; V. G. Kozlov, Microtech Instruments, Inc.; D. F. Bliss, Air Force Research Lab.; M. M. Fejer, Stanford Univ. . . . . [6120-03]

10:00 am: **Photonic band gap structures for millimeter-wave TWTs,** A. G. Bailey, E. Smirnova, L. M. Earley, B. E. Carlsten, J. L. Maxwell, Los Alamos National Lab. . . . . [6120-04]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

RM: Conv. Ctr. Room A1/A2 . . . . . Wed. 10:50 am to 2:50 pm

Terahertz and Gigahertz Detection

Chair: **Kurt J. Linden**, Spire Corp.

10:50 am: **Amplitude and phase recovery using holographic imaging of antenna feeds,** R. J. Mahon, W. P. Lanigan, J. A. Murphy, National Univ. of Ireland/Maynooth (Ireland) . . . . . [6120-08]

11:10 am: **Tunable THz detector based on a grating gated field-effect transistor,** M. C. Wanke, E. A. Shaner, M. Lee, A. Grine, J. L. Reno, Sandia National Labs.; S. J. Allen, Jr., Univ. of California/Santa Barbara . . . . [6120-09]

Lunch/Exhibition Break . . . . . 11:30 am to 1:50 pm

1:50 pm: **Electro-optic modulator optimization for optically-based passive millimeter-wave detection,** C. A. Schuetz, C. Huang, R. Shireen, T. H. Hwang, G. J. Schneider, J. A. Murakowski, D. W. Prather, Univ. of Delaware . . [6120-10]

2:10 pm: **Phase-matched optical-to-terahertz conversion via excitation of a surface plasmon polariton,** M. I. Bakunov, Nizhny Novgorod State Univ. (Russia); A. V. Maslov, NASA Ames Research Ctr.; S. B. Bodrov, Nizhny Novgorod State Univ. . . . . [6120-11]

2:30 pm: **THz semiconductor hot electron bolometer,** V. N. Dobrovolsky, F. F. Sizov, Institute of Semiconductor Physics (Ukraine) . . . . . [6120-12]

Coffee Break . . . . . 2:50 to 3:30 pm

SESSION 3

RM: Conv. Ctr. Room A1/A2 . . . . . Wed. 3:30 to 5:10 pm

Terahertz Spectroscopy, Measurement and Applications

Chair: **R. Jennifer Hwu**, Innosys, Inc.

3:30 pm: **THz reflection spectroscopy of composition C-4 and its detection through interferometric imaging,** A. Sengupta, A. Bandyopadhyay, R. B. Barat, D. E. Gary, J. F. Federici, New Jersey Institute of Technology . . . . . [6120-13]

3:50 pm: **Characterization of hollow polycarbonated metal waveguides using Terahertz time domain spectroscopy,** A. Bandyopadhyay, A. Sengupta, J. F. Federici, New Jersey Institute of Technology; V. S. Johnson, J. A. Harrington, Rutgers Univ. . . . . [6120-14]

4:10 pm: **A tunable THz source for spectroscopy and imaging applications,** M. Mross, T. Lowell, M. F. Kimmitt, R. Durant, Vermont Photonics, Inc. [6120-15]

4:30 pm: **Teraherz generalized Mueller-matrix ellipsometry,** T. Hofmann, Univ. of Nebraska-Lincoln; U. Schade, BESSY GmbH (Germany); C. M. Herzinger, J. A. Woollam Co., Inc.; M. M. Schubert, Univ. of Nebraska-Lincoln . . [6120-16]

4:50 pm: **Candidate THz sources: the history and future (?) of velocity-modulated devices,** T. H. Lee, Stanford Univ. . . . . [6120-17]

Thursday 26 January

SESSION 4

RM: Conv. Ctr. Room A1/A2 . . . . . Thurs. 9:00 to 10:00 am

Analytical Methods and Modeling

Chair: **Anthony Murphy**, National Univ. of Ireland/Maynooth (Ireland)

9:00 am: **Analysis of standing waves in submillimeter-wave optics,** N. A. Trappe, T. J. Finn, A. Murphy, National Univ. of Ireland/Maynooth (Ireland); W. Jellema, SRON Nationaal Instituut voor Ruimteonderzoek (Netherlands); S. Withington, Univ. of Cambridge (United Kingdom) . . . . . [6120-18]

9:20 am: **Modeling of the optical performance of the QUaD telescope in MODAL,** M. L. Gradziel, C. M. O'Sullivan, J. A. Murphy, G. A. Cahill, National Univ. of Ireland/Maynooth (Ireland); C. Pryke, The Univ. of Chicago; W. K. Gear, Cardiff Univ. (United Kingdom); S. E. Church, Stanford Univ. . . . . [6120-19]

9:40 am: **Grain size dependent scattering studies of common materials using THz time domain techniques,** A. Bandyopadhyay, A. Sengupta, R. B. Barat, D. E. Gary, J. F. Federici, New Jersey Institute of Technology . . . . . [6120-20]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

RM: Conv. Ctr. Room A1/A2 . . . . . Thurs. 10:30 am to 4:50 pm

Terahertz and Gigahertz Activities in Europe

Chair: **Edmund H. Linfield**, Univ. of Leeds (United Kingdom)

10:30 am: **Terahertz pulsed imaging of breast tumors,** V. P. Wallace, A. J. Fitzgerald, E. Pickwell, TeraView Ltd. (United Kingdom); S. E. Pinder, A. Purushotham, Addenbrooke's Hospital (United Kingdom) . . . . . [6120-32]

10:50 am: **Novel applications of Gaussian beam mode analysis,** C. M. O'Sullivan, J. A. Murphy, G. A. Cahill, R. May, National Univ. of Ireland/ Maynooth (Ireland); S. Withington, Univ. of Cambridge (United Kingdom) . . . . . [6120-22]

11:10 am: **Can fundamental gain limitations of nanostructure THz lasers be overcome?,** L. D. Shvartsman, B. Laikhtman, The Hebrew Univ. of Jerusalem (Israel) . . . . . [6120-23]

11:30 am: **Determination of water content in petroleum products via terahertz transmission spectroscopy,** S. Gorenflo, I. Hinkov, U. Tauer, A. Lambrecht, Fraunhofer-Institut für Physikalische Messtechnik (Germany); B. Fischer, H. Helm, Albert-Ludwigs-Univ. Freiburg (Germany) . . . . . [6120-24]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

1:30 pm: **Analysis of Drugs-of-Abuse and Explosives Using Terahertz Time-Domain and Raman Spectroscopy,** A. Burnett, W. Fan, J. Cunningham, P. Upadhya, A. G. Davies, E. H. Linfield, R. Miles, Univ. of Leeds (United Kingdom); H. Edwards, T. Munshi, A. O'Neil, Univ. of Bradford (United Kingdom) [6120-25]

1:50 pm: **High power superlattice quantum cascade laser emitting at 2 THz,** C. Worrall, Univ. of Cambridge (United Kingdom); J. Alton, TeraView Ltd (United Kingdom); M. Houghton, O. Marshall, Univ. of Cambridge (United Kingdom); C. Sirtori, Univ. of Paris 7 (France); S. Barbieri, TeraView Ltd (United Kingdom); H. E. Beere, D. A. Ritchie, Univ. of Cambridge (United Kingdom) . . . . [6120-26]

2:10 pm: **Practical applications of terahertz imaging** *(Invited Paper),* D. D. Arnone, TeraView Ltd. (United Kingdom) . . . . . [6120-27]

2:40 pm: **Guided-wave THz devices for sensing the properties of overlaid dielectric films** *(Invited Paper),* J. Cunningham, Leeds Univ. (United Kingdom); C. Wood, C. K. Tiang, E. H. Linfield, I. C. Hunter, A. G. Davies, Univ. of Leeds (United Kingdom) . . . . . [6120-28]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Detecting the full polarisation state of terahertz transients** *(Invited Paper),* M. B. Johnston, E. Castro-Camus, J. Lloyd-Hughes, Univ. of Oxford (United Kingdom); M. D. Fraser, L. Fu, H. H. Tan, C. Jagadish, The Australian National Univ. (Australia) . . . . . [6120-29]

4:00 pm: **Terahertz scattering: comparison of a novel theoretical approach with experiment** *(Invited Paper),* G. P. Swift, J. R. Fletcher, J. A. Levitt, D. Dai, A. J. Gallant, D. M. Beggs, R. A. Abram, M. A. Kaliteevski, J. M. Chamberlain, Univ. of Durham (United Kingdom) . . . . . [6120-30]

4:30 pm: **TeraNova: a European integrated project on 'Novel terahertz sensing and imaging systems',** E. H. Linfield, A. G. Davies, J. M. Chamberlain, Univ. of Leeds (United Kingdom) . . . . . [6120-31]

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GaN Materials and Devices

Conference Chairs: **Cole W. Litton**, Air Force Research Lab.; **James G. Grote**, Air Force Research Lab.; **Hadis Morkoc**, Virginia Commonwealth Univ.; **Anupam Madhukar**, Univ. of Southern California

Program Committee: **Hiroshi Amano**, Meijo Univ. (Japan); **John C. Carrano**, DARPA; **W. J. Choyke**, Univ. of Pittsburgh; **Robert Davis**, Carnegie Mellon Univ.; **Steven P. DenBaars**, Univ. of California/Santa Barbara; **Russell D. Dupuis**, Georgia Institute of Technology; **Asif M. Khan**, Univ. of South Carolina; **Subhash Mahajan**, Arizona State Univ.; **Richard Molnar**, Massachusetts Institute of Technology; **Bo Monemar**, Univ. Linkoeping (Sweden); **Theodore D. Moustakas**, Boston Univ.; **Shuji Nakamura**, Univ. of California/Santa Barbara; **Yoon-Soo Park**, Seoul National Univ. (South Korea); **Fernando A. Ponce**, Arizona State Univ.; **Shiro Sakai**, The Univ. of Tokushima (Japan); **Leo J. Schowalter**, Crystal IS, Inc.; **Zlatko Sitar**, North Carolina State Univ.; **James S. Speck**, Univ. of California/Santa Barbara; **Todd D. Steiner**, Air Force Office of Scientific Research; **Randy E. Treece**, Astralux, Inc.; **Gerald L. Witt**, Air Force Office of Scientific Research; **Colin Wood**, Office of Naval Research; **Sadafumi Yoshida**, Saitama Univ. (Japan); **John M. Zavada**, U.S. Army Research Office; **John C. Zolper**, DARPA

Monday 23 January

SPECIAL SESSION HONORING

RM: Conv. Ctr. Room E . . . . . Mon. 10:00 am to 12:00 pm

Dr. Gerald L. Witt Air Force Research Lab., Office of Scientific Research, Directorate of Physics and Electronics

Air Force Office of Scientific Research Fellow, Dr. Gerald L. Witt is being honored after 26 years of exemplary service with AFOSR. He has been a long time sponsor of Nitride Semiconductor Materials and Device Research programs. He also directed programs that led to the discovery of low temperature gallium arsenide material and its transition into powerful, high frequency transistors. His direction of other Air Force programs led to the early development of monolithic millimeter wave integrated circuits; and to the concept of building transistors from dissimilar materials which rapidly transitioned to industrial production and use in MILSTAR systems.

He has organized and chaired numerous national and international professional scientific conferences that have produced trendsetting ideas for industrial development of novel electron devices for critical Air Force applications. Under his leadership, the Joint Services Electronics Program has earned national recognition and served as a model in creating the DoD University Research Initiatives program. His contributions to National Research Council and National Academy of Science Studies resulted in Congressional and National Science Foundation policy recommendations.

Dr. Witt managed the redirection of AFOSR's international programs culminating in the establishment of AFOSR's Asian Office of Aerospace Research and Development (AOARD).

Included in this special 1/2 day morning session will be invited presentations honoring Dr. Witt.

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 2

RM: Conv. Ctr. Room E . . . . . Mon. 1:30 to 5:20 pm

Growth and Characterization I

1:30 pm: **Effects of growth interruption time on InGaN/GaN quantum dots size grown by metal organic chemical vapor deposition** *(Invited Paper),* H. H. Yao, G. S. Huang, T. C. Lu, H. Kuo, S. C. Wang, National Chiao Tung Univ. (Taiwan) . . . . . [6121-01]

2:00 pm: **Growth of GaN on patterned GaN/sapphire substrates with various metallic masks by high pressure solution method** *(Invited Paper),* M. S. Bockowski, Instytut Wysokich Cisnien (Poland) . . . . . [6121-02]

2:30 pm: **Investigation the strain distribution of GaN/AlN Wurtzite crystal structure material self-organized truncated pyramid shaped quantum dot** *(Invited Paper),* Y. Liu, Z. Yu, Beijing Univ. of Posts and Telecommunications (China) . . . . . [6121-03]

3:00 pm: **Quantum-structure dependent excitonic carrier dynamics of In_xGa_{1-x}N/GaN multiquantum-wells** *(Invited Paper),* S. Hong, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) and Pohang Univ. of Science and Technology (South Korea); Y. S. Kim, J. W. Kim, G. H. Lee, Y. J. Yoon, D. Kim, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea); T. Joo, Pohang Univ. of Science and Technology (South Korea) [6121-04]

Coffee Break . . . . . 3:30 to 3:50 pm

3:50 pm: **Microscopic emission properties of nonpolar a-plane GaN grown by HVPE: effect of different buffers** *(Invited Paper),* T. Paskova, Univ. Bremen (Germany); P. P. Paskov, B. Monemar, Linköpings Univ. (Sweden); S. Figge, D. Hommel, Univ. Bremen (Germany) . . . . . [6121-05]

4:20 pm: **Crystallization of GaN by HVPE on pressure grown seeds** *(Invited Paper),* I. Grzegory, Instytut Wysokich Cisnien (Poland) . . . . . [6121-07]

4:50 pm: **Non-polar GaN substrates and GaN/AlGaN quantum structures** *(Invited Paper),* S. A. Porowski, Instytut Wysokich Cisnien (Poland) . . [6121-08]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 3

RM: Conv. Ctr. Room E . . . . . Tues. 10:20 am to 5:30 pm

Growth and Characterization II

10:20 am: **Growth and characterization of AlInN/GaInN quantum wells for high-speed intersubband devices at telecommunication wavelengths** *(Invited Paper),* C. Skierbiszewski, Instytut Wysokich Cisnien (Poland) and TopGaN Ltd. (Poland); G. Cywinski, Instytut Wysokich Cisnien (Poland); M. Siekacz, A. Feduniewicz, TopGaN Ltd. (Poland); L. Nevou, L. Doyennette, F. H. Julien, Univ. Paris-Sud II (France); M. Krysko, TopGaN Ltd. (Poland); I. Grzegory, J. Z. Domagala, Instytut Wysokich Cisnien (Poland); J. Smalc, Politechnika Warszawska (Poland); T. Remmele, M. Albrecht, Institut für Kristallzüchtung (Germany); S. A. Porowski, Instytut Wysokich Cisnien (Poland) . . . . . [6121-09]

10:50 am: **Cathodoluminescence study of GaN and GaN:Si on sapphire,** N. Pauc, D. Drouin, V. Aimez, Univ. de Sherbrooke (Canada); M. R. Phillips, Univ. of Technology/Sydney (Australia) . . . . . [6121-10]

11:10 am: **Characterization of GaN epitaxial films grown on SiN and TiN porous network templates** *(Invited Paper),* J. Xie, Y. Fu, U. Ozgur, Y. Moon, F. Yun, H. Morkoc, Virginia Commonwealth Univ.; H. O. Everitt, Duke Univ.; A. Sagar, R. M. Feenstra, Carnegie Mellon Univ.; T. Kuan, C. K. Inoki, SUNY/ Univ. at Albany; L. Zhou, D. J. Smith, Arizona State Univ. . . . . [6121-11]

11:40 am: **Optical and structural characterization of wurtzite $Al_{0.8}In_{0.2}N$ grown by low temperature magnetron sputter epitaxy** *(Invited Paper),* T. Seppänen, J. Birch, L. Hultman, Linköpings Univ. (Sweden) . . . . . [6121-12]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

1:30 pm: **Growth and characterization of algan/GaN epitaxial layers by MOCVD on 6H-SIC substrates for RF device applications** *(Invited Paper),* A. K. Sood, Y. R. Puri, Magnolia Optical Technologies, Inc.; F. W. Clarke, U.S. Army Space and Missile Defense Command; O. Laboutin, R. Wesler, P. DeLuca, Kopin Corp.; J. C. Hwang, Lehigh Univ. . . . . [6121-13]

2:00 pm: **Impact of spontaneous polarization on surface spatial profiles of defects in GaN** *(Invited Paper),* D. K. Johnstone, SEMETROL; S. Akarca Biyikli, F. Yun, Y. Fu, H. Morkoc, Virginia Commonwealth Univ. . . . . [6121-14]

2:30 pm: **Synthesis of nanoporous GaN crystalline particles by chemical vapor deposition,** J. Carvajal, N. Gomez, J. Bai, M. Dudley, J. C. Rojo, Stony Brook Univ. . . . . [6121-15]

2:50 pm: **Polarization management techniques for enhanced vertical and lateral transport in III-Nitride superlattices** *(Invited Paper),* M. Z. Kauser, Univ. of Minnesota; A. Osinsky, B. Hertog, A. M. Dabiran, P. P. Chow, SVT Associates, Inc. . . . . [6121-16]

Coffee Break . . . . . 3:20 to 3:40 pm

3:40 pm: **Synthesis of erbium doped gallium nitride crystals by the ammonothermal technique,** B. T. Adekore, North Carolina State Univ.; K. Rakes, Air Force Research Lab.; B. Wang, Solid State Scientific Corp.; M. J. Callahan, Air Force Research Lab.; Z. Sitar, North Carolina State Univ. . . . . [6121-17]

4:00 pm: **Studies of electron trapping in III-nitride semiconductors** *(Invited Paper),* L. Chernyak, O. Lopatiuk, Univ. of Central Florida; A. Osinsky, SVT Associates, Inc. . . . . [6121-18]

4:30 pm: **Direction-dependent homo-epitaxial growth of GaN nanowires** *(Invited Paper),* M. K. Sunkara, H. Li, Univ. of Louisville . . . . . [6121-19]

5:00 pm: **AFM and C-AFM studies of MBE GaN films** *(Invited Paper),* K. A. Cooper, J. Xie, Y. Moon, A. A. Baski, H. Morkoc, Virginia Commonwealth Univ. . . . . [6121-20]

Wednesday 25 January

SESSION 4

RM: Conv. Ctr. Room E . . . . . Wed. 8:30 to 10:00 am

Growth and Characterization III

8:30 am: **Development of very low dislocation density AlN substrates for device applications** *(Invited Paper),* L. J. Schowalter, K. Morgan, W. Liu, Crystal IS, Inc. . . . . [6121-21]

9:00 am: **Exploration of the growth and suitability of nitride-base semiconductors for ferromagnetic semiconductor spintronics** *(Invited Paper),* M. H. Kane, W. E. Fenwick, M. Strassburg, A. Asghar, N. Li, I. T. Ferguson, Georgia Institute of Technology . . . . . [6121-22]

9:30 am: **TEM studies of laterally overgrown GaN layers grown in polar and non-polar directions** *(Invited Paper),* Z. Liliental-Weber, D. Zakharov, Lawrence Berkeley National Lab. . . . . [6121-23]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

RM: Conv. Ctr. Room E . . . . . Wed. 10:30 am to 3:00 pm

Devices

10:30 am: **Hydrostatic pressure - a unique tool in studies of quantum structures and light emitting devices based on group-III nitrides** *(Invited Paper),* T. Suski, Instytut Wysokich Cisnien (Poland) . . . . . [6121-24]

11:00 am: **Etched facet technology for GaN and blue lasers** *(Invited Paper),* A. Behfar, A. J. Morrow, A. Schremer, C. Stagarescu, BinOptics Corp. [6121-25]

11:30 am: **Recovery of GaN surface after reactive ion etching** *(Invited Paper),* Q. Fan, S. Chevtchenko, X. Ni, S. Cho, H. Morko, Virginia Commonwealth Univ. . . . . [6121-26]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

1:30 pm: **Solar-blind AlGaN 256x256 p-i-n detectors and focal plane arrays** *(Invited Paper),* M. B. Reine, BAE Systems . . . . . [6121-27]

2:00 pm: **Ferroelectric PZT/AlGaN/GaN field effect transistors** *(Invited Paper),* Y. Kang, H. Morkoc, Virginia Commonwealth Univ. . . . [6121-28]

2:30 pm: **Deep UV AlGaN light emitting diodes grown by gas source molecular beam epitaxy on sapphire and AlGaN/sapphire substrates.** *(Invited Paper),* S. Nikishin, B. Borisov, V. Kuryatkov, Texas Tech Univ.; A. S. Usikov, V. A. Dmitriev, Technologies and Devices International, Inc.; M. Holtz, Texas Tech Univ. . . . . [6121-29]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Investigation of band gaps and bowing parameters for zincblende III-nitride ternary alloys,** B. Liou, Hsiuping Institute of Technology (Taiwan); S. H. Yen, Y. K. Kuo, National Changhua Univ. of Education (Taiwan) [6121-30]

✔ **Studies of spin polarized carrier injection into GaN-based heterostructures,** V. Avrutin, Ü. Özgür, J. Xie, S. Cho, Y. Fu, H. Morko, Virginia Commonwealth Univ.; V. Litvinov, Waveband Corp. . . . . [6121-31]

✔ **High-reflectivity and thermal-stability Cr-base reflectors and n-type Ohmic contact for GaN-based flip-chip light-emitting diodes,** K. Hsueh, K. Chiang, National Central Univ. (Taiwan); C. J. Wang, LEDARTS OPTO Corp. (Taiwan); Y. Hsin, National Central Univ. . . . . [6121-32]

✔ **Temperature dependent cross-relaxation of blue emission from Tm doped AlN epilayers,** W. M. Jadwisienczak, H. J. Lozykowski, Ohio Univ.; A. Anders, Lawrence Berkeley National Lab. . . . . [6121-33]

✔ **Applications of transparent Al-doped ZnO contact on GaN-based power LED,** C. Tun, National Central Univ. (Taiwan); J. Sheu, National Cheng Kung Univ. (Taiwan); B. Pong, National Central Univ. (Taiwan); M. Lee, National Cheng Kung Univ. (Taiwan); M. Lee, C. Hsieh, C. Hu, G. Chi, National Central Univ. (Taiwan) . . . . . [6121-34]

✔ **Increase of output power and lifetime by improving the heat dissipation of GaN-based laser diodes,** J. Chae, H. Ryu, K. Kim, K. Ha, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6121-35]

✔ **Gallium Nitride (GaN) based MODFET Devices for Power Electronics,** H. F. Huq, The Univ. of Tennessee . . . . . [6121-36]

Sunday 22 January 2006 • Proceedings of SPIE Vol. 6122

Zinc Oxide Materials and Devices

Conference Chairs: **Ferechteh Hosseini Teherani**, Nanovation (France); **Cole W. Litton**, Air Force Research Lab.

Sunday 22 January

INTRODUCTION

RM: Marriott: San Jose Ballroom Salon I . . . . . Sun. 8:10 am

Chair: **Ferechteh Hosseini Teherani**, Nanovation (France)

SESSION 1

RM: Marriott: San Jose Ballroom Salon I . . . . Sun. 8:20 to 8:50 am

Optical Properties

Chair: **Ferechteh Hosseini Teherani**, Nanovation (France)

8:20 am: **On the identifications of impurities and point defects in ZnO** *(Invited Paper),* D. C. Look, B. Claflin, G. C. Farlow, Wright State Univ. [6122-01]

SESSION 2

RM: Marriott: San Jose Ballroom Salon I . . . Sun. 8:50 to 10:10 am

ZnO Doping

Chairs: **Seong-Ju Park**, Gwangju Institute of Science and Technology (South Korea); **Takayuki Makino**, The Institute of Physical and Chemical Research - RIKEN (Japan)

8:50 am: **Effect of Al diffusion and thermal annealing on the electrical properties of ZnO Films grown on sapphire substrate** *(Invited Paper),* J. Mimmila-Arroyo, J. Rommeluère, F. Jomard, Y. Marfaing, P. Galtier, Univ. de Versailles Saint-Quentin-en Yvelines (France) . . . . . [6122-09]

9:10 am: **Optical properties of undoped and Al-, Ga- and In-doped ZnO thin films,** L. Hsu, V. Mani, National Changhua Univ. of Education (Taiwan) [6122-10]

9:30 am: **Optical properties of phosphor ion implanted ZnO,** B. Pong, B. Chou, C. Pan, G. Chi, National Central Univ. (Taiwan) . . . . . [6122-11]

9:50 am: **Growth and scintillation properties of ZnO and In:ZnO single crystals as ultrafast semiconducting scintillators** *(Invited Paper),* A. Yoshikawa, Y. Kagamitani, D. Ehrentraut, Tohoku Univ. (Japan); M. Nikl, Instytut Fizyki (Czech Republic); T. Fukuda, Tohoku Univ. (Japan) . . . . [6122-12]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 3

RM: Marriott Hotel: San Jose Ballroom Salon I . . Sun. 10:30 am to 12:20 pm

ZnO Nano-Devices

Chairs: **Manijeh Razeghi**, Northwestern Univ.; **Hock Chun Ong**, The Chinese Univ. of Hong Kong (Hong Kong China)

10:30 am: **ZnO photonic crystal lasers,** X. Wu, A. Yamilov, X. Liu, S. Li, V. P. Dravid, R. P. H. Chang, H. Cao, Northwestern Univ. . . . . [6122-20]

10:50 am: **ZnO nanorods for electronic device applications** *(Invited Paper),* G. Yi, National CRI Center for Semiconductor Nanorods and Department of Materials Science and Engineering, (South Korea) . . . . . [6122-21]

11:10 am: **Innovative optical gas sensor based on photoluminescence quenching of ZnO nanowires,** C. Baratto, M. Picinelli, E. Comini, G. Faglia, G. Sberveglieri, C.N.R. - INFM & Univ. degli Studi di Brescia (Italy) . . . [6122-22]

11:30 am: **Fabrication, characterization and growth mechanism of ZnO nanostructures synthesized by thermal oxidation reaction,** J. Delaunay, N. Kakoiyama, I. Yamada, The Univ. of Tokyo (Japan) . . . . . [6122-23]

11:50 am: **Light emission and charge transport studies on ZnO heterostructures** *(Invited Paper),* H. C. Ong, W. H. Nei, J. An, R. Wang, J. B. Xu, J. Y. Dai, The Chinese Univ. of Hong Kong (Hong Kong China) . . . . . [6122-19]

Lunch Break . . . . . 12:20 to 1:30 pm

SESSION 4

RM: Marriott Hotel: San Jose Ballroom Salon ISun. 1:30 to 2:40 pm

Spintronics and Ferroelectric

Chairs: **Jagdish Narayan**, North Carolina State Univ.; **Masashi Kawasaki**, Tohoku Univ. (Japan)

1:30 pm: **Zinc oxide based materials for Spintronics** *(Invited Paper),* S. Ramachandran, J. Narayan, North Carolina State Univ. . . . . [6122-13]

2:00 pm: **Optical and magneto-optical studies of ZnO doped with transition metals,** V. Avrutin, Ü. Özgür, H. Lee, B. Xiao, C. Liu, H. Morkoc, Virginia Commonwealth Univ.; A. El-Shaer, A. Che Mofor, A. S. Bakin, A. Waag, Technische Univ. Braunschweig (Germany); N. Izyumskaya, W. Schoch, Univ. Ulm (Germany); S. Sorokin, S. V. Ivanov, A.F. Ioffe Physico-Technical Institute (Russia) . . . . . [6122-14]

2:20 pm: **To be announced** *(Invited Paper),* M. Lorenz, Univ. Leipzig (Germany) . . . . . [6122-33]

SESSION 5

RM: Marriott: San Jose Ballroom Salon I . . . Sun. 2:40 to 3:40 pm

Growth and Processing

Chairs: **Naoki Ohashi**, Consultant (Japan); **Pierre Galtier**, Univ. de Versailles Saint-Quentin-en Yvelines (France)

2:40 pm: **Advances in ZnO Etching** *(Invited Paper),* K. J. Nordheden, The Univ. of Kansas . . . . . [6122-16]

3:00 pm: **Green-light emission of ZnO nanoparticles spontaneously precipitated in fluorinated polyimide films,** A. Somwangthanaroj, Chulalongkorn Univ. (Thailand); A. Matsumura, S. Ando, Tokyo Institute of Technology (Japan) . . . . . [6122-17]

3:20 pm: **Defects in zinc oxide,** N. Ohashi, T. Ishigaki, National Institute for Materials Science (Japan); T. Ohgaki, Tokyo Univ. of Science (Japan); S. Isao, T. Sekiguchi, H. Haneda, National Institute for Materials Science (Japan) . . . . . [6122-32]

Coffee Break . . . . . 3:40 to 4:00 pm

SESSION 6

RM: Marriott: San Jose Ballroom Salon I . . . Sun. 4:00 to 5:50 pm

ZnO P-Type Doping

Chairs: **David C. Look**, Wright State Univ.; **David Rogers**, Nanovation (France) and Univ. Technologique de Tryes (France)

4:00 pm: **Progress of ZnO devices** *(Invited Paper),* Y. Ryu, T. S. Lee, J. A. Lubguban, MOXtronics, Inc.; H. W. White, Univ. of Missouri/Columbia; Y. Park, Seoul National Univ. (South Korea); C. J. Yoon, Chonbuk National Univ. (South Korea) . . . . . [6122-02]

4:30 pm: **P-type ZnO by Sb doping for PN-junction photodetectors,** J. Liu, F. Xiu, L. J. Mandalapu, Z. Yang, Univ. of California/Riverside . . . . . [6122-03]

4:50 pm: **Optical and electrical properties of n- and p-type doped ZnO thin films** *(Invited Paper),* T. Makino, Univ. of Hyogo (Japan) . . . . . [6122-04]

5:20 pm: **ZnO light-emitting diode using phosphorus doped p-type ZnO** *(Invited Paper),* S. Park, Gwangju Institute of Science and Technology (South Korea) . . . . . [6122-28]

Coffee Break . . . . . 5:50 to 6:10 pm

SESSION 7
RM: Marriott: San Jose Ballroom Salon I . . . Sun. 6:10 to 8:40 pm

ZnO LED Devices

Chairs: **Cole W. Litton**, Air Force Research Lab.;
Ferechteh Hosseini Teherani, Nanovation (France)

6:10 pm: **ZnCdO/AlGaN heterostructures for application as UV and visible light emitters** *(Invited Paper),* A. Osinsky, J. Dong, J. Xie, B. Hertog, M. Z. Kauser, A. M. Dabiran, P. P. Chow, SVT Associates, Inc.; W. V. Schoenfeld, L. Chernyak, College of Optics and Photonics/Univ. of Central Florida; S. J. Pearton, Univ. of Florida; D. C. Look, Wright State Univ.; M. D. Gerhold, U.S. Army Research Office . . . . . [6122-05]

6:40 pm: **ZnO LED** *(Invited Paper),* M. Kawasaki, Tohoku Univ. (Japan) [6122-06]

7:10 pm: **ZnO based light emitting diodes growth and fabrication** *(Invited Paper),* M. Pan, R. Rondon, J. Cloud, V. Rengarajan, W. Nemeth, A. Valencia, J. Gomez, J. Nause, Cermet, Inc. . . . . [6122-07]

7:40 pm: **Two different features of ZnO: transparent ZnO:Ga electrodes for InGaN-LEDs and homoepitaxial ZnO films for UV-LEDs** *(Invited Paper),* K. Nakahara, K. Tamura, H. Yuji, S. Akasaka, ROHM Co., Ltd. (Japan); S. Niki, National Institute of Advanced Industrial Science and Technology (Japan); A. Tsukasaki, A. Ohtomo, M. Kawasaki, Tohoku Univ. (Japan) . . . . . [6122-30]

8:10 pm: **Development of UV LEDs based on epitaxial ZnO grown by pulsed laser deposition** *(Invited Paper),* D. Rogers, Nanovation (France) and Univ. Technologique de Tryes (France); F. Hosseini Teherani, Nanovation (France); K. Mayes, R. P. McClintock, A. Yasan, P. Kung, M. Razeghi, Northwestern Univ. . . . . [6122-08]

RM: Marriott: San Jose Ballroom Salon I . . . . . Sun. 8:40 pm

Closing Remarks

Chair: **Cole W. Litton**, Air Force Research Lab.

Wednesday 25 January

✔ Posters-Wednesday

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✔ **Room temperature ferromagnetism in MOCVD grown ZnO thin films,** V. Rengarajan, Cermet, Inc; M. H. Kane, N. Li, Georgia Institute of Technology; M. Pan, Cermet, Inc.; I. T. Ferguson, Georgia Institute of Technology; J. Nause, Cermet, Inc . . . . . [6122-15]

✔ **Physical vapor transport crystal growth of ZnO,** J. C. Rojo, S. Taraphdar, G. Dhanaraj, H. Chen, J. Bai, M. Dudley, Stony Brook Univ. . . . . [6122-18]

✔ **Synthesis and characterization of (Zn,Mg)O:P/ZnO heterostructures for light emitting applications,** Y. Li, H. Yang, J. G. M. Erie, H. Kim, S. J. Pearton, D. P. Norton, F. Ren, Univ. of Florida . . . . . [6122-24]

✔ **Strong green luminescence in P+-implanted ZnMnO thin films,** S. Lee, H. S. Lee, S. J. Hwang, D. N. Kim, Dongguk Univ. (South Korea); D. Y. Kim, Dongguk Univ. . . . . [6122-25]

✔ **Rare Earth doped bulk ZnO,** W. Nemeth, J. Nause, J. Cloud, N. Spencer, Cermet, Inc. . . . . [6122-26]

✔ **Metal organic chemical vapor deposition of zinc oxide,** W. E. Fenwick, Georgia Institute of Technology; M. Pan, Cermet, Inc.; J. Song, N. Li, S. Gupta, H. Kang, A. Asghar, M. Strassburg, Georgia Institute of Technology; N. Dietz, Georgia State Univ.; I. T. Ferguson, Georgia Institute of Technology . . . . . [6122-27]

✔ **Optical modes in ZnO nanoresonators,** T. Nobis, A. Rahm, M. Lorenz, M. Grundmann, Univ. Leipzig (Germany) . . . . . [6122-29]

✔ **Exchange polarization coupling in wurtzite-perovskite,** M. M. Schubert, Univ. of Nebraska-Lincoln; N. Ashkenov, H. Wenkstern, H. Hochmuth, M. Lorenz, M. Grundmann, Univ. Leipzig (Germany) . . . . . [6122-31]

Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6123

Integrated Optics: Devices, Materials, and Technologies X

Conference Chairs: **Yakov Sidorin**, Photineer Technology Group; **Christoph A. Waechter**, Fraunhofer-Institut für Optik und Feinmechanik (Germany)

Program Committee: **Trevor M. Benson**, The Univ. of Nottingham (United Kingdom); **Jean-Emmanuel Broquin**, ENSERG (France); **Christoph M. Greiner**, LightSmyth Technologies, Inc.; **Helmut Heidrich**, Fraunhofer Institut für Nachrichtentechnik, Heinrich-Hertz-Institut (Germany); **Pierre Lemaitre-Auger**, ESISAR (France); **Reinhard März**, Infineon Technologies AG (Germany); **Ronald Miles**, Silicon Light Machines; **Robert L. Nelson**, Air Force Research Lab.; **Gualtiero Nunzi-Conti**, Istituto di Fisica Applicata Nello Carrara (Italy)

Monday 23 January

SESSION 1

RM: Marriott: San Jose Ballroom Salon II . Mon. 8:30 to 10:10 am

Materials, Tests, and Characterization

Chair: **Yakov Sidorin**, Photineer Technology Group

8:30 am: **Patterned UV-curable high refractive index coatings,** R. V. Morford, C. Planje, D. Holmes, W. Shih, J. Dachsteiner, K. Marler, Brewer Science, Inc. . . . . [6123-01]

8:50 am: **Elaboration of polymer-based materials and waveguides doped with erbium complexes for amplification at 1.55 μm: a multifunctional approach,** A. Q. Le Quang, I. N. Ledoux-Rak, J. Zyss, École Normale Supérieure de Cachan (France); E. Besson, C. Reye, R. Corriu, Univ. Montpellier II (France) . . . . . [6123-03]

9:10 am: **Novel nonlinear electro-optic composite materials,** B. Birchfield, Univ. of Dayton; R. L. Nelson, Air Force Research Lab.; J. W. Haus, Univ. of Dayton . . . . . [6123-04]

9:30 am: **Fast amplitude and delay measurement for characterization of integrated optic devices,** C. K. Madsen, M. Thompson, W. Rivera, H. Zhu, M. Solmaz, D. Adams, Texas A&M Univ. . . . . [6123-05]

9:50 am: **Polymeric integrated nonlinear optical devices,** R. L. Nelson, Air Force Research Lab.; J. W. Haus, B. Birchfield, Univ. of Dayton . . . . . [6123-06]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Marriott: San Jose Ballroom Salon II . Mon. 10:30 am to 12:20 pm

Modelling

Chair: **Christoph A. Waechter**, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

10:30 am: **Emerging Trends in Photonics Modeling** *(Invited Paper),* J. F. Pond, Lumerical Solutions, Inc (Canada); T. Kleckner, P. Paddon, A. Reid, Lumerical Solutions, Inc. (Canada) . . . . . [6123-07]

11:00 am: **Plasmon-enhanced absorption and transmission in spherical Bragg resonators,** M. Deutsch, K. Hasegawa, C. Rohde, Univ. of Oregon . . . . . [6123-08]

11:20 am: **Subwavelength plasmonic waveguide structures based on slots in thin metal films,** G. Veronis, S. Fan, Stanford Univ. . . . . [6123-09]

11:40 am: **Resonant leaky mode silicon-on-insulator photonic devices,** R. Magnusson, Univ. of Connecticut . . . . . [6123-10]

12:00 pm: **The modeling of MMI devices,** L. W. Cahill, La Trobe Univ. (Australia) . . . . . [6123-11]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 3

RM: Marriott: San Jose Ballroom Salon II . . Mon. 1:40 to 3:10 pm

IO Sensors and Modulators

Chair: **Gualtiero Nunzi-Conti**, Istituto di Fisica Applicata Nello Carrara (Italy)

1:40 pm: **Bimetallic silver-gold film waveguide surface plasmon resonance sensor,** B. H. Ong, X. Yuan, S. C. Tjin, Nanyang Technological Univ. (Singapore) . . . . . [6123-12]

2:00 pm: **Some new trends on LINBO3 modulators** *(Invited Paper),* N. Courjal, M. Bernal, Univ. de Franche-Comté (France); H. Porte, Photline Technologies (France) . . . . . [6123-13]

2:30 pm: **Novel optical-waveguide sensing platform based on grating coupler,** S. Grego, S. Naskar, A. M. Patel, B. R. Stoner, RTI International . . . . . [6123-14]

2:50 pm: **Novel integrated polarization analyzer sensor made by ion-exchange in glass,** K. Djerroud, Institut National Polytechnique de Grenoble (France); P. Lemaitre-Auger, École Supérieure d'Ingénieurs en Systèmes Industriels Avancés Rhône-Alpes (France); P. Benech, P. Benech, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France) . . . . . [6123-15]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

RM: Marriott: San Jose Ballroom Salon II . . Mon. 3:30 to 5:10 pm

WG Engineering I

Chair: **Jean-Emmanuel Broquin**, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France)

3:30 pm: **Novel glass-based devices for photonic integrated circuits,** D. Zhang, W. Pan, Y. Zhang, The Univ. of Nottingham (United Kingdom); A. Loni, The Univ. of Nottingham (United Kingdom) and pSiMedica (United Kingdom); P. Sewell, T. M. Benson, C. A. Miller, D. Furniss, A. B. Seddon, The Univ. of Nottingham (United Kingdom) . . . . . [6123-16]

3:50 pm: **UV imprinting of waveguides on active silica-germania sputtered thin film,** S. Sebastiani, S. Berneschi, M. Brenci, Istituto di Fisica Applicata Nello Carrara (Italy); A. Chiasera, M. Ferrari, Institute of Photonics and Nanotechnologies (Italy); G. Nunzi-Conti, S. Pelli, Istituto di Fisica Applicata Nello Carrara (Italy); C. Tosello, Univ. of Trento (Italy); G. C. Righini, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [6123-17]

4:10 pm: **Thick hybrid silica-zirconia sol-gel film for single-step fabrication of channel waveguide,** M. He, J. Bu, X. Yuan, Nanyang Technological Univ. (Singapore) . . . . . [6123-18]

4:30 pm: **Polymer photonic integrated circuits by DUV-induced modification,** D. G. Rabus, Forschungszentrum Karlsruhe (Germany) and Univ. of California/Santa Cruz; P. Henzi, M. Bruendel, H. Hein, Y. Ichihashi, T. Rogge, A. Welle, Forschungszentrum Karlsruhe (Germany) . . . . . [6123-19]

4:50 pm: **Highly stable and low loss electro-optic polymer waveguides for high speed modulators using photodefinition technique,** M. Balakrishnan, M. Diemeer, A. Driessen, M. Faccini, W. Verboom, D. Reinhoudt, Univ. of Twente (Netherlands); A. Leinse, LioniX, BV (Netherlands) . . . . . [6123-20]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5
RM: Marriott: San Jose Ballroom Salon II . Tues. 10:30 am to 12:10 pm

Novel Devices and Applications I

Chair: **Ronald Miles**, Silicon Light Machines

10:30 am: **InP-based 1.55 μm waveguide-integrated photodetectors for high-speed applications** *(Invited Paper),* A. Beling, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz Institut (Germany) . . . . . [6123-21]

11:00 am: **Infrared single-mode hollow conductive waveguides for stellar interferometry,** P. R. Labeye, CEA-LETI (France); J. Broquin, IMEP (France); L. Labadie, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); P. Noel, CEA-LETI (France); P. Saguet, IMEP (France); P. Y. Kern, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); C. Ruilier, Alcatel Alenia Space (France) . . . . . [6123-22]

11:20 am: **Manipulation of microparticles with integrated optics** *(Invited Paper),* O. G. Hellesø, K. Grujic, Univ. of Tromsø (Norway); J. P. Hole, Univ. of Southampton (United Kingdom); H. Jaising, Univ. of Tromsø (Norway); J. Wilkinson, Univ. of Southampton (United Kingdom) . . . . . [6123-23]

11:50 am: **Enhanced second-harmonic generation in a lithium niobate photonic crystal waveguide,** C. Deng, J. W. Haus, A. M. Sarangan, A. Mahfoud, Univ. of Dayton; M. Scalora, U.S. Army Aviation and Missile Command; C. Sibilia, Univ. degli Studi di Roma/La Sapienza (Italy); A. Zheltikov, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6123-24]

Lunch/Exhibition Break . . . . . 12:10 to 1:20 pm

SESSION 6
RM: Marriott: San Jose Ballroom Salon II . . Tues. 1:20 to 3:10 pm

Grating-Based Devices

Chair: **Christoph M. Greiner**, LightSmyth Technologies, Inc.

1:20 pm: **Cascaded planar reflective gratings,** S. Bidnyk, M. R. Pearson, A. Balakrishnan, M. Gao, Enablence Inc. (Canada) . . . . . [6123-25]

1:40 pm: **Multilayer integrated nano-optical devices** *(Invited Paper),* J. J. Wang, X. Deng, P. Sciortino, Jr., X. Liu, NanoOpto Corp. . . . . [6123-26]

2:10 pm: **Integration of encoder/decoder for avionic OCDMA by holographic Bragg reflectors,** Y. Huang, V. Baby, I. Glesk, P. R. Prucnal, Princeton Univ.; C. M. Greiner, D. Iazikov, T. W. Mossberg, LightSmyth Technologies, Inc. . . . . [6123-27]

2:30 pm: **Compact coding devices using the novel anti-symmetric gratings,** J. M. Castro, D. F. Geraghty, S. Honkanen, The Univ. of Arizona; C. M. Greiner, D. Iazikov, T. W. Mossberg, LightSmyth Technologies, Inc. . . . . [6123-28]

2:50 pm: **Annular Bragg resonators (ABR) - the ideal tool for biochemical sensing, nonlinear optics and cavity QED,** J. Scheuer, California Institute of Technology . . . . . [6123-29]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 7
RM: Marriott: San Jose Ballroom Salon II . . Tues. 3:30 to 5:20 pm

WG Engineering II

Chair: **Pierre Lemaitre-Auger**, École Supérieure d'Ingénieurs en Systèmes Industriels Avancés Rhôme-Alpes (France)

3:30 pm: **Study of a pump/signal multiplexer based on a segmented asymmetric Y junction by Silver/Sodium ion exchange on glass,** D. Bucci, J. Grelin, E. Ghibaudo, J. Broquin, Ecole Nationale Superieure d'Electronique et de Radioélectricité de Grenoble (France) . . . . . [6123-30]

3:50 pm: **Femtosecond micromachining of waveguides in a Faraday material,** T. Shih, R. R. Gattass, E. Mazur, Harvard Univ. . . . . [6123-31]

4:10 pm: **Active and passive integrated optical devices written in glasses with femtosecond laser systems** *(Invited Paper),* R. Osellame, N. Chiodo, G. Della Valle, S. Taccheo, G. Cerullo, R. Ramponi, P. Laporta, Politecnico di Milano (Italy); A. W. Killi, TRUMPF Laser GmbH & Co. KG (Germany); U. Morgner, Univ. of Hannover (Germany) . . . . . [6123-32]

4:40 pm: **Fabrication of multifunctional optical waveguides by capillary-electrophoresis doping technique,** T. Yano, J. Taguchi, H. Segawa, S. Shibata, Tokyo Institute of Technology (Japan) . . . . . [6123-33]

5:00 pm: **All optical broadband steering by phase angle controlled stationary element (PACSE) mirrors,** D. V. Tsu, R. O. Miller, Energy Conversion Devices, Inc. . . . . [6123-34]

Wednesday 25 January

SESSION 8
RM: Marriott: San Jose Ballroom Salon II . Wed. 8:00 to 10:10 am

Novel Devices and Applications II

Chair: **Andreas Beling**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany)

8:00 am: **Photonic crystal waveguide-based dispersion compensators** *(Invited Paper),* M. Kamp, J. Zimmermann, A. W. Forchel, Univ. Würzburg (Germany); S. Anand, Kungliga Tekniska Högskolan (Sweden); R. März, Infineon Technologies AG (Germany) . . . . . [6123-35]

8:30 am: **The fabrication and study of in-plane multiquantum well microring lasers,** B. Miao, J. A. Murakowski, D. W. Prather, Univ. of Delaware . . [6123-36]

8:50 am: **Nonlinear optical nanostructures for filtering and switching light** *(Invited Paper),* A. Scherer, M. Hochberg, T. Baehr-Jones, G. Wang, California Institute of Technology; R. Lawson, Y. Liao, P. A. Sullivan, L. R. Dalton, A. K. Jen, Univ. of Washington . . . . . [6123-37]

9:20 am: **Net gain demonstration with glass hybrid optical amplifier made by ion-exchange and wafer bonding,** F. Gardillou, J. Broquin, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France) [6123-38]

9:40 am: **Design, fabrication, and characterization of 3D photonic crystals constructed from low-index polymers** *(Invited Paper),* D. W. Prather, Univ. of Delaware and EM Photonics, Inc.; A. S. Sharkawy, P. Yao, S. Shi, E. Kelmelis, EM Photonics, Inc. . . . . [6123-39]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 9

RM: Marriott: San Jose Ballroom Salon II . Wed. 10:30 am to 12:00 pm

Integration Technologies

Chair: **Christoph A. Waechter**, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

10:30 am: **Integration of plastic waveguide lasers on film and its application,** Y. Oki, H. Watanabe, Kyushu Univ. (Japan); M. Maeda, Kurume National College of Technology (Japan) . . . . . [6123-41]

10:50 am: **From magic to technology: materials integration by wafer bonding** *(Invited Paper),* V. Dragoi, EV Group E. Thallner GmbH (Austria) . . . . . [6123-42]

11:20 am: **Integrated high-q reflective cavities,** T. W. Mossberg, C. M. Greiner, D. Iazikov, LightSmyth Technologies, Inc. . . . . [6123-43]

11:40 am: **Wafer bonding between InP and Ce:YIG(CeY2Fe5O12) using O2 plasma surface activation for an integrated optical waveguide isolator,** J. W. Roh, Yonsei Univ. (South Korea) and Korea Institute of Science and Technology (South Korea); J. S. Yang, W. Y. Lee, Yonsei Univ. (South Korea); S. H. Ok, D. H. Woo, Y. T. Byun, Y. M. Jhon, Korea Institute of Science and Technology (South Korea); T. Mizumoto, Tokyo Institute of Technology (Japan); S. Lee, Korea Institute of Science and Technology (South Korea) . . . . [6123-44]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Theoretical and experimental study of non-adjacent channel crosstalk of AWG devices induced by random phase errors,** W. Li, Huazhong Univ. of Science and Technology (China); W. Ma, Accelink Technologies Co., Ltd (China); D. Liu, D. Huang, Huazhong Univ. of Science and Technology (China) . . . . . [6123-45]

✔ **Long-term stability of polymeric integrated optical components,** W. Kwong, Consultant . . . . . [6123-47]

✔ **Proton exchanged waveguides in LiNbO3: characterization and design methodology,** J. M. M. M. de Almeida, Univ. de Trás-os-Montes (Portugal); A. M. P. P. Leite, Univ. of Porto (Portugal) . . . . . [6123-48]

✔ **Microdisplacement measurements with moire patterns of fresnel zone plates films,** M. Pérez-Cortés, Univ. Autónoma de Yucatán (Mexico); M. Ortíz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); J. C. Ibarra, Tratamientos Geotecnicos, S. A. de C. V. (Mexico); A. Olivares Pérez II, Insituto Nacional de Astrofísica, Optica y Electrónica (Mexico); J. Becerra-Macías, Digital Optical Quantum Electronics Devices (Mexico) . . . . . [6123-49]

✔ **Metal clad optical waveguide with high index buffer layer,** K. N. Tripathi, Univ. of Delhi (India) . . . . . [6123-50]

✔ **Super slim optical pickup for mobile data storage device applications,** S. Suh, E. Cho, SAMSUNG Advanced Institute of Technology (South Korea); Y. Jin, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea); H. Kim, Y. Nam, J. Sohn, M. Lee, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6123-51]

✔ **Designing WDM filter on planar holographic Bragg reflectors with iterative layer-peeling algorithm,** Y. Ouyang, Chinese Military Academy (Taiwan) . . . . . [6123-52]

✔ **Low loss optical interconnect to silicon waveguides,** A. Donval, R. Oron, M. Oron, KiloLambda Technologies, Ltd. (Israel); A. N. M. M. Choudhury, T. R. Stanczyk, D. Richardson, Molex Fiber Optics . . . . . [6123-53]

Monday-Wednesday 23-25 January 2006 • Proceedings of SPIE Vol. 6124

Optoelectronic Integrated Circuits X

Conference Chairs: **Louay A. Eldada**, Dupont Photonics Technologies; **El-Hang Lee**, Inha Univ. (South Korea)

Program Committee: **Larry A. Coldren**, Univ. of California/Santa Barbara; **Mario Dagenais**, Univ. of Maryland/College Park; **P. D. Dapkus**, Univ. of Southern California; **Hans J. Heider**, Technische Univ. Hamburg-Harburg (Germany); **Ghassan E. Jabbour**, Arizona State Univ.; **Jack L. Jewell**, Picolight, Inc.; **Yue Liu**, Honeywell Inc.; **Shigeru Nakamura**, NEC Corp. (Japan); **Yoshiaki Nakano**, The Univ. of Tokyo (Japan); **Ikuo Ogawa**, Nippon Telegraph and Telephone Corp. (Japan); **Richard M. Osgood, Jr.**, Columbia Univ.; **Manijeh Razeghi**, Northwestern Univ.; **Robert Scarmozzino**, RSoft Design Group

Monday 23 January

SESSION 1

RM: Conv. Ctr. Room K . . . . . Mon. 8:10 to 10:10 am

Trends in OEIC Components and Subsystems

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

8:10 am: **Optical components and subsystems: opportunities and challenges** *(Invited Paper),* J. Hong, Oplink Communications, Inc. . . [6124-01]

8:40 am: **Semicustom OEIC implementation in an optical networking DWDM system** *(Invited Paper),* C. M. Look, J. J. Maki, A. P. Aitken, Intellambda Systems, Inc. . . . . [6124-02]

9:10 am: **Integrated Optoelectronic Materials, Devices, and Systems** *(Invited Paper),* D. V. Plant, McGill Univ. (Canada) . . . . . [6124-03]

9:40 am: **Nanophotonics for integrated information systems** *(Invited Paper),* Y. Fainman, U. Levy, Univ. of California/San Diego . . . . . [6124-04]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room K . . . . . Mon. 10:30 am to 12:00 pm

OEIC Advances and Roadmaps

Chair: **El-Hang Lee**, Inha Univ. (South Korea)

10:30 am: **Microphotonics: hardware for the information age** *(Invited Paper),* L. A. Eldada, DuPont Photonics Technologies . . . . . [6124-05]

11:00 am: **Challenges and opportunities for integrated optics in computing systems** *(Invited Paper),* M. A. Taubenblatt III, IBM Thomas J. Watson Research Ctr. . . . . [6124-06]

11:30 am: **Waveguide and packaging technology for optical backplanes and hybrid electrical-optical circuit boards** *(Invited Paper),* H. Schröder, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [6124-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room K . . . . . Mon. 1:30 to 3:10 pm

Micro/Nano-Scale OEICs

Chair: **Yeshaiahu Fainman**, Univ. of California/San Diego

1:30 pm: **Fabrication and integration of micro/nano-scale optical waveguides and photonic devices for application specific planar optical integrated circuit board** *(Invited Paper),* E. Lee, Inha Univ. (South Korea) . . . . . [6124-08]

2:00 pm: **Chalcogenide glass waveguide devices for high- speed all-optical signal processing** *(Invited Paper),* D. J. Moss, The Univ. of Sydney (Australia) [6124-09]

2:30 pm: **An extended long-range surface-plasmon-polariton waveguides,** S. Song, H. Won, K. Kim, Hanyang Univ. (South Korea) . . . . . [6124-10]

2:50 pm: **Photonic crystal nanosecond wavelength switches,** R. O. Miller, D. V. Tsu, Energy Conversion Devices, Inc.; J. A. Reed, Science Applications International Corp. . . . . [6124-11]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room K . . . . . Mon. 3:30 to 6:00 pm

OEIC Design and Characterization

Chair: **David V. Plant**, McGill Univ. (Canada)

3:30 pm: **Design optimization of high-speed optical modulators** *(Invited Paper),* A. B. M. Rahman, City Univ. (United Kingdom); S. Haxha, Univ. of Kent (United Kingdom); V. Haxha, K. T. V. Grattan, City Univ. (United Kingdom) . . . . . [6124-12]

4:00 pm: **Extraction of orthogonal incident state of polarization spectra using Mueller matrix approach** *(Invited Paper),* É. Desfonds, K. Pimenov, MetroPhotonics Inc. (Canada); M. Crawford, dBm Optics, Inc. . . . . [6124-13]

4:30 pm: **Stydy on the group velocity anomaly in the photonic band gap crystals and it's applications,** H. Noh, B. O, S. Lee, K. H. Kim, E. Lee, Inha Univ. (South Korea) . . . . . [6124-14]

4:50 pm: **Analysis on planar-type long-period gratings for wavelength tuning filters,** K. H. Kim, D. Lee, E. Lee, Inha Univ. (South Korea) . . . [6124-15]

5:10 pm: **Broadband InAs/InGaAlAs dot-in-well superluminescent diode,** C. E. Dimas, H. Susanto Djie, B. Ooi, Lehigh Univ. . . . . [6124-16]

5:30 pm: **Experiment and modeling of tilted mirror MEMS variable optical attenuator** *(Invited Paper),* C. He, Alliance Fiber Optic Products Inc. . [6124-58]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

RM: Conv. Ctr. Room K . . . . . Tues. 10:30 to 11:50 am

Optical Interconnects I

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

10:30 am: **WDM package enabling high-bandwidth optical intrasystem interconnects for high-performance computer systems** *(Invited Paper),* J. Schrage, Siemens AG; Y. Soenmez, Cooperative Computing & Communication Lab. . . . . [6124-17]

11:00 am: **Challenges for the introduction of board-level optical interconnect technology into product development roadmaps** *(Invited Paper),* C. Berger, IBM Corp. (Switzerland) . . . . . [6124-18]

11:30 am: **Speeding up multiprocessor machines with reconfigurable optical interconnects,** W. Heirman, Univ. Gent (Belgium); I. Artundo, L. Desmet, Vrije Univ. Brussel (Belgium); J. Dambre, Univ. Gent (Belgium); C. Debaes, H. Thienpont, Vrije Univ. Brussel (Belgium); J. M. Van Campenhout, Univ. Gent (Belgium) . . . . . [6124-19]

Lunch/Exhibition Break . . . . . 11:50 am to 1:20 pm

SESSION 6

RM: Conv. Ctr. Room K . . . . . Tues. 1:20 to 2:50 pm

Optical Interconnects II

Chair: **El-Hang Lee**, Inha Univ. (South Korea)

1:20 pm: **2D parallel optical interconnects between CMOS ICs** *(Invited Paper),* O. Rits III, K. Naessens, R. Bockstaele, R. Baets, Univ. Gent (Belgium) . . . . . [6124-20]

1:50 pm: **High-density parallel optical interconnection for 10Tbps interconnection in high-speed memory test systems** *(Invited Paper),* T. Okayasu, D. Watanabe, A. Ono, Y. Hayase, Advantest Corp. (Japan); H. Mori, T. Nomura, The Furukawa Electric Co., Ltd. (Japan) . . . . . [6124-21]

2:20 pm: **A scaleable optical interconnect for low-latency cell switching in high-performance computing systems** *(Invited Paper),* M. Sauer, B. R. Hemenway, R. R. Grzybowski, Corning Inc. . . . . [6124-22]

Coffee Break . . . . . 2:50 to 3:20 pm

SESSION 7

RM: Conv. Ctr. Room K . . . . . Tues. 3:20 to 5:30 pm

Active OEICs and Modules

Chair: **Juergen Schrage**, Cooperative Computing & Communication Lab. (Germany)

3:20 pm: **Scaling VCSEL performance up to 250Terabits/s of system bandwidth** *(Invited Paper),* J. E. Cunningham, A. V. Krishnamoorthy, Sun Microsystems . . . . . [6124-23]

3:50 pm: **High-speed integrated transceivers development for short reach communications** *(Invited Paper),* S. M. Deliwala, B. Omara, M. K. Emsley, J. Yasaitis, C. Roberts, E. Gleason, J. Steigerwald, B. Scharf, Analog Devices, Inc. . . . . [6124-24]

4:20 pm: **Highly Reliable High Power Optical Amplifiers at 1.55 μm** *(Invited Paper),* T. H. Wood, Lucent Technologies/Bell Labs. . . . . [6124-25]

4:50 pm: **Hybrid integration of a CMOS active quench and reset circuit and a geiger-mode avalanche photodiode,** D. Cronin, A. P. Morrison, K. McCarthy, National Univ. of Ireland/Cork (Ireland) . . . . . [6124-26]

5:10 pm: **Integrated photon counting gain and bias control system,** D. O'Connell, A. P. Morrison, National Univ. of Ireland/Cork (Ireland); J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . . [6124-27]

Wednesday 25 January

SESSION 8

RM: Conv. Ctr. Room K . . . . . Wed. 8:10 to 10:00 am

Silicon OEICs

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

8:10 am: **Increased functionality in Si-wire photonics** *(Invited Paper),* R. M. Osgood, Jr., Columbia Univ. . . . . [6124-28]

8:40 am: **3D integration of sub-surface photonics with CMOS** *(Invited Paper),* B. Jalali, T. Indukuri, P. Koonath, Univ. of California/Los Angeles . . . . [6124-29]

9:10 am: **Photonic crystals and silicon photonics** *(Invited Paper),* C. Wong, Columbia Univ. . . . . [6124-30]

9:40 am: **Laser direct molding of good-quality silicon nanostructure for photonic integration,** E. Liang, Z. Huang, C. Kuan, C. F. Lin, National Taiwan Univ. (Taiwan) . . . . . [6124-31]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 9

RM: Conv. Ctr. Room K . . . . . Wed. 10:20 am to 12:20 pm

Polymer OEICs

Chair: **El-Hang Lee**, Inha Univ. (South Korea)

10:20 am: **Organics in optoelectronics: advances and roadmap** *(Invited Paper),* L. A. Eldada, DuPont Photonics Technologies . . . . . [6124-32]

10:50 am: **The optical performance of perfluorocyclobutyl based fluoropolymers and waveguides** *(Invited Paper),* J. M. Ballato, D. W. Smith, Jr., Clemson Univ. . . . . [6124-33]

11:20 am: **Integrated polymer optoelectronic time delay device for an X-band phased array antenna system** *(Invited Paper),* B. Howley, R. T. Chen, The Univ. of Texas at Austin . . . . . [6124-34]

11:50 am: **Silicon and polymer based nano photonic crystal waveguide devices** *(Invited Paper),* R. T. Chen, The Univ. of Texas at Austin . . . . [6124-57]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 10

RM: Conv. Ctr. Room K . . . . . Wed. 1:20 to 3:20 pm

Silica OEICs

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

1:20 pm: **Advanced arrayed-waveguide gratings and integrated optical devices** *(Invited Paper),* B. Fondeur, B. Brainard, S. M. Thekdi, D. K. Nakamoto, D. Dougherty, J. K. Bhardwaj, JDS Uniphase Corp. . . . . [6124-36]

1:50 pm: **Integrated bidirectional transceivers for Access applications based on a cost-effective PLC hybridised platform** *(Invited Paper),* H. Imam, Ignis Photonyx A/S (Denmark); J. P. Rasmussen, ignis Photonyx A/S (Denmark); M. R. Pearson, Enablence Inc. (Canada) . . . . . [6124-37]

2:20 pm: **Integrated PLCs based on high-index contrast microring resonator** *(Invited Paper),* Y. J. Chen, Industrial Technology Research Institute (Taiwan) and Univ. of Maryland/Baltimore County; S. Chang, Y. Huang, Y. Chu, Industrial Technology Research Institute (Taiwan); Z. Wang, Univ. of Maryland/ Baltimore County . . . . . [6124-38]

2:50 pm: **Highly integrated photonic modules** *(Invited Paper),* J. Shmulovich, S. Frolov, A. Paunescu, D. C. Lee, Y. DeHazan, A. A. Hanjani, A. Bruce, Inplane Photonics, Inc. . . . . [6124-39]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 11

RM: Conv. Ctr. Room K . . . . . Wed. 3:40 to 6:00 pm

InP OEICs

Chair: **Richard M. Osgood, Jr.**, Columbia Univ.

3:40 pm: **Photonic integration for high-denisty and multifunctionality in the InP-material system** *(Invited Paper),* H. Jaeckel, F. Robin, D. Erni, E. Gini, J. Holzman, H. Lohe, K. Rauscher, R. Scollo, P. Strasser, W. Vogt, R. Wueest, ETH Zürich (Switzerland) . . . . . [6124-40]

4:10 pm: **Waveguide devices for polarization control** *(Invited Paper),* X. Guo, T. Zaman, R. J. Ram, Massachusetts Institute of Technology . . . . . [6124-41]

4:40 pm: **Field modulated wavelength conversion** *(Invited Paper),* J. S. Barton, A. Tauke-Pedretti, M. Dummer, M. N. Sysak, J. W. Raring, L. A. Coldren, Univ. of California/Santa Barbara . . . . . [6124-42]

5:10 pm: **InP-based monolithically integrated optical gain-competition inverter,** A. Y. Hsu, G. A. Vawter, E. J. Skogen, G. M. Peake, K. C. Baucom, R. J. Shul, W. W. Chow, Sandia National Labs.; C. R. Alford, B. Salters, L&M Technologies, Inc.; F. Cajas, Jobs Plus . . . . . [6124-43]

5:30 pm: **Ultrafast InP optical integrated circuits** *(Invited Paper),* E. A. Bente, M. K. Smit, Technische Univ. Eindhoven (Netherlands) . . . . . [6124-44]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Fabrication of an optical-electrical printed circuit board (OE-PCB) by double-side lamination of an embedded polymer waveguide board between two electrical printed circuit boards,** H. Lee, S. An, S. Lee, B. O, E. Lee, Inha Univ. (South Korea) . . . . . [6124-35]

✔ **Investigating the effects of package capacitance on the frequency response of shallow junction avalanche photodiodes,** G. J. Cleary, National Univ. of Ireland/Cork (Ireland); A. M. Moloney, Dublin Institute of Technology (Ireland); A. P. Morrison, National Univ. of Ireland/Cork (Ireland) . . . . . [6124-45]

✔ **Photon-assisted conducting polymer polymerization process development for storage information and microelectronic device applications,** W. M. de Azevedo, E. F. da Silva, Jr., R. A. de Barros, Univ. Federal de Pernambuco (Brazil) . . . . . [6124-46]

✔ **Hybrid CMOS compatible active/passive quenching module,** F. Lin, Tyndall National Institute (Ireland); J. C. Jackson, SensL Technologies Ltd. (Ireland); M. MacSweeney, M. M. Sheehan, Tyndall National Institute (Ireland) . . . . . [6124-47]

✔ **Synthesis and characterization of fluorinated methacrylates-based copolymers containing cross-linkable pendant groups for optical waveguides,** H. J. Kim, K. Kim, I. Chin, Inha Univ. (South Korea) . . [6124-48]

✔ **The analysis of optical signal transmission characteristics in laser diodes,** D. Kim, Y. Yun, K. Kim, J. Lee, Y. Choi, Chung-Ang Univ. (South Korea) . . . . . [6124-49]

✔ **A 2.5 Gb/s CMOS optical transmitter with 10:1 serializer using clock generation method,** K. Kim, D. Kim, Y. Moon, H. Kang, Y. Choi, Chung-Ang Univ. (South Korea) . . . . . [6124-50]

✔ **Replication of precise optical waveguide for an optical device,** M. Y. Jeong, Pusan National Univ. (South Korea) . . . . . [6124-51]

✔ **Fabrication of a compact photonic crystal wavelength demultiplexer using ultraviolet embossing process,** J. Sung, B. O, S. G. Lee, S. Park, E. Lee, Inha Univ. (South Korea) . . . . . [6124-52]

✔ **Polymeric 1 x 2 switch using thermo-optic transition controlled directional coupler,** C. Choi, M. W. Lee, B. O, S. Lee, S. Park, E. Lee, Inha Univ. (South Korea) . . . . . [6124-53]

✔ **Design and fabrication of polymer AWG using UV embossing technique,** J. Kim, B. O, S. Lee, S. Park, E. Lee, Inha Univ. (South Korea) . . . . [6124-54]

✔ **A triplexer optical transceiver module using cascaded directional couplers,** H. Bae, E. Lee, H. Lee, S. An, K. H. Kim, S. G. Lee, B. O, S. Park, Inha Univ. (South Korea) . . . . . [6124-55]

✔ **Fabrication of a 45° microreflector ended polymer waveguide using one-step UV embossing technique,** S. An, H. Lee, B. O, S. Lee, S. Park, E. Lee, Inha Univ. (South Korea) . . . . . [6124-56]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6125

Silicon Photonics

Conference Chairs: **Joel A. Kubby**, Univ. of California/Santa Cruz; **Graham T. Reed**, Univ. of Surrey (United Kingdom)

Program Committee: **Alyssa B. Apsel**, Cornell Univ.; **Laurence W. Cahill**, La Trobe Univ. (Australia); **Philippe M. Fauchet**, Univ. of Rochester; **Ghassan E. Jabbour**, Arizona State Univ.; **Siegfried Janz**, National Research Council Canada (Canada); **Laura M. Lechuga**, Ctr. Nacional de Microelectrónica (Spain); **Sebania Libertino**, Consiglio Nazionale delle Ricerche (Italy); **Mario J. Paniccia**, Intel Corp.; **David J. Robbins**, QinetiQ (United Kingdom); **Adrian P. Vonsovici**, Argessus Photonics Ltd. (United Kingdom); **Dan-Xia Xu**, National Research Council Canada (Canada)

Wednesday 25 January

SESSION 1

RM: Conv. Ctr. Room C3 . . . . . Wed. 8:10 to 9:40 am

Electronic and Photonic Intigrated Circuits (EPIC)

Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

8:10 am: **CMOS photonics technology platform** *(Invited Paper),* C. Gunn, Luxtera Inc. . . . . [6125-01]

8:40 am: **Recent advances in CMOS compatible integrated photonics** *(Invited Paper),* L. C. Kimerling, Massachusetts Institute of Technology; A. B. Apsel, Cornell Univ.; M. Beals, Massachusetts Institute of Technology; D. Carothers, BAE Systems North America; Y. Chen, Lucent Technologies; T. Conway, BAE Systems North America; D. Gill, Lucent Technologies; M. Grove, BAE Systems North America; C. Hong, Massachusetts Institute of Technology; M. F. Lipson, Cornell Univ.; J. Liu, J. Michel, Massachusetts Institute of Technology; S. S. Patel, Lucent Technologies; A. T. Pomerene, BAE Systems North America; M. Rasras, Lucent Technologies; D. K. Sparacin, Massachusetts Institute of Technology; K. Tu, A. E. White, Lucent Technologies; C. Wong, Columbia Univ. . . . . [6125-02]

9:10 am: **Electronic photonic integrated circuits for high speed, high resolution, analog to digital conversion** *(Invited Paper),* F. X. Kaertner, Massachusetts Institute of Technology . . . . . [6125-03]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room C3 . . . . . Wed. 10:30 am to 12:40 pm

Joint session with conference 6133.

10:30 am: **Continuous-wave silicon raman laser and amplifier for opto-electronic integration** *(Invited Paper),* H. Rong, M. J. Paniccia, Intel Corp. . . . . [6125-04]

11:00 am: **High performance self-organized In(Ga)as quantum dot lasers monolithically grown on silicon,** Z. Mi, J. Yang, P. K. Bhattacharya, P. K. L. Chan, K. P. Pipe, Univ. of Michigan . . . . . [6125-05]

11:20 am: **Silicon and germanium-silicon raman lasers,** B. Jalali, V. Raghunathan, D. P. Dimitropoulos, O. Boyraz, R. Claps, Univ. of California/Los Angeles . . . . . [6133-33]

11:50 pm: **Emitting 1530 nm light on Si with optical gain from light emitting layer consisting of Er2O3, P2O5, Yb2O3 nanoparticles and spin-on glass,** C. F. Lin, National Taiwan Univ. (Taiwan) . . . . . [6125-06]

12:10 pm: **Heterogeneous integration of silicon and AlGaInAs for a silicon evanescent laser** *(Invited Paper),* A. Fang, H. Park, Univ. of California/Santa Barbara; R. Jones, Intel Corp.; O. Cohen, Intel Corp. (Israel); M. J. Paniccia, Intel Corp.; J. E. Bowers, Univ. of California/Santa Barbara . . . . . [6133-34]

Lunch/Exhibition Break . . . . . 12:40 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room C3 . . . . . Wed. 1:30 to 2:50 pm

Silicon Light Emitters and Amplifiers II

Chair: **Philippe M. Fauchet**, Univ. of Rochester

1:30 pm: **Silicon light emitters and amplifiers: state of the art** *(Invited Paper),* L. Pavesi, Univ. degli Studi di Trento (Italy) . . . . . [6125-07]

2:00 pm: **Raman emission in porous silicon: prospects for an amplifier,** M. A. Ferrara, Univ. degli Studi Mediterranea di Reggio Calabria (Italy) and Istituto per la Microelettronica e Microsistemi (Italy); L. Sirleto, Istituto per la Microelettronica e Microsistemi (Italy); L. Moretti, Univ. degli Studi Mediterranea di Reggio Calabria (Italy) and Istituto per la Microelettronica e Microsistemi (Italy); L. Rotiroti, Istituto per la Microelettronica e Microsistemi (Italy); E. Santamato, Univ. degli Studi di Napoli Federico II (Italy); B. Jalali, Univ. of California/Los Angeles; I. Rendina, Istituto per la Microelettronica e Microsistemi (Italy) . . . . . [6125-08]

2:20 pm: **New approaches to silicon-based light emitters** *(Invited Paper),* H. A. Atwater, R. J. Walters, J. S. Biteen, S. Kim, California Institute of Technology . . . . . [6125-09]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room C3 . . . . . Wed. 3:30 to 5:20 pm

Silicon Light Emitters and Modulators

Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

3:30 pm: **Germanium modulators on silicon for optical interconnects,** Y. Kuo, D. A. Miller, J. S. Harris, Jr., Stanford Univ. . . . . [6125-36]

3:50 pm: **Towards the era of silicon photonics through high-efficient silicon-based light emitter,** G. Y. Sung, K. Kim, N. Park, T. Kim, K. S. Cho, C. Huh, J. H. Shin, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6125-11]

4:10 pm: **High-speed modulators** *(Invited Paper),* M. F. Lipson, Cornell Univ. . . . . [6125-12]

4:40 pm: **Design of a 10 GHz silicon modulator based on a 0.25 μm CMOS process,** D. Zheng, D. Feng, Kotura, Inc.; G. Gutierrez, Independent Consultant; T. Smith, Kotura, Inc. . . . . [6125-13]

5:00 pm: **Electro-optic modulators in silicon using 2D photonic bandgap structures,** M. Haurylau, S. P. Anderson, K. L. Marshall, P. M. Fauchet, Univ. of Rochester . . . . . [6125-14]

✔ Posters-Wednesday

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✔ **Silicon photodetectors at 1.55um,** M. Casalino, L. Sirleto, L. Moretti, G. Coppola, S. Libertino, I. Rendina, Consiglio Nazionale delle Ricerche (Italy) . . . . . [6125-29]

✔ **Novel GaP-based Ga(NAsP)laser material,** W. Stolz, B. Kunert, S. Reinhard, M. Lampalzer, K. Volz, Philipps-Univ. Marburg (Germany) . . . . . [6125-31]

✔ **Silicon microspheres for wavelegth division multiplexing,** A. Serpengüzel, Koç Univ. (Turkey) . . . . . [6125-32]

✔ **Characterization of high-index contrast silica guided-wave devices,** A. B. M. Rahman, N. Somasiri, City Univ. (United Kingdom); T. Wongcharoen, Bangkok Univ. (Thailand); V. Rakocevic, City Univ. (United Kingdom) . . . . . [6125-33]

✔ **The convergence of photonics and micro-electronics,** L. W. Cahill, La Trobe Univ. (Australia); T. V. Clapp, Dow Corning Corp. (United Kingdom) and Univ. of Cambridge (United Kingdom) . . . . . [6125-34]

✔ **Silicon-nanocrystal-coated silica microsphere thermooptical switch,** A. Tewary, M. J. F. Digonnet, M. L. Brongersma, Stanford Univ.; J. Y. Sung, J. H. Shin, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6125-35]

Thursday 26 January

SESSION 5

RM: Conv. Ctr. Room C3 . . . . . Thurs. 8:10 to 9:50 am

Integrated Optoelectronics in Si

Chair: **Graham T. Reed**, Univ. of Surrey (United Kingdom)

8:10 am: **Integration issues of a photonic layer on top of a CMOS circuit** *(Invited Paper),* J. Fedeli, CEA-LETI (France); R. Orobtchouk, Institut National des Sciences Appliquées de Lyon (France); C. Seassal, École Centrale de Lyon (France); L. Vivien, Univ. Paris-Sud II (France) . . . . . [6125-15]

8:40 am: **Integrated silicon photonic circuit- monolithic 8-channel modulator, tap, vertical coupler, and flip-chip mounted photodetector array,** B. T. Smith, H. Lei, C. Kung, D. Feng, J. Yin, H. Liang, Kotura, Inc. . . . [6125-16]

9:00 am: **Monolithically integrated photodetectors for optical signal monitoring in silicon waveguides** *(Invited Paper),* A. P. Knights, J. Bradley, S. Gou, P. Jessop, McMaster Univ. (Canada) . . . . . [6125-17]

9:30 am: **Heterogenous integration of InP/InGaAsP photodetectors onto ultracompact silicon-on-insulator waveguide circuits,** G. Roelkens, J. Brouckaert, D. Van Thourhout, R. Baets, Univ. Gent (Belgium) . . . . . [6125-18]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

RM: Conv. Ctr. Room C3 . . . . . Thurs. 10:30 to 11:50 am

Waveguides I

Chairs: **Graham T. Reed**, Univ. of Surrey (United Kingdom); **Ghassan E. Jabbour**, Arizona State Univ.

10:30 am: **Monolithically integrated graded-index waveguide input couplers for silicon-photonics** *(Invited Paper),* S. Janz, A. Delage, B. Lamontagne, A. Bogdanov, D. Xu, K. P. Yap, National Research Council Canada (Canada) . . . . . [6125-19]

11:00 am: **Polarization-independent directional couplers on silicon-on-insulator,** G. T. Reed, B. Timotijevic, G. Z. Masanovic, W. R. Headley, Univ. of Surrey (United Kingdom); A. Liu, M. J. Paniccia, Intel Corp. . . . . [6125-20]

11:20 am: **Silicon integrated optics for stellar interferometry** *(Invited Paper),* P. R. Labeye, CEA-LETI (France); J. Broquin, IMEP (France); J. Berger, P. Y. Kern, Lab. d'Astrophysique de l'Observatoire de Grenoble (France) . . . . . [6125-21]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7

RM: Conv. Ctr. Room C3 . . . . . Thurs. 1:30 to 2:50 pm

Waveguides II and Lab-on-Chip/Sensors I

Chair: **Siegfried Janz**, National Research Council Canada (Canada)

1:30 pm: **Planar single-molecule sensors based on hollow-core ARROW waveguides** *(Invited Paper),* H. Schmidt, D. Yin, P. Measor, Univ. of California/Santa Cruz; J. P. Barber, E. J. Lunt, A. R. Hawkins, Brigham Young Univ. . . . . [6125-22]

2:00 pm: **Compact add and drop and wavelength filter based on microdisk on SOI substrate,** A. Morand, K. Phan Huy, D. Amans, B. Martin, F. Bredillot, P. Benech, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France); J. Verbert, E. Hadji, CEA Grenoble (France); J. Eedeli, CEA-LETI (France) . . . . . [6125-23]

2:20 pm: **Surface waveguide technology for telecom and biochemical sensing applications** *(Invited Paper),* J. A. Walker, JayWalker Technical Consulting, LLC and LioniX, BV (Netherlands); R. G. Heideman, LioniX, BV (Netherlands) . . . . . [6125-24]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 8

RM: Conv. Ctr. Room C3 . . . . . Thurs. 3:30 to 5:10 pm

Lab-on-Chip/Sensors II

Chair: **Siegfried Janz**, National Research Council Canada (Canada)

3:30 pm: **Integrated nanosensors** *(Invited Paper),* I. K. Schuller, A. C. Kummel, M. J. Sailor, W. C. Trogler, Y. Lo, B. Fruhberger, M. Montero, Univ. of California/San Diego; G. J. Brown, H. J. Haugan, F. Szmulowicz, K. Mahalingam, B. Ullrich, S. Houston, Air Force Research Lab. . . . . [6125-25]

4:00 pm: **Monolithic silicon optoelectronic devices for protein and DNA detection** *(Invited Paper),* K. Misiakos, P. Patrou, S. E. Kakabakos, M. Vlachopoulou, A. Tserepi, E. Gogolides, National Ctr. for Scientific Research Demokritos (Greece) . . . . . [6125-26]

4:30 pm: **Porous silicon-based Bragg reflectors and Fabry-Perot interference filters for photonic applications,** D. Mangaiyarkarasi, M. B. H. Breese, O. Y. Sheng, K. A. Mahabadi, D. J. Blackwood, National Univ. of Singapore (Singapore) . . . . . [6125-27]

4:50 pm: **Electrostatically tunable infrared filter that uses etched thin Si plates,** I. Yamada, K. Kimura, Ryukoku Univ. (Japan); Y. Yamagishi, HORIBA Ltd. (Japan); M. Saito, Ryukoku Univ. (Japan) . . . . . [6125-28]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6126

Photonics Packaging and Integration VIII

Conference Chairs: **Allen M. Earman**, Finisar Corp.; **Ray T. Chen**, The Univ. of Texas at Austin

Program Committee: **Alexei L. Glebov**, Fujitsu Labs of America; **Craig Goldberg**, Newport Corp.; **Wei Jiang**, Omega Optics; **John McKeen**, Siemens Milltronics Process Inc. (Canada); **Axel Mehnert**, Redfern Integrated Optics, Inc.; **Yakov G. Soskind**, JDS Uniphase Corp.; **Torsten Wipiejewski**, ASTRI (Hong Kong China); **Xiaocong Yuan**, Nanyang Technological Univ. (Singapore)

Wednesday 25 January

SESSION 1

RM: Conv. Ctr. Room M . . . . . Wed. 8:30 to 10:10 am

Optical Interconnects I

8:30 am: **Ultra-high speed transmission of polymer-based Multimode Interference: devices for high-throughput Optical Interconnects** *(Invited Paper),* G. Chang, Y. J. Chang, Georgia Institute of Technology [6126-01]

9:00 am: **Holographic optical elements for optical backplane bus targeted at high speed data transfer** *(Invited Paper),* J. Ellis, Advanced Communications Concepts, Inc. . . . . [6126-02]

9:30 am: **Development of a fabrication technology for integrating low cost optical interconnects on a printed circuit board,** G. V. Steenberge, N. Hendrickx, P. Geerinck, E. Bosman, S. Van Put, Univ. Gent/IMEC (Belgium); H. Ottevaere, H. Thienpont, Vrije Univ. Brussel (Belgium); P. Van Daele, Univ. Gent/IMEC (Belgium) . . . . . [6126-03]

9:50 am: **Bit-interleaved optical bus for high-speed secure multiboard system,** H. Bi, The Univ. of Texas at Austin; X. Han, Brewer Science, Inc.; R. T. Chen, The Univ. of Texas at Austin . . . . . [6126-04]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room M . . . . . Wed. 10:30 am to 12:10 pm

Materials in Advanced Packaging

10:30 am: **Advanced packaging materials for optical applications: bridging the gap between nm-size structures and large-area panel processing** *(Invited Paper),* R. Houbertz, Fraunhofer-ISC (Germany) . . . . . [6126-05]

11:00 am: **Fiber optics structural mechanics, and nanotechnology based new generation of fiber coatings** *(Invited Paper),* E. Suhir, Univ. of California/ Santa Cruz . . . . . [6126-06]

11:30 am: **Versatile coupling of a plastic optical fibre imaging bundle to an avalanche photodiode array,** D. M. O'Driscoll, A. P. Morrison, National Univ. of Ireland/Cork (Ireland) . . . . . [6126-21]

11:50 am: **Lithography-grade tungsten-copper substrates for wafer level packaging,** G. I. Rudd, B. Cronk, Spectra-Mat, Inc. . . . . [6126-08]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room M . . . . . Wed. 1:30 to 3:30 pm

Optical Interconnects II

1:30 pm: **3D chip-scale optical interconnects and switches with self-organized wiring based on device-embedded waveguide films and molecular nanotechnologies** *(Invited Paper),* T. Yoshimura, Y. Suzuki, K. Asama, Tokyo Univ. of Technology (Japan) . . . . . [6126-09]

2:00 pm: **Progress toward intra-chip optical interconnects** *(Invited Paper),* M. W. Haney, M. Iqbal, M. McFadden, D. W. Prather, T. E. Dillon, Univ. of Delaware . . . . . [6126-10]

2:30 pm: **A novel, free-space optical interconnect employing vertical-cavity surface emitting laser diodes and InGaAs metal-semiconductor-metal photodetectors for Gbit/s RF/microwave systems,** G. R. Savich, Univ. of Rochester and NASA Glenn Research Ctr.; R. N. Simons, NASA Glenn Research Ctr. . . . . [6126-11]

2:50 pm: **Application of parallel optical axis converting waveguide to optoelectronic-PWB,** T. Tanaka, H. Nanai, H. Sakamoto, Y. Yamamoto, S. Sakaguti, Central Glass Co., Ltd. (Japan) . . . . . [6126-12]

3:10 pm: **High-channel density optical interconnects using photonic crystal fibers,** T. J. Shepherd, C. R. H. Bennett, D. M. Taylor, L. F. Michaille, QinetiQ Ltd. (United Kingdom) . . . . . [6126-13]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 4

RM: Conv. Ctr. Room M . . . . . Wed. 3:50 to 4:50 pm

Packaging for Communication Components

3:50 pm: **Efficient optical communications using multibit differential signaling,** D. M. Chiarulli, S. P. Levitan, S. J. Dickerson, J. D. Bakos, J. R. Martin, Univ. of Pittsburgh . . . . . [6126-16]

4:10 pm: **Multimode fibers with integrated optical mode field adapters for 40Gbit/s optical ethernet systems,** U. H. P. Fischer, T. Windel, S. Hemrungrote, Hochschule Harz (Germany) . . . . . [6126-17]

4:30 pm: **Highly integrated plastic package transceiver modules for large core fiber systems,** F. H. W. Ho, B. Lui, W. Hung, F. Tong, T. Choi, S. Yau, G. Egnisaban, T. Mangenete, A. Chow, E. Wong, A. Wong, S. K. Cheng, E. Cheung, T. Wipiejewski, Hong Kong Applied Science and Technology Research Institute Co. Ltd. (Hong Kong China) . . . . . [6126-18]

Thursday 26 January

SESSION 5

RM: Conv. Ctr. Room M . . . . . Thurs. 8:30 to 10:10 am

Alignment/Packaging/Fabrication

8:30 am: **Advanced integration schemes for high-functionality/high-performance photonic integrated circuits** *(Invited Paper),* J. W. Raring, M. N. Sysak, A. Tauke-Pedretti, M. Dummer, Univ. of California/Santa Barbara; E. J. Skogen, Sandia National Labs.; J. S. Barton, S. P. DenBaars, L. A. Coldren, Univ. of California/Santa Barbara . . . . . [6126-19]

9:00 am: **Two-dimensional scalable optical controlled phased-array antenna system** *(Invited Paper),* M. Y. Chen, Omega Optics, Inc. . . . . [6126-20]

9:30 am: **Recent advances in photonics packaging materials,** C. H. Zweben, Advanced Packaging Materials Consultant . . . . . [6126-07]

9:50 am: **Edge termination effects on finite aperture polarizers for polarimetric imaging applications at mid- and long-wave IR,** A. A. Cruz-Cabrera, S. A. Kemme, J. R. Wendt, R. R. Boye, Sandia National Labs.; T. R. Carter, S. Samora, L&M Technologies . . . . . [6126-22]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

RM: Conv. Ctr. Room M . . . . . Thurs. 10:30 am to 12:30 pm

Optical Interconnects/Micro-Optics

10:30 am: **Fabrication of a hybrid electrical-optical printed circuit board (EO-PCB) by lamination of an optical printed circuit board (O-PCB) and an electrical printed circuit board (E-PCB)** *(Invited Paper),* E. Lee, Inha Univ. (South Korea) . . . . . [6126-23]

11:00 am: **Low-cost plastic micro-optics for board level optical interconnections** *(Invited Paper),* C. Debaes, M. Vervaeke, B. Volckaerts, J. Van Erps, L. Desmet, H. Ottevaere, P. Vynck, V. Gomez, A. Hermanne, H. Thienpont, Vrije Univ. Brussel (Belgium) . . . . . [6126-24]

11:30 am: **Integrated waveguide and microoptic elements for board-level optical interconnects,** A. L. Glebov, M. G. Lee, S. Aoki, S. D. Zhou, K. Yokouchi, Fujitsu Labs. of America . . . . . [6126-25]

11:50 am: **Hyperboloid solgel microlens array fabricated by soft-lithography for optical coupling,** M. He, J. Bu, Nanyang Technological Univ. (Singapore); X. Yuan, Nanyang Technological Univ. (Singapore) and Shenzhen Univ. (China); H. Niu, X. Peng, Shenzhen Univ. (China) . . . . . [6126-26]

12:10 pm: **Fabrication of SIL array of glass by surface-tension mold technique,** T. Kishi, S. Shibata, T. Yano, Tokyo Institute of Technology (Japan) . . . . . [6126-27]

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Quantum Sensing and Nanophotonic Devices III

Conference Chairs: **Manijeh Razeghi**, Northwestern Univ.; **Gail J. Brown**, Air Force Research Lab.

Program Committee: **Olivier Acher**, CEA Le Ripault (France); **Yoshinobu Aoyagi**, The Institute of Physical and Chemical Research (R (Japan); **Eronides F. da Silva, Jr.**, Univ. Federal de Pernambuco (Brazil); **Henri-Jean M. Drouhin**, École Polytechnique (France); **Allan Hahn**, Air Force Research Lab.; **Ferechteh Hosseini Teherani**, Nanovation (France); **Agisilaos A. Iliadis**, Univ. of Maryland/College Park; **Mark B. Johnson**, Naval Research Lab.; **Patrick Kung**, Northwestern Univ.; **Cole W. Litton**, Air Force Research Lab.; **James A. Lott**, Air Force Institute of Technology; **Kazuhiko Matsumoto**, National Institute of Advanced Industrial Science (Japan); **Hooman Mohseni**, Northwestern Univ.; **Yoon-Soo Park**, Seoul National Univ. (South Korea); **C. Kumar N. Patel**, Pranalytica, Inc.; **Antoni Rogalski**, Military Univ. of Technology (Poland); **Stephen D. Russell**, Space and Naval Warfare Sytems Ctr.

Monday 23 January

SESSION 1

RM: Conv. Ctr. Room L . . . . . Mon. 8:00 to 10:00 am

High Power Infrared Laser Diodes I

Chairs: **Federico Capasso**, Harvard Univ.; **Manijeh Razeghi**, Northwestern Univ.

Keynote Presentation

8:00 am: **To be announced,** C. K. N. Patel, Pranalytica, Inc. . . . . [6127-01]

8:30 am: **Improved performance of quantum cascade lasers utilizing epi-down mounting** *(Invited Paper),* A. G. Tsekoun, R. Go, M. Pushkasrsky, Pranalytica, Inc.; M. Razeghi, Northwestern Univ.; C. K. N. Patel, Pranalytica, Inc. and Univ. of California/Los Angeles . . . . . [6127-02]

9:00 am: **High power, continuous-wave, quantum cascade lasers for MWIR and LWIR applications** *(Invited Paper),* S. Slivken, A. J. Evans, J. Nguyen, J. Yu, S. R. Darvish, K. Mi, M. Razeghi, Northwestern Univ. . . . . [6127-03]

9:30 am: **High-power distributed-feedback and Fabry-Perot quantum cascade lasers** *(Invited Paper),* J. R. Meyer, W. W. Bewley, J. R. Lindle, C. Kim, I. Vurgaftman, Naval Research Lab.; B. Gokden, A. J. Evans, J. Yu, S. R. Darvish, S. Slivken, M. Razeghi, Northwestern Univ. . . . . [6127-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room L . . . . . Mon. 10:30 am to 12:00 pm

High Power Infrared Laser Diodes II

Chairs: **C. Kumar N. Patel**, Pranalytica, Inc.; **Manijeh Razeghi**, Northwestern Univ.

10:30 am: **Waveguides with uniaxially patterned layers** *(Invited Paper),* S. Luryi, A. V. Subashiev, Stony Brook Univ. . . . . [6127-05]

11:00 am: **Recent progress is short wavelength quantum cascade lasers** *(Invited Paper),* C. Sirtori, Thales Research & Technology (France) . . . [6127-06]

Lunch Break . . . . . 11:30 am to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room L . . . . . Mon. 1:30 to 3:00 pm

High Power Infrared Laser Diodes III

Chairs: **Joseph Zyss**, École Normale Supérieure de Cachan (France); **Mark B. Johnson**, Naval Research Lab.

1:30 pm: **Terahertz quantum-cascade lasers and real-time T-rays imaging** *(Invited Paper),* Q. Hu, Massachusetts Institute of Technology . . . . . [6127-08]

2:00 pm: **Optimizing short-wavelength performance and injector doping concentration of InP-based quantum cascade lasers,** C. Mann, Q. Yang, W. Bronner, K. Köhler, F. Fuchs, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6127-09]

2:20 pm: **Pixilated wideband achromatic waveplates fabricated for the mid-IR using subwavelength features,** R. R. Boye, S. A. Kemme, J. R. Wendt, A. A. Cruz-Cabrera, Sandia National Labs.; T. R. Carter, S. Samora, L&M Technologies . . . . . [6127-10]

2:40 pm: **Cavity ring-down spectroscopy with pulsed distributed feedback quantum cascade laser,** A. P. Lytkine, O. Sukhorukov, W. Jäger, J. Tulip, Univ. of Alberta (Canada) . . . . . [6127-11]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room L . . . . . Mon. 3:30 to 5:30 pm

High Power Lasers and Applications

Chairs: **C. Kumar N. Patel**, Pranalytica, Inc.; **Agisilaos A. Iliadis**, Univ. of Maryland/College Park

3:30 pm: **To be announced** *(Invited Paper),* G. A. Mourou, École Nationale Supérieure de Techniques Avancées (France) . . . . . [6127-12]

4:00 pm: **High power vertical external cavity surface emitting lasers and their applications** *(Invited Paper),* M. Fallahi, College of Optical Sciences/The Univ. of Arizona . . . . . [6127-13]

4:30 pm: **High-performance optical modulators based on stepped quantum wells** *(Invited Paper),* H. Mohseni, Northwestern Univ. . . . . [6127-14]

5:00 pm: **Recent advances in infrared laser diode system for paper cutting in digital printing applications** *(Invited Paper),* O. Acher, H. Pagès, H. Piombini, CEA Le Ripault (France) . . . . . [6127-15]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5
RM: Conv. Ctr. Room L . . . . . Tues. 10:30 am to 12:00 pm

Nanoelectrophotonics

Chairs: **Gerard A. Mourou**, École Nationale Supérieure de Techniques Avancées (France); **Jerry R. Meyer**, Naval Research Lab.

10:30 am: **Ballistic electrophotonics** *(Invited Paper),* V. Narayanamurti, Harvard Univ. . . . . [6127-16]

11:00 am: **Strain effects on the electronic properties of InAs/GaAs self-assembled quantum dots (Invited Paper, Presentation Only),** J. Leburton, Univ. of Illinois at Urbana-Champaign . . . . . [6127-17]

11:30 am: **Nanostructured semiconductors for optoelectronic applications** *(Invited Paper),* J. P. Reithmaier, Univ. Würzburg (Germany) and Univ. Kassel (Germany) . . . . . [6127-18]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6
RM: Conv. Ctr. Room L . . . . . Tues. 1:30 to 3:00 pm

Quantum Dots I

Chairs: **Venkatesh Narayanamurti**, Harvard Univ.; **Jean-Pierre Leburton**, Univ. of Illinois at Urbana-Champaign

1:30 pm: **GaN quantum dots: nanophotonics and nanophononics** *(Invited Paper),* M. Dutta, D. Alexson, Univ. of Illinois at Chicago; J. Brown, P. M. Petroff, J. S. Speck, Univ. of California/Santa Barbara; M. A. Stroscio, Univ. of Illinois at Chicago and Univ. of California/Santa Barbara; T. Yamanaka, Univ. of Illinois at Chicago . . . . . [6127-19]

2:00 pm: **Optical advanced spectroscopic techniques for the study of nanostructured materials** *(Invited Paper),* S. R. Lefrant, Univ. de Nantes (France) . . . . . [6127-20]

2:30 pm: **Fabrication of GaN nanotubular material using MOCVD with aluminum oxide membrane** *(Invited Paper),* W. Jung, S. Jung, Kookmin Univ. (South Korea); P. Kung, M. Razeghi, Northwestern Univ. . . . . [6127-21]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 7
RM: Conv. Ctr. Room L . . . . . Tues. 3:30 to 5:10 pm

Quantum Dots II

Chairs: **Serge R. Lefrant**, Univ. de Nantes (France); **Venkataraman S. Swaminathan**, Army Research Lab.

3:30 pm: **Colloidal quantum dots as optoelectronic elements** *(Invited Paper),* M. A. Stroscio, D. Alexson, M. Dutta, D. Geerpuram, Univ. of Illinois at Chicago; N. A. Kotov, Univ. of Michigan; Y. Li, D. Ramadurai, P. Shi, Univ. of Illinois at Chicago; Z. Tang, Univ. of Michigan . . . . . [6127-22]

4:00 pm: **InAs quantum dot infrared photodetectors on InP by MOCVD** *(Invited Paper),* W. Zhang, H. Lim, M. Taguchi, S. Tsao, J. Szafraniec, A. A. Quivy, B. Movaghar, M. Razeghi, Northwestern Univ.; V. Nathan, Air Force Research Lab. . . . . [6127-23]

4:30 pm: **InGaAs/InGaP quantum-dot infrared photodetector with a high detectivity,** J. Szafraniec, S. Tsao, A. A. Quivy, W. Zhang, H. Lim, M. Taguchi, B. Movaghar, M. Razeghi, Northwestern Univ.; M. Z. Tidrow, Missile Defense Agency . . . . . [6127-24]

4:50 pm: **Charge carrier transport in barrier "in-macroporous silicon" structures,** L. A. Karachevtseva, V. F. Onishchenko, F. F. Sizov, A. V. Sukach, V. F. Teterkin, Institute of Semiconductor Physics (Ukraine) . . . . . [6127-25]

Wednesday 25 January

SESSION 8
RM: Conv. Ctr. Room L . . . . . Wed. 8:00 to 10:00 am

Infrared Detectors and FPAs I

Chairs: **Joe Pellegrino**, U.S. Army Night Vision & Electronic Sensors Directorate; **James A. Lott**, Air Force Institute of Technology

8:00 am: **Space-based infrared technology for missile defense** *(Invited Paper),* M. Z. Tidrow, Missile Defense Agency . . . . . [6127-26]

8:30 am: **MCT research at the Night Vision Lab** *(Invited Paper),* J. Pellegrino, U.S. Army Night Vision & Electronic Sensors Directorate . . . . . [6127-27]

9:00 am: **Infrared lasers and detectors operating in the 3-12 μm range using band-gap engineered structures with type II band-gap alignment** *(Invited Paper),* V. S. Swaminathan, Army Research Lab. . . . . [6127-28]

9:30 am: **Influence of IR sensor technology on the military and civil defense** *(Invited Paper),* L. S. R. Becker, U.S. Army Space and Missile Defense Command . . . . . [6127-29]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 9
RM: Conv. Ctr. Room L . . . . . Wed. 10:30 am to 12:30 pm

Infrared Detectors and FPAs II

Chairs: **Meimei Z. Tidrow**, Missile Defense Agency; **Latika S. R. Becker**, U.S. Army Space and Missile Defense Command

10:30 am: **High quantum efficiency long-wave infrared photodiodes using W- structured type-II superlattices** *(Invited Paper),* E. H. Aifer, J. G. Tischler, J. H. Warner, Naval Research Lab.; C. L. Canedy, E. M. Jackson, Naval Research Lab. and SFA Inc.; I. Vurgaftman, J. C. Kim, J. R. Meyer, L. J. Whitman, Naval Research Lab. . . . . [6127-30]

11:00 am: **Performance characteristics of high-purity mid-wave and long-wave infrared type-II InAs/GaSb superlattice infrared photodiodes** *(Invited Paper),* A. D. Hood, E. J. Michel, F. Fuchs, M. Razeghi, Northwestern Univ.; V. Nathan, Air Force Research Lab.; E. H. Aifer, Naval Research Lab.; M. Z. Tidrow, Missile Defense Agency . . . . . [6127-31]

11:30 am: **Optical performance of InAs/GaSb superlattice LWIR detectors** *(Invited Paper),* G. J. Sullivan, Rockwell Scientific Co., LLC . . . . . [6127-32]

12:00 pm: **Single- and two-color HgTe/CdTe-superlattice based infrared detectors** *(Invited Paper),* C. H. Grein, P. Boieriu, EPIR Technologies, Inc.; M. E. Flatte, The Univ. of Iowa . . . . . [6127-33]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 10
RM: Conv. Ctr. Room L . . . . . Wed. 1:30 to 3:00 pm

Infrared Detectors and FPAs III

Chairs: **Allan Hahn**, Air Force Research Lab.; **Edward H. Aifer**, Naval Research Lab.

1:30 pm: **SOI diode uncooled focal plane arrays** *(Invited Paper),* M. Kimata, Ritsumeikan Univ. (Japan); M. Ueno, M. Takeda, T. Seto, Mitsubishi Electric Corp. (Japan) . . . . . [6127-34]

2:00 pm: **High-quantum efficiency dual band C-QWIP detectors** *(Invited Paper),* J. W. Devitt, D. P. Forrai, D. Endres, R. Rawe, L-3 Communications Cincinnati Electronics, Inc.; K. K. Choi, V. S. Swaminathan, Army Research Lab.; A. M. Sarangan, Univ. of Dayton . . . . . [6127-35]

2:30 pm: **Development of device fabrication process for strained layer superlattice IR detectors** *(Invited Paper),* D. R. Rhiger, R. E. Kvaas, M. V. Liguori, M. A. Gritz, G. Crawford, Raytheon Vision Systems; C. J. Hill, Jet Propulsion Lab. . . . . [6127-36]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 11

RM: Conv. Ctr. Room L . . . . . Wed. 3:30 to 5:00 pm

Nanophotonics

Chairs: **Masafumi Kimata**, Ritsumeikan Univ. (Japan); **Mitra Dutta**, Univ. of Illinois at Chicago

3:30 pm: **Fancy shaped polymer based micro-billiard lasers: tailoring testbeds for wave chaos physics** *(Invited Paper),* M. Lebental, J. Lauret, R. Hierle, J. Zyss, École Normale Supérieure de Cachan (France) . . . . [6127-37]

4:00 pm: **Anisotropic magneto-thermopower in ferromagnetic structures** *(Invited Paper),* J. Wegrowe, H. M. Drouhin, École Polytechnique (France) . . . . . [6127-38]

4:30 pm: **Fabrication and integration of micro- nano-scale photonic devices and sensors for application specific planar optical integrated circuit board** *(Invited Paper),* E. Lee, Inha Univ. (South Korea) . . . . . [6127-39]

Thursday 26 January

SESSION 12

RM: Conv. Ctr. Room L . . . . . Thurs. 8:00 to 10:00 am

Carbon Nanotubes

Chairs: **Kazuhiko Matsumoto**, National Institute of Advanced Industrial Science and Technology (Japan); **Eronides F. da Silva, Jr.**, Univ. Federal de Pernambuco (Brazil)

8:00 am: **Precise control of number of carbon nanotube growth by current monitoring** *(Invited Paper),* M. Maeda, Univ. of Tsukuba (Japan); T. Kamimura, Osaka Univ. (Japan); C. Hyon, National Institute of Advanced Industrial Science and Technology (Japan); K. Murata, Olympus Corp. (Japan); K. Matsumoto, Osaka Univ. (Japan) . . . . . [6127-40]

8:30 am: **Electrical observation of 1D sub-band structure of carbon nanotube in Schottky barrier transistor** *(Invited Paper),* T. Kamimura, K. Matsumoto, Osaka Univ. (Japan) . . . . . [6127-41]

9:00 am: **High-sensitive label-free biosensors based on single-walled carbon nanotubes** *(Invited Paper),* K. Maehashi, K. Matsumoto, Osaka Univ. (Japan) . . . . . [6127-42]

9:30 am: **Island size control of carbon nanotube single electron transistor operating at room temperature by AFM electrical manipulation** *(Invited Paper),* C. Hyon, Japan Science and Technology Corp. (Japan) and National Institute of Advanced Industrial Science and Technology (Japan); T. Kamimura, Japan Science and Technology Corp. (Japan) and Osaka Univ. (Japan); M. Maeda, Univ. of Tsukuba (Japan) and Japan Science and Technology Corp. (Japan); K. Matsumoto, Osaka Univ. (Japan) and Japan Science and Technology Corp. (Japan) and National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6127-43]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 13

RM: Conv. Ctr. Room L . . . . . Thurs. 10:30 am to 12:30 pm

Photonic Crystals

Chairs: **Yoshinobu Aoyagi**, The Institute of Physical and Chemical Research - RIKEN (Japan); **Michael D. Gerhold**, U.S. Army Research Office

10:30 am: **Photonic engineering of quantum cascade lasers with novel functionalities** *(Invited Paper),* F. Capasso, M. A. Belkin, M. Loncar, M. Troccoli, L. Diehl, E. Cubuckcu, B. Lee, Harvard Univ.; O. J. Painter, J. Rosenberg, California Institute of Technology; A. A. Belyanin, Texas A&M Univ. . . [6127-44]

11:00 am: **Simultaneous inhibition and redistribution of spontaneous emission in 2D photonic crystal slabs** *(Invited Paper),* S. Noda, Kyoto Univ. (Japan) . . . . . [6127-45]

11:30 am: **Organic photonic devices utilizing nano-structured materials** *(Invited Paper),* H. Kajii, T. Morimune, H. Maki, Y. Hino, Z. Kin, Y. Ohmori, Osaka Univ. (Japan) . . . . . [6127-46]

12:00 pm: **Photonic crystal microstructured fiber lasers** *(Invited Paper),* N. N. Peyghambarian, College of Optical Sciences/The Univ. of Arizona . . . . . [6127-47]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 14

RM: Conv. Ctr. Room L . . . . . Thurs. 1:30 to 3:10 pm

III-Nitride Nanophotonics

Chairs: **Susumu Noda**, Kyoto Univ. (Japan); **Nasser N. Peyghambarian**, College of Optical Sciences/ The Univ. of Arizona

1:30 pm: **Development of ZnMgCdO-based alloys and heterostructures for optical applications** *(Invited Paper),* M. D. Gerhold, U.S. Army Research Office; A. Osinsky, SVT Associates, Inc.; D. C. Look, Wright State Univ. . . . . [6127-48]

2:00 pm: **III-nitride deep ultraviolet micro- and nano-photonics** *(Invited Paper),* H. Jiang, J. Y. Lin, Kansas State Univ. . . . . [6127-49]

2:30 pm: **Solar-blind avalanche photodiodes,** R. P. McClintock, K. A. Mayes, A. Yasan, P. Kung, M. Razeghi, Northwestern Univ. . . . . [6127-50]

2:50 pm: **High-sensitivity rotation sensing with atomic interferometers using Aharonov-Bohm effect,** M. Ozcan, Sabanci Univ. (Turkey) . . . [6127-51]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 15

RM: Conv. Ctr. Room L . . . . . Thurs. 3:30 to 5:10 pm

Infrared Detectors and Characterization

Chairs: **Michael A. Stroscio**, Univ. of Illinois at Chicago; **Cole W. Litton**, Air Force Research Lab.

3:30 pm: **Status of two-color and large format HgCdTe FPA technology at Raytheon Vision Systems** *(Invited Paper),* E. P. G. Smith, R. E. Bornfreund, I. Kasai, L. T. Pham, E. A. Patten, J. Peterson, Raytheon Vision Systems; J. A. Roth, B. Nosho, J. E. Jensen, HRL Labs., LLC; J. W. Bangs, S. M. Johnson, W. A. Radford, Raytheon Vision Systems . . . . . [6127-52]

4:00 pm: **Atomically accurate structure analysis for reliable bandgap engineering of strained layer superlattices** *(Invited Paper),* M. Weimer, Texas A&M Univ.; M. E. Flatte, The Univ. of Iowa; C. H. Grein, Univ. of Illinois at Chicago and EPIR Technologies, Inc.; A. P. Ongstad, Air Force Research Lab.; G. J. Sullivan, Rockwell Scientific Co., LLC . . . . . [6127-53]

4:30 pm: **Positive and negative luminescence in binary type II InAs/GaSb superlattice photodiodes,** D. M. Hoffman, A. D. Hood, Y. Wei, E. J. Michel, F. Fuchs, M. Razeghi, Northwestern Univ. . . . . [6127-54]

4:50 pm: **Short-period superlattices: is thinner better?,** G. J. Brown, H. J. Haugan, F. Szmulowicz, K. Mahalingam, L. Grazulis, S. Houston, Air Force Research Lab. . . . . [6127-55]

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Photonic Crystal Materials and Devices IV

Conference Chairs: **Ali Adibi**, Georgia Institute of Technology; **Shawn-Yu Lin**, Rensselaer Polytechnic Institute; **Axel Scherer**, California Institute of Technology

Program Committee: **Douglas C. Allan**, Corning Inc.; **Shanhui Fan**, Stanford Univ.; **Maryanne C. Large**, The Univ. of Sydney (Australia); **Reginald K. Lee**, California Institute of Technology; **Susumu Noda**, Kyoto Univ. (Japan); **Masaya Notomi**, NTT Basic Research Labs. (Japan); **Ekmel Özbay**, Bilkent Univ. (Turkey); **William J. Wadsworth**, Univ. of Bath (United Kingdom); **Robert S. Windeler**, OFS Fitel Labs.; **Yong Xu**, California Institute of Technology; **Eli Yablonovitch**, Univ. of California/Los Angeles

Monday 23 January

SESSION 1
RM: Marriott: San Jose Ballroom Salon III . Mon. 8:30 to 10:00 am

Special Review Session: Present and Future of Photonic Crystals

Chair: **Ali Adibi**, Georgia Institute of Technology

8:30 am: **Nonlinear optical nanostructures for filtering and switching light** *(Invited Paper),* A. Scherer, M. Hochberg, T. Baehr-Jones, G. Wang, California Institute of Technology; R. Lawson, Y. Liao, P. A. Sullivan, L. R. Dalton, A. K. Jen, Univ. of Washington . . . . . [6128-01]

9:00 am: **To be announced** *(Invited Paper),* S. John, Univ. of Toronto (Canada) . . . . . [6128-02]

9:30 am: **Silicon integrated nanophotonics: advantages and challenges** *(Invited Paper),* Y. G. A. Vlasov, IBM Thomas J. Watson Research Ctr. [6128-03]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2
RM: Marriott: San Jose Ballroom Salon III Mon. 10:30 am to 12:00 pm

Fabrication of Photonic Crystal Structures

Chair: **Axel Scherer**, California Institute of Technology

10:30 am: **Cu coated square Si nanospring arrays as a 3D photonic crystal: fabricated by a novel oblique angle deposition technique and low-pressure chemical vapor deposition** *(Invited Paper),* S. Lin, D. Ye, J. A. Bur, T. Lu, Rensselaer Polytechnic Institute . . . . . [6128-04]

11:00 am: **Tailorable, 3D microfabrication for photonic applications: Two-polymer microtransfer molding,** J. Lee, C. Kim, K. Constant, K. Ho, Iowa State Univ. . . . . [6128-05]

11:20 am: **Novel spatially distributed porous Si optical bandpass filters,** N. Tokranova, SUNY/Univ. at Albany; I. A. Levitsky, Emitech, Inc.; A. Gracias, B. Xu, J. Castracane, SUNY/Univ. at Albany . . . . . [6128-06]

11:40 am: **Infrared photonic bandgap materials and structures,** S. K. Sundaram, Pacific Northwest National Lab. . . . . [6128-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3
RM: Marriott: San Jose Ballroom Salon III . . Mon. 1:30 to 3:00 pm

Analysis, Design, and Optimization of Photonic Crystal Structures I

Chair: **Shawn-Yu Lin**, Rensselaer Polytechnic Institute

1:30 pm: **Ultraflat bands in 2D photonic crystals** *(Invited Paper),* M. Ibanescu, Massachusetts Institute of Technology . . . . . [6128-08]

2:00 pm: **Geometrical suppression of photonic band gaps,** D. R. Solli, R. Y. Chiao, Univ. of California/Berkeley; J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil) . . . . . [6128-09]

2:20 pm: **Simulation of VO2-based electrically programmable photonic crystals,** D. Xiao, K. W. Kim, North Carolina State Univ.; J. M. Zavada, U.S. Army Research Office . . . . . [6128-10]

2:40 pm: **The impact of high-dielectric constant on photonic bandgaps in PbSe nanocrystal-based photonic crystal slabs,** V. Nair, W. Zhou, The Univ. of Texas at Arlington . . . . . [6128-11]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4
RM: Marriott: San Jose Ballroom Salon III . . Mon. 3:30 to 5:30 pm

Analysis, Design, and Optimization of Photonic Crystal Structures II

Chair: **Mihai Ibanescu**, Massachusetts Institute of Technology

3:30 pm: **Two dimensional coupled photonic crystal microcavity arrays and its applications,** H. Altug, J. Vuckovic, Stanford Univ. . . . . [6128-12]

3:50 pm: **Magneto-optical circulator in 2D photonic crystals,** Z. Wang, S. Fan, Stanford Univ. . . . . [6128-13]

4:10 pm: **Theoretical analysis of band gap formation in rotationally symmetric 2D photonic quasicrystal using rotational symmetry arguments,** K. Mnaymneh, R. C. Gauthier, Carleton Univ. (Canada) . . . . . [6128-14]

4:30 pm: **Accuracy of the tight binding approximation for the description of the photonic crystal coupled cavities,** T. Kamalakis, T. Sphicopoulos, S. Dimitris, Univ. of Athens (Greece) . . . . . [6128-15]

4:50 pm: **Design optimization of a high-Q channel add-drop filter with a twin stick-shaped resonator system,** K. H. Hwang, Gwangju Institute of Science and Technology (South Korea) and Samsung SDI Co., Ltd. (South Korea); C. M. Lim, G. H. Song, Gwangju Institute of Science and Technology (South Korea) . . . . . [6128-16]

5:10 pm: **Controllable polarization splitting in liquid crystal infiltrated photonic crystal,** A. Gandhi, X. Sun, P. Shum, Nanyang Technological Univ. (Singapore); M. Yu, Institute of Microelectronics (Singapore) . . . . . [6128-17]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5
RM: Marriott: San Jose Ballroom Salon III Tues. 10:30 am to 12:00 pm

Special Review Session:
Present and Future of Photonic Crystal Fibers

Chair: **Ali Adibi**, Georgia Institute of Technology

10:30 am: **Integration of hollow-core photonic crystal fiber in all-fiber devices** *(Invited Paper),* F. A. Benabid, Univ. of Bath (United Kingdom) . . . . . [6128-66]

11:00 am: **Fiber-web detectors and surface emitting photonics bandgrap fiber lasers** *(Invited Paper),* O. Shapira, Massachusetts Institute of Technology . . . . . [6128-67]

11:30 am: **Biosensing using microstructured polymer optical fibers** *(Invited Paper),* G. A. Emiliyanov, J. B. Jensen, Danmarks Tekniske Univ. (Denmark); P. E. Hoiby, Bioneer A/S (Denmark); O. Bang, Danmarks Tekniske Univ. (Denmark); L. H. Pedersen, Bioneer A/S (Denmark); A. O. Bjarklev, Danmarks Tekniske Univ. (Denmark) . . . . . [6128-68]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6
RM: Marriott: San Jose Ballroom Salon III . . Tues. 1:30 to 3:00 pm

Photonic Crystal Fibers

Chair: **Henri Benisty**, École Polytechnique (France)

1:30 pm: **Photonic crystal fibres: with and without bandgaps** *(Invited Paper),* W. J. Wadsworth, Univ. of Bath (United Kingdom) . . . . . [6128-18]

2:00 pm: **Recent advances in the development of holey optical fibers based on sulphide glasses,** F. Smektala, Univ. de Rennes I (France); L. Brilland, PERFOS (France); T. Chartier, T. N. Nguyen, École Nationale Supérieure des Sciences Appliquées et de Technologie (France); N. Traynor, PERFOS (France); J. Troles, T. Jouan, Univ. de Rennes I (France) . . . . . [6128-19]

2:20 pm: **Modal solutions of photonic crystal fibers by using a full-vectorial finite element method,** A. B. M. Rahman, S. A. K. M. Kabir, M. M. Vaghjani, I. Wijeratne, G. S. Sahota, M. Rajarajan, K. T. V. Grattan, City Univ. London (United Kingdom) . . . . . [6128-20]

2:40 pm: **Propagation characteristics of highly elliptical core photonic crystal fiber,** A. D. Varshney, R. K. Sinha, Delhi College of Engineering (India) . . . . . [6128-21]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 7
RM: Marriott: San Jose Ballroom Salon III . . Tues. 3:30 to 5:20 pm

Photonic Crystal Waveguides

Chair: **William J. Wadsworth**, Univ. of Bath (United Kingdom)

3:30 pm: **Role of 1D singularities in the operation of some photonic-crystal based devices** *(Invited Paper),* H. Benisty, L. Martinelli, E. Viasnoff-Schwoob, M. A. Pinault, C. Weisbuch, École Polytechnique (France); G. Duan, Alcatel Research & Innovation (France); H. Heidrich, K. Janiak, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) . . . . . [6128-22]

4:00 pm: **Theoretical and experimrntal study of mode dispersion in biperiodic photonic crystal structures,** A. Jafarpour, J. Huang, M. Soltani, M. Askari, A. Adibi, Georgia Institute of Technology . . . . . [6128-23]

4:20 pm: **Tunable time delays in photonic-crystal waveguides,** M. L. Povinelli, Stanford Univ.; S. G. Johnson, J. D. Joannopoulos, Massachusetts Institute of Technology . . . . . [6128-24]

4:40 pm: **Tamm's surface states in photonic crystal,** N. Malkova, C. Ning, NASA Ames Research Ctr. . . . . [6128-25]

5:00 pm: **Segmented cladding fibers for the middle infrared,** A. Millo, Y. Lavi, I. Neah, A. Katzir, Tel Aviv Univ. (Israel) . . . . . [6128-26]

Wednesday 25 January

SESSION 8
RM: Marriott: San Jose Ballroom Salon III . Wed. 8:00 to 10:00 am

Dispersive and Nonlinear Properties of Photonic Crystals

Chair: **Shanhui Fan**, Stanford Univ.

8:00 am: **Dispersion engineering for 3D subwavelength imaging using photonic crystals** *(Invited Paper),* D. W. Prather, Z. Lu, S. Shi, C. A. Schuetz, Univ. of Delaware . . . . . [6128-27]

8:30 am: **Compact preconditioned photonic crystal demultiplexers based on combined focusing and superprism effects** *(Invited Paper),* B. Momeni, J. Huang, M. Soltani, M. Askari, A. Adibi, Georgia Institute of Technology . . . . . [6128-28]

9:00 am: **Modulating dispersion properties of low index photonic crystal structures using microfluidics,** A. S. Sharkawy, S. Shi, EM Photonics, Inc. and Univ. of Delaware; D. W. Prather, Univ. of Delaware; S. E. McBride, P. J. Zanzucchi, Sarnoff Corp. . . . . [6128-29]

9:20 am: **Organic nonlinear Kerr materials in Fabry-Perot cavities for all optical switching,** N. Moll, A. Jebali, R. Harbers, S. Jochim, S. T. Gulde, R. F. Mahrt, B. J. Offrein, IBM Zürich Research Lab. (Switzerland) . . . [6128-30]

9:40 am: **Ultracompact current-injected optical modulator based on silicon photonic crystal waveguide,** Y. Jiang, L. Gu, The Univ. of Texas at Austin; W. Jiang, Omega Optics Inc.; X. Chen, R. T. Chen, The Univ. of Texas at Austin . . . . . [6128-31]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 9
RM: Marriott: San Jose Ballroom Salon III Wed. 10:30 am to 12:00 pm

Photonic Crystal Cavities and Emitters

Chair: **Kalpathy B. Sundaram**, Univ. of Central Florida

10:30 am: **The use of resonances in photonic crystals** *(Invited Paper),* S. Fan, Stanford Univ. . . . . [6128-32]

11:00 am: **An optically triggered Q-switched photonic crystal laser,** B. M. Maune, J. Witzens, M. Kolodrubetz, H. A. Atwater, California Institute of Technology; R. Hagen, Bayer AG (Germany); Y. Qiu, Jet Propulsion Lab. and California Institute of Technology; A. Scherer, California Institute of Technology . . . . . [6128-33]

11:20 am: **Coupling of PbS quantum dots to photonic crystal cavities at room temperature,** I. Fushman, D. R. Englund, J. Vuckovic, Stanford Univ. . . . . [6128-34]

11:40 am: **Resonant scattering and second harmonic generation spectroscopy of a photonic crystal microcavity,** M. W. McCutcheon, G. W. Rieger, I. W. Cheung, J. F. Young, The Univ. of British Columbia (Canada); D. Dalacu, S. Frederick, P. J. Poole, National Research Council Canada (Canada); G. C. Aers, R. L. Williams, National Research Council Canada (Canada) and Univ. of Ottawa (Canada) . . . . . [6128-35]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 10
RM: Marriott: San Jose Ballroom Salon III . . Wed. 1:30 to 3:00 pm

Novel Effects and Applications in Photonic Crystal Structures I

Chair: **Ilya V. Shadrivov**, The Australian National Univ. (Australia)

1:30 pm: **Experimental demonstration of sub-wavelength imaging by labyrinth based left handed composite metamaterials** *(Invited Paper),* E. Özbay, Bilkent Univ. (Turkey) . . . . . [6128-36]

2:00 pm: **Incorporation of electrooptic material in 2D photonic crystal microcavities: electrical tuning of cavity resonance,** Y. Lee, G. S. Subramania, P. G. Clem, Sandia National Labs. . . . . [6128-37]

2:20 pm: **Silicon-on-insulator-based photonic-crystal Mach-Zehnder interferometers,** L. Gu, Y. Jiang, W. Jiang, X. Chen, R. T. Chen, The Univ. of Texas at Austin . . . . . [6128-38]

2:40 pm: **Tunable terahertz Bloch oscillations in chirped photonic crystals,** V. M. P. Lousse, S. Fan, Stanford Univ. . . . . [6128-39]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 11
RM: Marriott: San Jose Ballroom Salon III . . Wed. 3:30 to 5:00 pm

Novel Effects and Applications in Photonic Crystal Structures II

Chair: **Ekmel Özbay**, Bilkent Univ. (Turkey)

3:30 pm: **Photonic crystals with negative index materials** *(Invited Paper),* I. V. Shadrivov, A. A. Sukhorukov, Y. S. Kivshar, The Australian National Univ. (Australia) . . . . . [6128-40]

4:00 pm: **Plasmonic films with a periodic arrangement of subwavelength slits,** P. B. Catrysse, G. Veronis, H. Shin, J. Shen, S. Fan, Stanford Univ. . . . . [6128-41]

4:20 pm: **Simultaneous localization of photons and phonons,** M. Maldovan, E. L. Thomas, Massachusetts Institute of Technology . . . . . [6128-42]

4:40 pm: **Lithium niobate phononic crystal for surface acoustic waves,** S. Benchabane, A. Khelif, J. Rauch, L. Robert, V. Laude, Institut Femto-ST (France) . . . . . [6128-43]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Fabrication of reconfigurable photonic bandgap-MEMS waveguide device,** M. A. Taysing-Lara, W. Zhou, G. Dang, D. M. Mackie, P. G. Newman, Army Research Lab. . . . . [6128-54]

✔ **Investigation of an effective medium theory for metallic periodic structures: a fitting-based approach,** S. Moon, D. Kim, Yonsei Univ. (South Korea) . . . . . [6128-55]

✔ **Nanophotonic boxes to modify black-body radiation for visible light emission,** C. Chao, C. Wu, C. F. Lin, National Taiwan Univ. (Taiwan) [6128-56]

✔ **Evaluation of manufacturability for 3D photonic crystal waveguide with nanoimprint,** T. Shimomura, K. Ito, N. Toyama, Dai Nippon Printing Co., Ltd. (Japan) . . . . . [6128-57]

✔ **Refractive index and geometrical structure measurement of a core-doped photonic crystal fiber,** Y. Youk, D. Y. Kim, K. Oh, Gwangju Institute of Science and Technology (South Korea) . . . . . [6128-58]

✔ **Analytical analysis of defect lines in 2D photonic crystals based on polynomial expansion of electromagnetic fields,** M. Chamanzar, A. H. Atabaki, K. Mehrany, S. Khorasani, B. Rashidian, Sharif Univ. of Technology (Iran) . . . . . [6128-59]

✔ **Ultrahigh resolution photonic crystal nanoprobe for high-density optical data storage, near-field microscopy and nanolithography systems,** A. S. Sharkawy, S. Shi, EM Photonics, Inc. and Univ. of Delaware; T. E. Dillon, G. J. Schneider, D. W. Prather, Univ. of Delaware . . . . . [6128-60]

✔ **Tunable photonic crystals based on liquid crystals,** P. Dardano, L. Sirleto, L. Moretti, V. Mocella, I. Rendina, Istituto per la Microelettronica e Microsistemi (Italy) . . . . . [6128-61]

✔ **Experimental demonstration of self-collimation in 3D photonic crystal at microwave frequencies,** Z. Lu, S. Shi, J. A. Murakowski, C. A. Schuetz, G. J. Schneider, D. W. Prather, Univ. of Delaware . . . . . [6128-63]

✔ **Low splicing loss and high-tensile strength index-guiding holey fiber with new defect design,** S. Kim, Y. Jung, K. Oh, Gwangju Institute of Science and Technology (South Korea); U. Röpke, J. Kirchhof, H. Bartelt, Institut für Physikalische Hochtechnologie e.V. (Germany) . . . . . [6128-64]

✔ **Refractive index measurement by using a photonic crystal fiber,** J. Sun, C. C. Chan, Nanyang Technological Univ. (Singapore) . . . . . [6128-65]

Thursday 26 January

SESSION 12
RM: Marriott: San Jose Ballroom Salon III . Thurs. 8:00 to 9:50 am

Modeling and Simulation of Photonic Crystal Structures I

Chair: **Dennis W. Prather**, Univ. of Delaware

8:00 am: **Low interface reflection of rod-type photonic crystals: a bottom up approach** *(Invited Paper),* C. M. de Sterke, T. White, The Univ. of Sydney (Australia); L. C. Botten, Univ. of Technology/Sydney (Australia); R. C. McPhedran, The Univ. of Sydney (Australia) . . . . . [6128-44]

8:30 am: **Discontinuous Galerkin spectral element methods for photonic crystals,** M. Min, Argonne National Lab. and Brown Univ. . . . . [6128-45]

8:50 am: **Application of the homogenization approximation to interfacial roughness in 1D photonic crystals,** K. R. Maskaly, Los Alamos National Lab.; W. C. Carter, Massachusetts Institute of Technology; R. D. Averitt, J. L. Maxwell, Los Alamos National Lab. . . . . [6128-46]

9:10 am: **Numerical band calculation of holographically formed periodic structures with irregular motif,** D. Chanda, L. Abolghasemi, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6128-47]

9:30 am: **Efficient modeling of photonic crystal structures under diffuse light illumination,** M. Badieirostami, A. Adibi, Georgia Institute of Technology . . . . . [6128-48]

Coffee Break . . . . . 9:50 to 10:30 am

SESSION 13
RM: Marriott: San Jose Ballroom Salon III Thurs. 10:30 am to 12:10 pm

Modeling and Simulation of Photonic Crystal Structures II

Chair: **C. Martijn de Sterke**, The Univ. of Sydney (Australia)

10:30 am: **Variation of a photonic crystal color with the Miller indices of the exposed surface,** J. Vigneron, Facultes Univ. Notre Dame de la Paix (Belgium); V. M. P. Lousse, Stanford Univ. and Facultes Univ. Notre Dame de la Paix (Belgium) . . . . . [6128-49]

10:50 am: **FDTD analysis of photonic quasicrystal,** K. Mnaymneh, R. C. Gauthier, Carleton Univ. (Canada) . . . . . [6128-50]

11:10 am: **Resonant effect analysis at finite 1D anisotropic photonic crystal band edges,** Y. Cao, M. A. Fiddy, Univ. of North Carolina/Charlotte . . [6128-51]

11:30 am: **Photonic crystal devices analysis based on perturbation theory,** M. Chamanzar, S. Khorasani, Sharif Univ. of Technology (Iran) . . . . . [6128-52]

11:50 am: **Modeling and design of photonic band gap polarizer,** Y. Kalra, R. K. Sinha, Delhi College of Engineering (India) . . . . . [6128-53]

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6129

Quantum Dots, Particles, and Nanoclusters III

Conference Chairs: **Kurt G. Eyink**, Air Force Research Lab.; **Diana L. Huffaker**, The Univ. of New Mexico

Program Committee: **Pallab K. Bhattacharya**, Univ. of Michigan; **C. J. Brinker**, Sandia National Labs.; **Joe C. Campbell**, The Univ. of Texas at Austin; **Dennis G. Deppe**, The Univ. of Texas at Austin; **Alfred W. Forchel**, Univ. Würzburg (Germany); **Lingjie J. Guo**, Univ. of Michigan; **Axel Hoffmann**, Technische Univ. Berlin (Germany); **Yong Hee Lee**, Korea Advanced Institute of Science and Technology (South Korea); **Luke F. Lester**, The Univ. of New Mexico; **James A. Lott**, Air Force Institute of Technology; **Richard P. Mirin**, National Institute of Standards and Technology; **Manijeh Razeghi**, Northwestern Univ.

Monday 23 January

SESSION 1

RM: Marriott: San Jose Ballroom Salon VI . Mon. 8:30 to 10:10 am

Quantum Dot Physics

Chair: **Thomas R. Nelson, Jr.**, Air Force Research Lab.

8:30 am: **Anticompetition of laser modes in quantum dot lasers,** C. F. Lin, D. Chiang, National Taiwan Univ. (Taiwan) . . . . . [6129-01]

8:50 am: **Experimental and theoretical study of multiple cations intermixing in InP-based quantum dot-in-well structure,** Y. Wang, H. Susanto Djie, B. Ooi, Lehigh Univ. . . . . [6129-03]

9:10 am: **Feasibility of conventional method of extracting internal loss and internal quantum efficiency in edge-emitting quantum dot lasers,** L. V. Asryan, Virginia Polytechnic Institute and State Univ. . . . . [6129-04]

9:30 am: **Characteristics of In(Ga)As quantum dot lasers on InP emitting at 1.5um in continuous wave mode,** N. J. Kim, J. S. Yim, D. Lee, Chungnam National Univ. (South Korea); S. H. Pyun, W. G. Jeong, Sungkyunkwan Univ. (South Korea) . . . . . [6129-05]

9:50 am: **Growth and characterization of InGaN/GaN nanocolumn LED,** A. Kikuchi, M. Tada, K. Miwa, K. Kishino, Sophia Univ. (Japan) . . . . . [6129-06]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Marriott: San Jose Ballroom Salon VI . Mon. 10:30 to 11:50 am

Quantum Dot Devices

Chair: **Luke F. Lester**, Univ. of New Mexico

10:30 am: **Quantum dot photonic crystal detectors,** K. T. Posani, The Univ. of New Mexico; V. Tripathi, Indian Institute of Technology/Kanpur (India); S. Annamalai, S. Krishna, The Univ. of New Mexico; R. Perahia, O. Crisafulli, O. J. Painter, California Institute of Technology . . . . . [6129-07]

10:50 am: **Broad-band superluminescent light emitting diodes incorporating quantum dots in compositionally modulated quantum wells,** R. A. Hogg, S. Ray, K. Groom, M. Beattie, H. Liu, M. Hopkinson, The Univ. of Sheffield (United Kingdom) . . . . . [6129-08]

11:10 am: **Tunnel quantum well-on-dots InGaAs-InAs high-gain medium for laser diodes,** V. E. Tokranov, M. Yakimov, J. van Eisden, S. Oktyabrsky, SUNY/Univ. at Albany . . . . . [6129-09]

11:30 am: **GaAs-based 1.3 μm quantum dot laser diode with 3-stacked InAs DWELL (dots-in-a-well) structure and Al0.7Ga0.3As cladding layer,** K. W. Kim, Korea Institute of Science and Technology (South Korea) and Korea Univ. (South Korea); N. K. Cho, S. P. Ryu, J. D. Song, W. J. Choi, J. I. Lee, Korea Institute of Science and Technology (South Korea); J. H. Park, Korea Univ. (South Korea) . . . . . [6129-10]

Lunch Break . . . . . 11:50 am to 1:30 pm

SESSION 3

RM: Marriott: San Jose Ballroom Salon VI . . Mon. 1:30 to 5:10 pm

Quantum Dot Growth

Chairs: **James A. Lott**, Air Force Institute of Technology; **Kurt G. Eyink**, Air Force Research Lab.

1:30 pm: **Infrared InN(As)Sb quantum dots for integrated smart sensor application,** S. M. Kim, H. B. Yuen, F. Hatami, Stanford Univ.; A. Moto, Innovation Core SEI Ltd.; J. S. Harris, Stanford Univ. . . . . [6129-11]

1:50 pm: **Self-assembly of heterojunction quantum dots(HeQuaDs),** K. G. Eyink, D. H. Tomich, Air Force Research Lab.; L. Grazulis, Univ. of Dayton Research Institute; J. J. Pitz, Air Force Research Lab.; K. Mahalingam, Universal Technology Corp.; J. Shank, Air Force Research Lab. . . . . [6129-12]

2:10 pm: **STEM and EDX study of material composition in Si/SiGe quantum dots,** A. Elfving, Linköpings Univ. (Sweden); A. Karim, M. Larsson, G. V. Hansson, Linköping Univ. (Sweden) . . . . . [6129-13]

2:30 pm: **Lateral distributions of MBE and MOCVD In(Ga)As quantum dots,** A. Roshko, National Institute of Standards and Technology; J. Cederberg, Sandia National Labs. . . . . [6129-14]

2:50 pm: **Strain-compensation in closely-spaced stacked quantum dot active regions grown by metalorganic chemical vapor deposition,** N. Nuntawong, Y. C. Xin, P. Wong, C. P. Hains, S. Huang, L. F. Lester, D. L. Huffaker, CHTM/The Univ. of New Mexico . . . . . [6129-15]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Polarization dependent size of Ge nanoparticle formed by ultrafast laser,** S. C. Jeoung, Korea Research Institute of Standards and Science (South Korea); M. Seo, Seoul National Univ. (South Korea); H. S. Kim, Korea Research Institute of Standards and Science (South Korea); D. S. Kim, Seoul National Univ. (South Korea) . . . . . [6129-16]

3:50 pm: **Control of size, position, and density of self-assembled InAs/GaAs quantum dots grown by molecular beam epitaxy on dielectic paterned substrates,** R. A. Hogg, J. Lin, M. Hopkinson, P. W. Fry, I. Ross, C. M. Tey, T. Cullis, R. Kolodka, A. Tartakovskii, M. Skolnick, The Univ. of Sheffield (United Kingdom) . . . . . [6129-17]

4:10 pm: **Experimental and theoretical investigation of the third-order nonlinearity in CdS quantum dots in a dendrimer matrix,** M. Potasek, R. Dorsinville, M. Etienne, A. Walser, D. Bauer, V. Balogh-Nair, City College of New York . . . . . [6129-18]

4:30 pm: **Intense midinfrared emission from self-assembled PbTe/CdTe quantum dots fabricated by lattice type mismatched epitaxy,** E. Kaufmann, W. Heiss, M. Boeberl, T. Schwarzl, G. Springholz, G. Hesser, F. Schaeffler, Johannes Kepler Univ. Linz (Austria); K. Koike, H. Harada, M. Yano, Osaka Institute of Technology (Japan) . . . . . [6129-19]

4:50 pm: **Saturable SiO2/PbTe quntum dots waveguides for the 1.3-1.5 μm region,** E. Rodriguez, E. Jimenez, C. L. César, L. C. Barbosa, Univ. Estadual de Campinas (Brazil) . . . . . [6129-20]

Tuesday 24 January

OPTO PLENARY SESSION

Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Silicon Photonics**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 4

RM: Marriott: San Jose Ballroom Salon VI . Tues. 10:30 to 11:50 am

Quantum Cascade

Chair: **David E. Zelmon**, Air Force Research Lab.

10:30 am: **Time-resolved and antibunching measurements on single photons at 1300nm from InAs quantum dots,** C. Zinoni, B. Alloing, V. Zwiller, C. Monat, L. Li, A. Fiore, École Polytechnique Fédérale de Lausanne (Switzerland); L. Lunghi, Univ. degli Studi di Roma (Italy); A. Gerardino, CNR-Universita degli Studi (Italy) . . . . . [6129-21]

10:50 am: **Sub-micrometer electrically-pumped light emitting devices based on single quantum dots for single photon applications at 1300 nm,** C. Monat, C. Zinoni, B. Alloing, L. H. Li, A. Fiore, Ecole Polytechnique Federale de Lausanne (Switzerland); L. Lunghi, G. Annamaria, CNR-Instituto di Fotonica e Nanotecnologie (Italy) . . . . . [6129-22]

11:10 am: **An electrically driven microcavity single photon source,** P. See, M. Ward, O. Karimov, Z. Yuan, A. Shields, Toshiba Research Europe Ltd. (United Kingdom); T. Farrow, P. Atkinson, D. A. Ritchie, Univ. of Cambridge (United Kingdom) . . . . . [6129-23]

11:30 am: **Quantum dots in micropillar cavities as bright single photon sources,** M. J. Stevens, R. P. Mirin, National Institute of Standards and Technology . . . . . [6129-24]

Tuesday-Wednesday 24-25 January 2006 • Proceedings of SPIE Vol. 6130

Advanced Optical and Quantum Memories and Computing III

Conference Chairs: **Hans J. Coufal**, IBM Corp.; **Zameer U. Hasan**, Temple Univ.; **Alan E. Craig**, Montana State Univ./Bozeman

Program Committee: **Philip R. Hemmer**, Texas A&M Univ.; **Demetri Psaltis**, California Institute of Technology; **Selim M. Shahriar**, Northwestern Univ.; **Warren S. Warren, Sr.**, Princeton Univ.

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 1

RM: Conv. Ctr. Room B2 . . . . . Tues. 10:20 am to 12:20 pm

Slow Light I

Chair: **Selim M. Shahriar**, Northwestern Univ.

10:20 am: **Applications of slow light in telecommunication and optical switching** *(Invited Paper),* R. W. Boyd, A. Schweinsberg, P. T. Zerom, G. Piredda, Z. Shi, H. Shin, Univ. of Rochester . . . . . [6130-01]

10:50 am: **Slow light in optical fibers** *(Invited Paper),* A. L. Gaeta, J. E. Sharping, Y. Okawachi, S. Ghosh, Cornell Univ.; M. Bigelow, A. Schweinsberg, R. W. Boyd, Univ. of Rochester; Z. Zhu, D. J. Gauthier, Duke Univ.; Y. Wang, A. E. Willner, Univ. of Southern California . . . . . [6130-02]

11:20 am: **Slow- and fast-light enhanced rotation sensing and Fabry-Perot interferometry** *(Invited Paper),* R. Tripathi, G. S. Pati, V. Gopal, K. Salit, M. Messal, S. M. Shahriar, Northwestern Univ. . . . . [6130-03]

11:50 am: **Stopping light in photonic crystals: some practical considerations** *(Invited Paper),* S. Sandhu, M. L. Povinelli, M. F. Yanik, S. Fan, Stanford Univ. . . . . [6130-04]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 2

RM: Conv. Ctr. Room B2 . . . . . Tues. 1:30 to 3:30 pm

Slow Light II

Chair: **Zameer U. Hasan**, Temple Univ.

1:30 pm: **Engineering nonlinearities in slow-light materials for photonic quantum information processing** *(Invited Paper),* C. M. Santori, S. M. Spillane, M. Fiorentino, R. G. Beausoleil, Hewlett-Packard Labs. . . . . [6130-05]

2:00 pm: **Towards integration of quantum interference in alkali atoms on a chip** *(Invited Paper),* H. Schmidt, W. Yang, D. Yin, Univ. of California/Santa Cruz; D. B. Conkey, J. P. Barber, A. R. Hawkins, Brigham Young Univ. . . . . [6130-06]

2:30 pm: **Improving the bandwidth of slow-light delay lines** *(Invited Paper),* Z. Zhu, A. M. Dawes, D. J. Gauthier, Duke Univ.; M. D. Stenner, M. A. Neifeld, The Univ. of Arizona . . . . . [6130-07]

3:00 pm: **Expanding of the bandwidth of slow light by artificial inhomogeneous broadening** *(Invited Paper),* D. Qing, Z. Deng, P. R. Hemmer, M. O. Scully, M. S. Zubairy, Texas A&M Univ. . . . . [6130-08]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 3

RM: Conv. Ctr. Room B2 . . . . . Tues. 3:50 to 5:50 pm

Slow Light III

Chair: **Philip R. Hemmer**, Texas A&M Univ.

3:50 pm: **Losses in optical resonators in the slow light regime** *(Invited Paper),* Y. G. A. Vlasov, F. Xia, S. J. McNab, IBM Thomas J. Watson Research Ctr. . . . . [6130-09]

4:20 pm: **Light pulse delay in semiconductor quantum well Bragg structures** *(Invited Paper),* N. H. Kwong, Z. S. Yang, D. T. Nguyen, R. H. Binder, The Univ. of Arizona; A. L. Smirl, The Univ. of Iowa . . . . . [6130-10]

4:50 pm: **Buffer-gas induced absorption resonances and large negative Tulse delay times in Rb vapor** *(Invited Paper),* G. R. Welch, E. E. Mikhailov, I. Novikova, V. A. Sautenkov, Y. V. Rostovtsev, Texas A&M Univ. . . . . [6130-11]

5:20 pm: **Liouville-space descriptions for intense-field coherent electromagnetic interactions** *(Invited Paper),* V. L. Jacobs, Z. Dutton, M. Bashkansky, M. J. Steiner, J. F. Reintjes, Naval Research Lab. . . . [6130-12]

Wednesday 25 January

SESSION 4

RM: Conv. Ctr. Room B2 . . . . . Wed. 8:10 to 10:00 am

Quantum Computing: Hardware

Chair: **Hans J. Coufal**, IBM Corp.

8:10 am: **Rare Earth doped materials for quantum computing** *(Invited Paper),* A. Konhodzic, A. P. Adamczyk, Z. U. Hasan, Temple Univ. . . . . [6130-13]

8:40 am: **VLSI quantum computer in diamond** *(Invited Paper),* P. R. Hemmer, Texas A&M Univ.; E. Trajkov, S. D. Prawer, The Univ. of Melbourne (Australia); F. Jelezko, J. Wrachtrup, N. B. Manson, The Australian National Univ. (Australia) . . . . . [6130-14]

9:10 am: **Ensemble-based quantum memory, quantum communication, and quantum computing** *(Invited Paper),* G. S. Pati, K. Salit, P. Kumar, S. M. Shahriar, Northwestern Univ. . . . . [6130-15]

9:40 am: **Optical interference logic in silicon-on-insulator waveguides,** D. C. Wheeler, D. C. Hall, Univ. of Notre Dame . . . . . [6130-16]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 5

RM: Conv. Ctr. Room B2 . . . . . Wed. 10:20 am to 12:20 pm

Optical Computing

Chair: **Richard I. Epstein**, Los Alamos National Lab.

10:20 am: **Rare Earths vs. Rare Earths: spectral storage in f-d and f-f materials** *(Invited Paper),* A. E. Craig, Montana State Univ./Bozeman [6130-17]

10:50 am: **Atomic tailoring for ultra-dense multi-layer spectral memories** *(Invited Paper),* J. Park, M. F. Aly, Z. U. Hasan, Temple Univ. . . . . [6130-18]

11:20 am: **Fabrication of rare earth doped multi-layer structures for spectral storage,** J. Park, M. F. Aly, L. Biyikli, Z. U. Hasan, Temple Univ. . . . . [6130-19]

11:40 am: **Optoelectronic hybrid components for optical concurrent communications in peer-to-peer self-organizing network,** T. Onishi, Y. Nozaki, W. Sasaki, Doshisha Univ. (Japan) . . . . . [6130-20]

12:00 pm: **Realization of all-optical basic logic gates using cross gain modulation in semiconductor optical amplifiers,** S. H. Kim, J. H. Kim, J. S. Lee, C. W. Son, Y. T. Byun, Y. M. Jhon, S. Lee, D. H. Woo, S. H. Kim, Korea Institute of Science and Technology (South Korea) . . . . . [6130-21]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 6

RM: Conv. Ctr. Room B2 . . . . . Wed. 1:30 to 3:40 pm

Laser Refrigeration

Chair: **Mansoor Sheik-Bahae**, The Univ. of New Mexico

1:30 pm: **Progress in laser cooling of rare-Earth doped solids** *(Invited Paper),* R. I. Epstein, Los Alamos National Lab. . . . . [6130-22]

2:00 pm: **Laser cooling of rare-Earth doped solids: the next step** *(Invited Paper),* M. P. Hehlen, Los Alamos National Lab. . . . . [6130-23]

2:30 pm: **IR-visible upconversion materials for laser refrigerators** *(Invited Paper),* Z. U. Hasan, Z. Luo, Temple Univ. . . . . [6130-24]

3:00 pm: **Cavity-enhanced resonant absorption with application for laser cooling,** D. V. Seletskiy, M. P. Hasselbeck, M. Sheik-Bahae, The Univ. of New Mexico; J. Thiede, R. I. Epstein, Los Alamos National Lab. . . . . [6130-25]

Monday-Tuesday 23-24 January 2006 • Proceedings of SPIE Vol. 6131

Nanomanipulation with Light II

Conference Chair: **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom)

Program Committee: **Nicholas P. Bigelow**, Univ. of Rochester; **Luciana C. Dávila Romero**, Univ. of St. Andrews (United Kingdom); **Wolfgang Ertmer**, Laser Zentrum Hannover e.V. (Germany); **Enrique J. Galvez**, Colgate Univ.; **Jesper Glückstad**, Risø National Lab. (Denmark); **Gerard Nienhuis**, Univ. Leiden (Netherlands); **Lukas Novotny**, Univ. of Rochester; **Miles J. Padgett**, Univ. of Glasgow (United Kingdom); **Paras N. Prasad**, SUNY/Univ. at Buffalo; **Halina H. Rubinsztein-Dunlop**, The Univ. of Queensland (Australia); **Vladan Vuletic**, Massachusetts Institute of Technology; **Anton Zeilinger**, Univ. Wien (Austria)

Monday 23 January

SESSION 1

RM: Conv. Ctr. Room B4 . . . . . Mon. 8:10 to 9:30 am

Atoms and Quantized Light

8:10 am: **Atoms, molecules and optics on microchips** *(Invited Paper),* N. P. Bigelow, Univ. of Rochester . . . . . [6131-01]

8:50 am: **Entanglement generated by collective atom-light interaction: single photons and squeezed spins,** V. Vuletic, J. K. Thompson, J. Simon, A. T. Black, Massachusetts Institute of Technology . . . . . [6131-02]

9:10 am: **Transient optical angular momentum effects and atom trapping in multiple twisted beams,** D. L. Andrews, Univ. of East Anglia Norwich (United Kingdom); A. C. Carter, M. Babiker, The Univ. of York (United Kingdom); M. Al-Amri, King Khalid Univ. (Saudi Arabia) . . . . . [6131-03]

SESSION 2

RM: Conv. Ctr. Room B4 . . . . . Mon. 9:30 am to 2:30 pm

Optical Vortices and Optical Angular Momentum

9:30 am: **Optical vortex application concerns: coherence and topological dispersion** *(Invited Paper),* G. A. Swartzlander, Jr., College of Optical Sciences/ The Univ. of Arizona . . . . . [6131-04]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **The phase-vortex flower garden: composite vortices of two Laguerre-Gauss beams** *(Invited Paper),* E. J. Galvez, N. M. Smiley, Colgate Univ. . . . . [6131-05]

11:10 am: **Observation of new optical vortex in experiments with Hermite Gaussian and Laguerre-Gaussian laser modes,** K. Contreras, G. Baldwin-Olguin, F. De Zela, Pontificia Univ. Catolica del Peru (Peru); E. J. Galvez, Colgate Univ. . . . . [6131-06]

11:30 am: **Vectorial vortices obtained with quantized Pancharatnam-Berry phase optical elements,** E. Hasman, A. Niv, G. Biener, V. Kleiner, Technion - Israel Institute of Technology (Israel) . . . . . [6131-07]

11:50 am: **Angular momentum and astigmatism of bichromatic beams** *(Invited Paper),* G. Nienhuis, Univ. Leiden (Netherlands) . . . . . [6131-08]

Lunch Break . . . . . 12:30 to 1:30 pm

1:30 pm: **New configurations in parametric downconversion for generating light with orbital angular momentum** *(Invited Paper),* J. P. Torres, Univ. Politècnica de Catalunya (Spain) . . . . . [6131-09]

2:10 pm: **Poincaré sphere for nondiffracting beams with orbital angular momentum,** W. Soares, D. P. Caetano, J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil) . . . . . [6131-10]

SESSION 3

RM: Conv. Ctr. Room B4 . . . . . Mon. 2:30 to 4:30 pm

Liquid Systems

2:30 pm: **Optical pumps and sensors for microfluidic devices** *(Invited Paper),* M. J. Padgett, J. Leach, J. M. Cooper, Univ. of Glasgow (United Kingdom); R. Di Leonardo, Univ. of Glasgow (United Kingdom) and Istituto Nazionale per la Fisica della Material (Italy); H. Mushfique, Univ. of Glasgow (United Kingdom) . . . . . [6131-11]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Optically driven microtools fabricated by UV-lithography,** P. J. L. Rodrigo, Risø National Lab. (Denmark); L. Gammelgaard, Danmarks Tekniske Univ. (Denmark); I. R. Perch-Nielsen, Risø National Lab. (Denmark); P. Bøggild, Danmarks Tekniske Univ. (Denmark); J. Glückstad, Risø National Lab. (Denmark) . . . . . [6131-12]

3:50 pm: **Computational modeling of optical manipulation of dielectric objects in complex optical fields and microfluidic flow,** Z. Sikorski, CFD Research Corp.; W. Butler, Genoptix, Inc.; Z. Chen, A. J. Przekwas, CFD Research Corp. . . . . [6131-14]

4:10 pm: **Tunable acoustic gradient index of refraction lenses for controllable nondiffracting beams,** E. J. McLeod, A. B. Hopkins, C. B. Arnold, Princeton Univ. . . . . [6131-15]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 4

RM: Conv. Ctr. Room B4 . . . . . Tues. 10:30 to 11:30 am

Optical Forces

10:30 am: **Optical tweezers 3D photonic force spectroscopy,** A. Á. R. Neves, A. Fontes, W. L. Moreira, A. A. de Thomaz, D. B. Almeida, L. C. Barbosa, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6131-16]

10:50 am: **Optical ordering of nanoparticles trapped by Laguerre-Gaussian laser modes,** D. L. Andrews, D. S. Bradshaw, Univ. of East Anglia Norwich (United Kingdom) . . . . . [6131-18]

11:10 am: **Light induced further aggregation of metal aggregates,** Y. Zhang, C. Gu, A. M. Schwartzberg, J. Z. Zhang, Univ. of California/Santa Cruz [6131-19]

Lunch/Exhibition Break . . . . . 11:30 am to 1:00 pm

SESSION 5

RM: Conv. Ctr. Room B4 . . . . . Tues. 1:00 to 3:00 pm

Near Fields and Evanescent Waves

1:00 pm: **From anisotropic photo-fluidity towards nanomanipulation in optical near-field** *(Invited Paper),* P. Karageorgiev, Ctr. of Advanced European Studies and Research (Germany) and Univ. Potsdam (Germany); D. Neher, B. Schulz, Univ. Potsdam (Germany); M. Giersig, Ctr. of Advanced European Studies and Research (Germany) . . . . . [6131-20]

1:40 pm: **Experimental tests of the composite diffractive evanescent wave model,** J. Weiner, G. Gay, R. Mathevet, H. J. Lezec, Univ. Paul Sabatier (France) . . . . . [6131-21]

2:00 pm: **Evanescent-wave bonding between nanophotonics waveguides,** M. Loncar, Harvard Univ.; M. L. Povinelli, Stanford Univ.; M. Ibanescu, Massachusetts Institute of Technology; E. J. Smythe, Harvard Univ.; S. G. Johnson, Massachusetts Institute of Technology; F. Capasso, Harvard Univ.; J. D. Joannopoulos, Massachusetts Institute of Technology . . . . . [6131-22]

2:20 pm: **Space-variant polarization manipulation of a thermal emission by a polar material subwavelength grating supporting surface phonon-polaritons,** E. Hasman, N. Dahan, A. Niv, G. Biener, V. Kleiner, Technion - Israel Institute of Technology (Israel) . . . . . [6131-23]

2:40 pm: **Near-field optical manipulation with cavity enhanced evanescent fields,** P. Reece, V. G. Garcés-Chávez, K. Dholakia, Univ. of St. Andrews (United Kingdom) . . . . . [6131-24]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6132

Vertical-Cavity Surface-Emitting Lasers X

Conference Chairs: **Chun Lei**, Redfern Integrated Optics, Inc.; **Kent D. Choquette**, Univ. of Illinois at Urbana-Champaign

Program Committee: **Luke A. Graham**, Picolight; **James K. Guenter**, Advanced Optical Components; **Karlheinz H. Gulden**, Avalon Photonics Ltd. (Switzerland); **Hong Q. Hou**, EMCORE Corp.; **Kevin L. Lear**, Colorado State Univ.; **Duane A. Louderback**, OptiComp Corp.; **John G. McInerney**, National Univ. of Ireland/Cork (Ireland); **Ryan L. Naone**, Optical Communication Products, Inc.; **Krassimir P. Panayotov**, Institute of Solid State Physics (Bulgaria); **Dieter Wiedenmann**, ULM Photonics GmbH (Germany)

Wednesday 25 January

SESSION 1

RM: Conv. Ctr. Room C2 . . . . . Wed. 8:30 to 9:50 am

Commercial VCSELs

8:30 am: **Issues with the application of 1.3 micron VCSELs to communication applications: why is it taking so long?** *(Invited Paper),* D. W. Kisker, Opitcal Communication Products, Inc.; J. M. Van Hove, R. L. Naone, M. Adamcyk, L. M. F. Chirovsky, G. Giudice, J. M. Rossler, J. Xu, N. Wasinger, J. G. Beltran, Optical Communication Products, Inc. . . . [6132-01]

9:00 am: **High volume production of singlemode VCSELs** *(Invited Paper),* D. Wiedenmann, M. Grabherr, R. Jaeger, R. King, ULM Photonics GmbH (Germany) . . . . . [6132-02]

9:30 am: **AOC moving forward: The impact of materials behavior,** D. T. Mathes, J. K. Guenter, R. A. Hawthorne III, J. A. Tatum, B. M. Hawkins, C. W. Johnson, Advanced Optical Components . . . . . [6132-03]

Coffee Break . . . . . 9:50 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room C2 . . . . . Wed. 10:30 am to 12:10 pm

VCSEL Manufacturing

10:30 am: **1310nm VCSELs in 1-10Gb/s commercial applications** *(Invited Paper),* J. L. Jewell, L. A. Graham, M. V. Crom, K. Maranowski, J. M. Smith, PicoLight, Inc. . . . . [6132-04]

11:00 am: **Effects of optical back reflection on long wavelength VCSELs** *(Invited Paper),* M. Steib, Y. V. Vandyshev, H. Deng, Finisar Corp. . . . . [6132-05]

11:30 am: **A TCAD based yield and reliability analysis for VCSELs,** S. Odermatt, ETH Zürich (Switzerland); R. Hoevel, S. Eitel, Avalon Photonics Ltd. (Switzerland); G. Letay, Synopsys Switzerland AG (Switzerland); M. Streiff, B. Witzigmann, ETH Zürich (Switzerland) . . . . . [6132-06]

11:50 am: **1.3 μm strained InGaAs quantum well VCSELs: operation characteristics and transverse modes analysis,** E. Pougeoise, P. Gilet, P. Grosse, S. Poncet, A. Chelnokov, J. Gérard, Commissariat à l'Energie Atomique (France); G. Bourgeois, Intexys Photonics (France); R. Stevens, R. R. Hamelin, IntexyS Photonics (France); M. Hammar, P. Sundgren, J. Berggren, Kungliga Tekniska Högskolan (Sweden) . . . . . [6132-07]

Lunch/Exhibition Break . . . . . 12:10 to 1:50 pm

SESSION 3

RM: Conv. Ctr. Room C2 . . . . . Wed. 1:50 to 2:50 pm

Emerging VCSEL Applications

1:50 pm: **VCSELs for atomic clocks,** D. K. Serkland, G. M. Peake, K. M. Geib, Sandia National Labs.; R. Lutwak, R. M. Garvey, Symmetricom, Inc.; M. Varghese, M. Mescher, Charles Stark Draper Lab., Inc. . . . . [6132-08]

2:10 pm: **Optical characterization of VCSELs in a CPT frequency standard,** K. D. Choquette, C. Long, Univ. of Illinois at Urbana-Champaign . . . . [6132-09]

2:30 pm: **In-situ optical time-domain reflectometry (OTDR) for VCSEL-based communication systems,** G. A. Keeler, D. K. Serkland, K. M. Geib, J. F. Klem, G. M. Peake, Sandia National Labs. . . . . [6132-11]

Coffee Break . . . . . 2:50 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room C2 . . . . . Wed. 3:30 to 4:50 pm

VCSEL Characteristics

3:30 pm: **Mode polarization partition noise in multimode short-wavelength vertical cavity surface emitting lasers,** J. Carstens, Univ. of Nevada/Reno . . . . . [6132-12]

3:50 pm: **VCSEL structure embedded in metal heat sink for optimal thermal management,** S. Q. Yu, R. Gupta, X. Jin, S. R. Johnson, J. Gu, Y. H. Zhang, Arizona State Univ. . . . . [6132-13]

4:10 pm: **End-pumped vertical external cavity surface emitting laser,** T. Kim, J. Lee, J. Y. Kim, K. Kim, S. Lee, S. Cho, J. Kim, G. Kim, S. Lim, Y. Park, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6132-14]

4:30 pm: **Vertical-cavity laser based on interband-tunneling staggered-bandgap heterostructure,** B. Gelmont, Univ. of Virginia; D. Woolard, U.S. Army Research Office; T. Globus, Univ. of Virginia . . . . . [6132-15]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Temperature dependent VCSEL optical characteristics based on graded AlxGa1-xAs/GaAs distributed Bragg reflectors: reflectivity and beam profile analyses,** S. Su, Chung Cheng Institute of Technology (Taiwan); S. Tang, Chung Shan Institute of Science and Technology (Taiwan); T. Chen, Chung Cheng Institute of Technology (Taiwan); C. Chiang, S. Yang, Chung Shan Institute of Science and Technology (Taiwan) . . . . . [6132-22]

✔ **Optimization of oxide-confinement and active layers for high-speed 850-nm VCSELs,** Y. K. Kuo, J. Chen, National Changhua Univ. of Education (Taiwan); J. Ho, C. Wu, GigaComm Corp. (Taiwan); B. Pong, C. Chen, National Central Univ. (Taiwan) . . . . . [6132-23]

✔ **Mode partition noise in 850 nm VCSELs,** J. Carstens, Univ. of Nevada/Reno . . . . . [6132-24]

Thursday 26 January

SESSION 5

RM: Conv. Ctr. Room C2 . . . . . Thurs. 8:30 to 10:00 am

Active 2-Dimensional Photonic Lattices

8:30 am: **The physics of coupled VCSEL arrays as generic cases of active photonic lattices** *(Invited Paper),* S. Riyopoulos, Science Applications International Corp. . . . . [6132-16]

9:00 am: **Leaky defect modes of 2D VCSEL arrays** *(Invited Paper),* L. J. Mawst, L. Bao, N. Kim, A. P. Napartovich, Univ. of Wisconsin/ Madison . . . . . [6132-17]

9:30 am: **VCSEL-based photonic crystal heterostructures** *(Invited Paper),* E. E. Kapon, École Polytechnique Fédérale de Lausanne (Switzerland) [6132-18]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

RM: Conv. Ctr. Room C2 . . . . . Thurs. 10:30 to 11:30 am

Novel VCSEL Structures

10:30 am: **Coherent transverse coupling in photonic crystal vertical cavity laser arrays,** J. T. Raftery, U.S. Military Academy of West Point; A. C. Lehman, K. D. Choquette, Univ. of Illinois at Urbana-Champaign . . . . . [6132-19]

10:50 am: **A C-shaped nanoaperture VCSEL for ultrahigh-density optical data storage,** Z. Rao, J. A. Matteo, L. Hesselink, J. S. Harris, Stanford Univ. . . . . [6132-20]

11:10 am: **2W continuous wave operation of an optically pumped blue VECSEL with frequency doubling,** T. Kim, K. Kim, J. Y. Kim, S. Lee, S. Cho, J. Kim, S. Lim, J. Lee, G. Kim, Y. Park, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6132-21]

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Novel In-Plane Semiconductor Lasers V

Conference Chairs: **Carmen Mermelstein**, Reute (Germany); **David P. Bour**, Agilent Technologies

Program Committee: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan); **Dan Botez**, Univ. of Wisconsin/Madison; **Federico Capasso**, Harvard Univ.; **Gary A. Evans**, Southern Methodist Univ.; **Claire F. Gmachl**, Princeton Univ.; **Michael Kneissl**, Palo Alto Research Ctr.; **Fumio Koyama**, Tokyo Institute of Technology (Japan); **Luke J. Mawst**, Univ. of Wisconsin/Madison; **Jerry R. Meyer**, Naval Research Lab.; **Mario J. Paniccia**, Intel Corp.; **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

Monday 23 January

SESSION 1

RM: Conv. Ctr. Room N . . . . . Mon. 8:10 to 10:20 am

Quantum Cascade Lasers

Chair: **Claire F. Gmachl**, Princeton Univ.

8:10 am: **Room-temperature continuous-wave single-mode quantum cascade lasers** *(Invited Paper),* S. Blaser, L. Hvozdara, Y. Bonetti, A. Netuschill, A. Muller, Alpes Lasers SA (Switzerland); M. Giovannini, J. Faist, Univ. de Neuchâtel (Switzerland) . . . . . [6133-01]

8:40 am: **Recent research development of InAs-based quantum cascade lasers** *(Invited Paper),* H. Ohno, K. Ohtani, Tohoku Univ. (Japan) . . . . [6133-02]

9:10 am: **High-performance GaInAs/AlAsSb and GaInAs/AlGaAsSb quantum cascade lasers,** Q. Yang, C. Manz, W. Bronner, C. Mann, L. Kirste, K. Köhler, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6133-03]

9:30 am: **InP based QCL in MBE production machine,** M. Garcia, F. Vermersch, X. Marcadet, S. Bansropun, C. Sirtori, Thales Research & Technology (France); A. Wilk, C. Chaix, RIBER (France) . . . . . [6133-04]

9:50 am: **Quantum cascade lasers by MOCVD** *(Invited Paper),* G. E. Hofler, D. P. Bour, S. W. Corzine, Agilent Technologies; M. Troccoli, F. Capasso, Harvard Univ. . . . . [6133-05]

Coffee Break . . . . . 10:20 to 10:40 am

SESSION 2

RM: Conv. Ctr. Room N . . . . . Mon. 10:40 am to 12:10 pm

Nitride Lasers I

Chair: **David P. Bour**, Agilent Technologies

10:40 am: **High-power and wide wavelength range GaN-based laser diodes** *(Invited Paper),* T. Kozaki, H. Matsumura, Y. Sugimoto, S. Nagahama, T. Mukai, Nichia Corp. (Japan) . . . . . [6133-06]

11:10 am: **Near- and deep-UV InAlGaN MQW lasers** *(Invited Paper),* M. Kneissl, Palo Alto Research Ctr. . . . . [6133-07]

11:40 am: **Nitride laser diodes** *(Invited Paper),* S. Tomiya, Sony Corp. (Japan) . . . . . [6133-08]

Lunch Break . . . . . 12:10 to 1:50 pm

SESSION 3

RM: Conv. Ctr. Room N . . . . . Mon. 1:50 to 2:50 pm

Mid-Infrared Lasers I

Chair: **Carmen Mermelstein**, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany)

1:50 pm: **Mid-IR type-II "W" lasers emitting high-Cw powers** *(Invited Paper),* J. R. Meyer, Naval Research Lab. . . . . [6133-09]

2:20 pm: **External-cavity tunable mid-IR semiconductor lasers and applications** *(Invited Paper),* C. Peng, H. Q. Le, Y. Wang, G. Luo, H. Zhang, Y. Wang, B. Guo, Univ. of Houston . . . . . [6133-11]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room N . . . . . Mon. 3:30 to 5:20 pm

High Power Lasers

Chair: **Luke J. Mawst**, Univ. of Wisconsin/Madison

3:30 pm: **Highly reliable 75W InGaAs/AlGaAs laser bars with over 70% conversion efficiency** *(Invited Paper),* G. Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6133-12]

4:00 pm: **Optical system integration of very large arrays of individually addressable, high-power, single- mode lasers,** S. P. Najda, G. Bacchin, A. Kendall, S. Wilson, M. Murad, E. Goutain, C. J. Hamilton, J. H. Marsh, Intense Photonics Ltd. (United Kingdom) . . . . . [6133-13]

4:20 pm: **High-efficient 650 nm laser bars with an output power of about 10 W and a wall-plug efficiency of 30%,** B. Sumpf, M. Zorn, R. Staske, J. Fricke, P. Ressel, G. Erbert, M. Weyers, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6133-14]

4:40 pm: **High-power, high-brightness tapered lasers with an Al-free active region at 915 nm,** N. Michel, I. Hassiaoui, M. Lecomte, O. Parillaud, M. Calligaro, M. M. Krakowski, Thales Research & Technology (France); I. Esquivias, L. Borruel, Univ. Politécnica de Madrid (Spain); S. Sujecki, E. C. Larkins, The Univ. of Nottingham (United Kingdom) . . . . . [6133-15]

5:00 pm: **High-power broad-area 808 nm DFB lasers for pumping solid state lasers,** A. Klehr, F. Bugge, G. Erbert, A. Knauer, P. Ressel, H. Wenzel, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6133-16]

Tuesday 24 January

OPTO PLENARY SESSION ON SILICON PHOTONICS

8:30 to 10:00 am · Marriott, San Jose Ballroom, Salon IV

Plenary talks will be from 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Light Emission in Silicon: Recent Advances and Future Directions**
Bahram Jalali, Univ. of California/Los Angeles

9:20 am: **Silicon Optoelectronics: Opportunities, Applications, and Recent Results**
Mario Paniccia, Photonics Technology Lab., Intel Corp.

See p. 20 for details.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

RM: Conv. Ctr. Room N . . . . . Tues. 10:30 to 11:40 am

Quantum Dots and Physics

Chair: **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

10:30 am: **Passively mode-locked quantum dot lasers for optical clocking** *(Invited Paper),* L. F. Lester, Univ. of New Mexico . . . . . [6133-17]

11:00 am: **Carrier lifetime and recombination in 1.3 μm P-doped InAs qauntum dot lasers,** A. A. Dikshit, J. M. Pikal, V. V. Vangapally, Univ. of Wyoming . . . . . [6133-18]

11:20 am: **Achieving narrow linewidth, low-phase noise external cavity semiconductor lasers through the reduction of 1/f noise.,** R. E. Bartolo, C. K. Kirkendall, Naval Research Lab.; V. Kupershmidt, K2 Optronics, Inc. . . . . [6133-19]

Lunch/Exhibition Break . . . . . 11:40 am to 1:30 pm

SESSION 6

RM: Conv. Ctr. Room N . . . . . Tues. 1:30 to 3:20 pm

Terahertz Quantum Cascade Lasers

Chair: **Mariano Troccoli**, Harvard Univ.

1:30 pm: **Terahertz quantum cascade lasers** *(Invited Paper),* A. Tredicucci, Scuola Normale Superiore di Pisa (Italy) . . . . . [6133-21]

2:00 pm: **Non-equilibrium electronic distribution in THz quantum cascade lasers** *(Invited Paper),* M. S. Vitiello, V. Spagnolo, G. Scarmarcio, Univ. degli Studi di Bari (Italy) . . . . . [6133-22]

2:30 pm: **THz generation and mixing in quantum cascade lasers** *(Invited Paper),* C. Sirtori, Univ. Paris 7-Denis Diderot (France) and Thales Group (France) . . . . . [6133-23]

3:00 pm: **Phase matched frequency mixing between telecom wavelengths and THz radiation in a quantum cascade laser,** S. S. Dhillon, Thales Research & Technology (France) and Univ. Paris 7-Denis Diderot (France); C. Sirtori, Thales Research & Technology (France); S. Barbieri, TeraView Ltd (United Kingdom); J. Alton, TeraView Ltd. (United Kingdom); A. De Rossi, M. Calligaro, Thales Research & Technology (France); H. E. Beere, D. A. Ritchie, Univ. of Cambridge (United Kingdom) . . . . . [6133-24]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 7

RM: Conv. Ctr. Room N . . . . . Tues. 3:40 to 5:20 pm

Nitride Lasers II

Chair: **Michael Kneissl**, Technische Univ. Berlin (Germany)

3:40 pm: **High-performance AlInGaN blue-violet laser diodes** *(Invited Paper),* O. Nam, SAMSUNG Advanced Institute of Technology (South Korea) [6133-25]

4:10 pm: **Characteristics of CW violet laser diodes grown by MBE** *(Invited Paper),* J. F. Heffernan, M. Kauer, S. E. Hooper, V. Bousquet, J. Windle, T. Smeeton, C. Zellweger, J. Barnes, Sharp Labs. of Europe, Ltd. (United Kingdom) . . . . . [6133-26]

4:40 pm: **Characteristics of intensity noise in blue-violet InGaN semiconductor lasers,** K. Matsuoka, K. Saeki, E. Teraoka, Y. Kuwamura, M. Yamada, Kanazawa Univ. (Japan) . . . . . [6133-27]

5:00 pm: **Broad-area, high-power, CW operated InGaN laser diodes,** P. Perlin, Instytut Wysokich Cisnien (Poland) and TopGaN Ltd. (Poland); P. Wisniewski, R. Czernecki, P. Prystawko, M. Leszczynski, T. Suski, I. Grzegory, S. A. Porowski, Instytut Wysokich Cisnien (Poland) . . . . . [6133-28]

Wednesday 25 January

SESSION 8

RM: Conv. Ctr. Room N . . . . . Wed. 8:10 to 10:10 am

Quantum Dots

Chair: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan)

8:10 am: **Advances in quantum dot lasers and single photon emitters** *(Invited Paper),* Y. Arakawa, The Univ. of Tokyo (Japan) . . . . . [6133-29]

8:40 am: **1.3-1.5 μm quantum dot lasers on foreign substrates: growth using defect reduction technique, high-power CW operation, and degradation resistance** *(Invited Paper),* N. Ledentsov, V. A. Shchukin, NL Nanosemiconductor GmbH (Germany) and Technical Univ. of Berlin (Germany) and A.F. Ioffe Physico-Technical Institute (Russia); A. R. Kovsh, A. V. Kozhukhov, I. L. Krestnikov, S. S. Mikhrin, C. Möller, NL Nanosemiconductor GmbH (Germany); L. Y. Karachinsky, N. Y. Gordeev, I. I. Novikov, M. V. Maximov, Y. M. Shernyakov, N. V. Kryzhanovskaya, A. E. Zhukov, E. S. Semenova, A. P. Vasil'ev, V. M. Ustinov, A.F. Ioffe Physico-Technical Institute (Russia); T. Kettler, D. Bimberg, Technical Univ. of Berlin (Germany) . . . . . [6133-30]

9:10 am: **Characterisation of modulation doped quantum dot lasers** *(Invited Paper),* P. M. Smowton, I. C. Sandall, C. L. Walker, J. D. Thomson, A. Sobiesierski, Cardiff Univ. (United Kingdom); T. Badcock, D. J. Mowbray, H. Liu, M. Hopkinson, The Univ. of Sheffield (United Kingdom) . . . . . [6133-31]

9:40 am: **High-performance 1.3μm quantum dot lasers on GaAs and Si** *(Invited Paper),* P. K. Bhattacharya, Z. Mi, J. Yang, S. Fathpour, Univ. of Michigan . . . . . [6133-32]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 9

RM: Conv. Ctr. Room C3 . . . . . Wed. 10:30 am to 12:40 pm

Joint session with conference 6125.

Silicon Light Emitters and Amplifiers I

Chair: **Mario J. Paniccia**, Intel Corp.

10:30 am: **Continuous-wave silicon raman laser and amplifier for opto-electronic integration** *(Invited Paper),* H. Rong, M. J. Paniccia, Intel Corp. . . . . [6125-04]

11:00 am: **High performance self-organized In(Ga)as quantum dot lasers monolithically grown on silicon,** Z. Mi, J. Yang, P. K. Bhattacharya, P. K. L. Chan, K. P. Pipe, Univ. of Michigan . . . . . [6125-05]

11:20 am: **Silicon and germanium-silicon raman lasers,** B. Jalali, V. Raghunathan, D. P. Dimitropoulos, O. Boyraz, R. Claps, Univ. of California/Los Angeles . . . . . [6133-33]

11:50 pm: **Emitting 1530 nm light on Si with optical gain from light emitting layer consisting of Er2O3, P2O5, Yb2O3 nanoparticles and spin-on glass,** C. F. Lin, National Taiwan Univ. (Taiwan) . . . . . [6125-06]

12:10 pm: **Heterogeneous integration of silicon and AlGaInAs for a silicon evanescent laser** *(Invited Paper),* A. Fang, H. Park, Univ. of California/Santa Barbara; R. Jones, Intel Corp.; O. Cohen, Intel Corp. (Israel); M. J. Paniccia, Intel Corp.; J. E. Bowers, Univ. of California/Santa Barbara . . . . . [6133-34]

Lunch/Exhibition Break . . . . . 12:40 to 1:30 pm

SESSION 10

RM: Conv. Ctr. Room N . . . . . Wed. 1:30 to 3:00 pm

Nonlinear Quantum Cascade Lasers

Chair: **Federico Capasso**, Harvard Univ.

1:30 pm: **Nonlinear quantum cascade lasers** *(Invited Paper),* C. F. Gmachl, Princeton Univ. . . . . [6133-35]

2:00 pm: **Intra-cavity raman lasing by electrical injection in quantum cascade devices** *(Invited Paper),* M. Troccoli, Harvard Univ. . . . . [6133-36]

2:30 pm: **Performance limits of nonlinear quantum cascade lasers** *(Invited Paper),* A. A. Belyanin, F. Xie, Texas A&M Univ.; F. Capasso, Harvard Univ.; C. F. Gmachl, Princeton Univ.; O. Malis, Lucent Technologies/Bell Labs. . . . . [6133-37]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 11

RM: Conv. Ctr. Room N . . . . . Wed. 3:30 to 5:00 pm

Novel Devices and Materials

Chair: **Dan Botez**, Univ. of Wisconsin/Madison

3:30 pm: **Folded cavity resonant filters and modulators** *(Invited Paper),* K. Djordjev, C. Lin, M. R. Tan, D. P. Bour, J. Zhu, Agilent Technologies [6133-38]

4:00 pm: **Single-mode equal lateral triangle resonant microcavity laser diode at 1.2 μm,** Y. Cao, S. R. Johnson, Y. H. Zhang, Ariozna State Univ. . . . . [6133-39]

4:20 pm: **High-index-contrast ridge waveguide lasers fabricated via oxygen-enhanced wet thermal oxidation,** D. Liang, J. Wang, D. C. Hall, Univ. of Notre Dame; G. M. Peake, Sandia National Labs.; Q. J. Hartmann, Epiworks, Inc. . . . . [6133-40]

4:40 pm: **High characteristic temperature 1.3-um GaInNAs/GaAs laser diode,** X. Zhang, Univ. of Ottawa (Canada) and National Research Council Canada (Canada); J. A. Gupta, P. J. Barrios, G. J. Pakulski, National Research Council Canada (Canada); T. J. Hall, Univ. of Ottawa (Canada) . . . . . [6133-41]

Thursday 26 January

SESSION 12

RM: Conv. Ctr. Room N . . . . . Thurs. 8:10 to 9:30 am

Mid-Infrared Lasers II

Chair: **Jerry R. Meyer**, Naval Research Lab.

8:10 am: **Mid-IR interband cascade lasers: progress and prospects** *(Invited Paper),* R. Q. Yang, Jet Propulsion Lab. . . . . [6133-43]

8:40 am: **Advances in design and performance of high-power GaSb-based lasers and laser arrays** *(Invited Paper),* G. L. Belenky, Stony Brook Univ. . . . . [6133-44]

9:10 am: **High-power diode laser arrays emitting at 2 μm with reduced far-field angle,** M. T. Kelemen, J. Weber, M. Rattunde, G. Kaufel, R. Moritz, J. Schmitz, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6133-45]

Coffee Break . . . . . 9:30 to 10:30 am

SESSION 13

RM: Conv. Ctr. Room N . . . . . Thurs. 10:30 am to 12:10 pm

Grating-Stabilized Lasers

Chair: **Gary A. Evans**, Southern Methodist Univ.

10:30 am: **850-nm surface etched distributed Bragg reflector semiconductors lasers with narrow spectral linewidth,** R. K. Price, V. C. Elarde, J. J. Coleman, Univ. of Illinois at Urbana-Champaign . . . [6133-46]

10:50 am: **Al-free active region InGaAsP/GaAs (λ = 852nm) DFB laser diodes for atomic clocks and interferometry applications,** F. Vermersch, S. Bansropun, V. Ligeret, M. Lecomte, M. Calligaro, O. Parillaud, M. M. Krakowski, Thales Research & Technology (France) . . . . . [6133-47]

11:10 am: **High-frequency tuning of high-powered DFB MOPA system with diffraction limited power up to 1.5W,** J. R. Sacher, R. Knispel, S. Stry, Sacher Lasertechnik GmbH (Germany) . . . . . [6133-48]

11:30 am: **Dual mode lasing from index patterned Fabry-Perot laser diodes,** S. W. Osborne, S. O'Brien, R. Fehse, E. P. O'Reilly, Tyndall National Institute (Ireland) . . . . . [6133-49]

11:50 am: **High power conversion efficiency diode lasers,** M. Kanskar, J. Cai, Y. He, E. Stiers, S. R. Tatavarti-Bharatam, Alfalight, Inc.; D. Botez, L. J. Mawst, Univ. of Wisconsin/Madison . . . . . [6133-50]

Wednesday-Thursday 25-26 January 2006 • Proceedings of SPIE Vol. 6134

Light-Emitting Diodes: Research, Manufacturing, and Applications X

Conference Chairs: **Klaus P. Streubel**, OSRAM Opto Semiconductors GmbH (Germany); **H. Walter Yao**, Advanced Micro Devices, Inc.; **E. Fred Schubert**, Rensselaer Polytechnic Institute

Program Committee: **John C. Carrano**, DARPA; **Nathan F. Gardner**, Lumileds Lighting, LLC; **James M. Gee**, Advent Solar, Inc.; **Paul L. Heremans**, IMEC (Belgium); **Michael Heuken**, AIXTRON AG (Germany); **Masayoshi Koike**, Sungkyunkwan Univ. (South Korea); **Kurt J. Linden**, Spire Corp.; **Heng Liu**, AXT, Inc.; **Daniel J. McGraw**, Light Diagnostics, Inc.; **Jerry A. Simmons**, Sandia National Labs.; **Steve A. Stockman**, Lumileds Lighting, LLC; **Li-Wei Tu**, National Sun Yat-Sen Univ. (Taiwan); **John M. Zavada**, U.S. Army Research Office

SPIE and the organizers gratefully acknowledge the following conference sponsor

OPTICAL RESEARCH ASSOCIATES

Wednesday 25 January

SESSION 1

RM: Conv. Ctr. Room A4 . . . . . Wed. 8:30 to 10:10 am

Power LEDs and Modules

8:30 am: **High-power LEDs for visible and infra-red emision** *(Invited Paper),* S. Illek, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6134-01]

9:00 am: **High power LEDs and the organization of light** *(Invited Paper),* S. Paolini, G. Harbers, Lumileds Lighting, LLC . . . . . [6134-02]

9:30 am: **Optimum arrangement of LEDs in a base station of optical wireless LANs,** T. Matsumoto, N. Inoue, Tokyo Denki Univ. (Japan) . . [6134-03]

9:50 am: **High-power LED arrays- special requirements on packaging technology,** O. Kueckmann, PerkinElmer, Inc. (Germany) . . . . . [6134-04]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room A4 . . . . . Wed. 10:30 am to 12:40 pm

LED Applications

10:30 am: **LEDs in automotive lighting** *(Invited Paper),* K. Eichhorn, Hella KGaA Hueck & Co. (Germany) . . . . . [6134-05]

11:00 am: **LEDs on the threshold for use in projection systems: challenges, limitations and applications** *(Invited Paper),* B. A. Moffat, Carl Zeiss Jena GmbH (Germany) . . . . . [6134-06]

11:30 am: **LEDs for automotive applications** *(Invited Paper),* M. S. Dassanayake, Ford Motor Co. . . . . [6134-07]

12:00 pm: **The innovations with the medical applications of white LEDs and the breakthrough for new business,** J. Shimada, Kyoto Prefectural Univ. of Medicine (Japan) and Kyoto Univ. (Japan) and Tsuji Plastic Co. (Japan); Y. Kawakami, Kyoto Univ. (Japan); K. Itoh, M. Nishimura, Kyoto Prefectural Univ. of Medicine (Japan); K. Tsuji, Tsuji Plastic Co. (Japan) . . . . . [6134-08]

12:20 pm: **Trichromatic LED Backlights for Mobile LCDs,** J. Kim, M. Park, J. Kim, H. Kim, J. Jun, J. Park, S. Cho, H. Jeong, Samsung Electro-Mechanics Co Ltd (South Korea) . . . . . [6134-09]

Lunch/Exhibition Break . . . . . 12:40 to 2:00 pm

SESSION 3

RM: Conv. Ctr. Room A4 . . . . . Wed. 2:00 to 3:10 pm

OLEDs

2:00 pm: **Recent developments on OLED lighting** *(Invited Paper),* H. Antoniadis, OSRAM Opto Semiconductors Inc. . . . . [6134-10]

2:30 pm: **Recent progress in vapor-phase deposition as a production tool for inorganic and organic optoelectronic devices,** M. Heuken, B. Marheineke, M. Schwambera, N. Meyer, O. Schoen, B. Schineller, AIXTRON AG (Germany) . . . . . [6134-11]

2:50 pm: **Superluminescent organic light-emitting diode with a novel anode structure,** S. Han, Y. Yuan, Z. Lu, Univ. of Toronto (Canada) . . . . . [6134-12]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room A4 . . . . . Wed. 3:30 to 5:00 pm

New Devices

3:30 pm: **Omni-directional reflectors for light-emitting diodes** *(Invited Paper),* J. K. Kim, Rensselaer Polytechnic Institute . . . . . [6134-13]

4:00 pm: **100 mW high-power depolarized-superluminescent diode at 1550nm wavelength,** S. Park, J. Wei, Y. Hu, P. J. S. Heim, R. Enck, V. Luciani, O. A. Konoplev, Covega Corp.; S. W. Wilson, Palomar Medical Technologies, Inc. . . . . [6134-14]

4:20 pm: **Correct wavelength-scale numerical modeling of optical characteristics of planar RCLED structures by the method of single expression,** H. V. Baghdasaryan, T. M. Knyazyan, R. I. Simonyan, A. Mankulov, State Engineering Univ. of Armenia (Armenia) . . . . . [6134-15]

4:40 pm: **Realization of highly efficient InGaN vertical LED on metal alloy substrate,** C. A. Tran, C. F. Chu, C. C. Chen, W. H. Liu, H. C. Chen, C. I. Chu, F. H. Fan, J. K. Yen, T. T. Doan, SemiLEDs Corp. . . . . [6134-31]

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Linear position sensor,** I. V. Friedland, I. Gurwich, M. Velger, ElOp Electrooptics Industries Ltd. (Israel) . . . . . [6134-24]

✔ **Numerical simulation of optical and electronic properties for multilayer organic light-emitting diodes,** S. Chang, Y. Chang, C. Yang, J. Chen, Y. K. Kuo, National Changhua Univ. of Education (Taiwan) . . . . . [6134-26]

✔ **Problems of linear birefringence in optical glass current,** Z. P. Wang, X. Liu, Z. Huang, Harbin Engineering Univ. (China) . . . . . [6134-27]

✔ **Precise formula of emission spectrum for light-emitting diodes,** T. Yang, H. Chou, National Central Univ. (Taiwan) . . . . . [6134-28]

Thursday 26 January

SESSION 5

RM: Conv. Ctr. Room A4 . . . . . Thurs. 8:00 to 10:00 am

Novel Technologies

8:00 am: **To be announced** *(Invited Paper),* J. Han, Yale Univ. . . . . [6134-17]

8:30 am: **Kelvinn force microscopy on a (GaxAl1-x)0.5In0.5P light-emitting diode,** W. Mertin, K. Katzer, G. Bacher, Univ. Duisburg-Essen (Germany); A. Jaeger, K. P. Streubel, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6134-18]

8:50 am: **High-brightness AlInGaN light-emitting diodes,** T. Margalith, M. O. Holcomb, S. Boles, D. A. Steigerwald, Lumileds Lighting, LLC . [6134-19]

9:10 am: **GaN light-emitting triodes for high-efficiency hole injection and light emission,** J. K. Kim, J. Xi, H. Luo, Rensselaer Polytechnic Institute; J. Cho, C. Sone, Y. Park, SAMSUNG Advanced Institute of Technology (South Korea); T. Gessmann, E. F. Schubert, Rensselaer Polytechnic Institute . . . . . [6134-20]

9:30 am: **InN-on-Si heteroepitaxy: growth, optical properties, and applications** *(Invited Paper),* S. Gwo, C. L. Wu, C. H. Shen, H. W. Lin, H. Y. Chen, H. M. Lee, National Tsing Hua Univ. (Taiwan) . . . . . [6134-29]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

RM: Conv. Ctr. Room A4 . . . . . Thurs. 10:30 am to 12:00 pm

UV LEDs

10:30 am: **Aluminum nitride substrates for ultra-violet LED development** *(Invited Paper),* L. J. Schowalter, Crystal IS, Inc. . . . . [6134-30]

11:00 am: **Fabrication and simulation of ultraviolet AlGaInN light-emitting diodes,** S. H. Yen, B. Chen, M. Chen, Y. K. Kuo, National Changhua Univ. of Education (Taiwan); Y. Chang, H. Kuo, National Chiao Tung Univ. (Taiwan) . . . . . [6134-21]

11:20 am: **Improvement of ultradeep ultraviolet light- emitting diodes with asymmetric active region,** M. Huang, C. Lu, National Changhua Univ. of Education (Taiwan) . . . . . [6134-22]

11:40 am: **Reliability of AlGaN-based deep UV LEDs on sapphire,** M. Shatalov, Z. Gong, M. Gaevski, S. Wu, W. Sun, V. Adivarahan, A. M. Khan, Univ. of South Carolina . . . . . [6134-23]

Saturday-Sunday 21-22 January 2006 • Proceedings of SPIE Vol. 6135

Liquid Crystal Materials, Devices, and Applications XII

Conference Chair: **Liang-Chy Chien**, Kent State Univ.

Program Committee: **Dirk J. Broer**, Philips Research Labs. (Netherlands); **Harry J. Coles**, Univ. of Cambridge (United Kingdom); **Gregory P. Crawford**, Brown Univ.; **Wolfgang Haase**, Technische Univ. Darmstadt (Germany); **Yong Bae Kim**, Konkuk Univ. (South Korea); **Shunsuke Kobayashi**, Tokyo Univ. of Science (Japan); **Akihiro Mochizuki**, Nano Loa Inc.; **Shohei Naemura**, Merck Ltd., Japan (Japan); **Shin-Tson Wu**, College of Optics and Photonics/Univ. of Central Florida

SPIE and the organizers gratefully acknowledge the following conference sponsor

OPTICAL RESEARCH ASSOCIATES

Saturday 21 January

SESSION 1

RM: Conv. Ctr. Room N . . . . . Sat. 9:00 to 10:00 am

Display Technologies I

Chair: **Liang-Chy Chien**, Kent State Univ.

9:00 am: **Enhancement of the characteristics of LCDs by doping nanoparticles: reduction of operating voltage, viscosity, and response times** *(Invited Paper),* S. Kobayashi, Tokyo Univ. of Science (Japan); S. Sano, Ube Material Industries, Ltd. (Japan); T. Miyama, Tokyo Univ. of Science (Japan) . . . . . [6135-01]

9:30 am: **Wide-viewing angle IPS-LCD for TV applications using optical compensation technology** *(Invited Paper),* D. Kajita, I. Hiyama, Y. Utsumi, Hitachi, Ltd. (Japan); M. Ishii, K. Ono, Hitachi Displays, Ltd. (Japan) . [6135-02]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room N . . . . . Sat. 10:30 am to 12:00 pm

New Materials and Emerging Applications I

Chair: **Michael D. Wand**, LC Vision, LLC

10:30 am: **High performance TAC film for LCDs** *(Invited Paper),* H. Mori, Fuji Photo Film Co., Ltd. (Japan) . . . . . [6135-03]

11:00 am: **The use of germanium liquid crystals in the quest for perfect ferroelectric liquid crystal displays** *(Invited Paper),* M. D. Wand, LC Vision, LLC; K. M. More, W. N. Thurmes, Displaytech, Inc. . . . . [6135-04]

11:30 am: **Optical microscopy studies of polymer/liquid-crystal composites** *(Invited Paper),* D. A. Higgins, Kansas State Univ. . . . . [6135-05]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room N . . . . . Sat. 1:30 to 3:00 pm

Display Technologies II

Chair: **Shunsuke Kobayashi**, Tokyo Univ. of Science (Japan)

1:30 pm: **A new method for simultaneous measurement of phase retardation and optical axis of a compensation film** *(Invited Paper),* Y. Wu, J. Lee, Y. Lin, H. Ren, S. Wu, College of Optics and Photonics/Univ. of Central Florida . . . . . [6135-07]

2:00 pm: **Advances in OCB mode LCDs: improvement of moving picture quality and control of bend alignment** *(Invited Paper),* H. Wakemoto, K. Nakao, A. Takimoto, Toshiba Matsushita Display Technology Co., Ltd. (Japan) . . . . . [6135-08]

2:30 pm: **Novel U-shaped liquid crystals for electro-optic devices** *(Invited Paper),* A. Yoshizawa, Hirosaki Univ. (Japan) . . . . . [6135-09]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room N . . . . . Sat. 3:30 to 5:30 pm

Photonic Applications I

Chair: **Ci-Ling Pan**, National Chiao Tung Univ. (Taiwan)

3:30 pm: **Influence of morphology on the optical properties of photonic structures in holographic-polymer dispersed liquid crystals** *(Invited Paper),* R. Jakubiak, D. P. Brown, Air Force Research Lab.; L. V. Natarajan, Science Applications International Corp.; P. Lloyd, UES, Inc.; R. L. Sutherland, V. P. Tondiglia, Science Applications International Corp.; R. A. Vaia, T. J. Bunning, Air Force Research Lab. . . . . [6135-10]

4:00 pm: **Potential applications of nematic liquid crystal materials in the millimeter wave region** *(Invited Paper),* T. Nose, S. Saito, S. Yanagihara, M. Honma, Akita Prefectural Univ. (Japan) . . . . . [6135-11]

4:30 pm: **Switchable lasing configurations using structures of liquid crystal and polymer dispersions** *(Invited Paper),* S. J. Woltman, M. E. Sousa, G. P. Crawford, Brown Univ.; H. Zhang, Scientific Solutions, Inc. . . . . [6135-12]

5:00 pm: **Transmissive spatial light modulators with high figure-of-merit liquid crystals for foveated imaging applications** *(Invited Paper),* J. L. Harriman, Boulder Nonlinear Systems, Inc.; S. Gauza, S. Wu, College of Optics and Photonics/Univ. of Central Florida; D. V. Wick, Sandia National Labs.; T. Martinez, Naval Research Lab.; D. Payne, Narrascape; S. A. Serati, Boulder Nonlinear Systems, Inc. . . . . [6135-13]

Sunday 22 January

Session 5 and Session 9 run concurrently

SESSION 5

RM: Conv. Ctr. Room N . . . . . Sun. 8:30 to 10:10 am

Photonic Applications II

Chair: **Toshiaki Nose**, Akita Prefectural Univ. (Japan)

8:30 am: **Recent progress in liquid crystal THz optics** *(Invited Paper),* C. Pan, R. Pan, National Chiao Tung Univ. (Taiwan) . . . . . [6135-14]

9:00 am: **Achromatic linear polarization switch for near infrared** *(Invited Paper),* A. B. Golovin, O. P. Pishnyak, S. V. Shiyanovskii, O. D. Lavrentovich, Kent State Univ. . . . . [6135-15]

9:30 am: **Molecular orientation effects in the CPW type LC devices for MMW phase shifting,** T. Nose, S. Yanagihara, M. Honma, Akita Prefectural Univ. (Japan) . . . . . [6135-16]

9:50 am: **Optical behaviour of hybrid LC/inorganic nanostructures,** N. G. Wakefield, A. C. van Popta, M. J. Brett, J. C. Sit, Univ. of Alberta |Canada) . . . . . [6135-17]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 9

RM: Conv. Ctr. Room B4 . . . . . Sun. 8:00 to 10:40 am

Projection Displays

Chair: **Ming H. Wu**, Hamamatsu Corp.

8:00 am: **Cross-display-technology video motion measurement tools** *(Invited Paper),* J. W. Roberts, National Institute of Standards and Technology . . . . . [6135-29]

8:30 am: **Visible laser and laser array sources for projection displays** *(Invited Paper),* A. V. Shchegrov, J. P. Watson, A. Umbrasas, D. Lee, G. P. Carey, S. Hallstein, R. Dato, R. F. Nabiev, S. G. Anikitchev, G. Giaretta, B. D. Cantos, W. R. Hitchens, M. Jansen, A. Mooradian, Novalux Inc. . . . . [6135-30]

9:00 am: **Vertical alignment of high-birefringence and negative dielectric anisotropic liquid crystals for projection displays** *(Invited Paper),* C. Wen, B. Wu, S. Gauza, S. Wu, College of Optics and Photonics/Univ. of Central Florida . . . . . [6135-31]

9:30 am: **Dual conical reflector systems with high coupling efficiency for projection displays** *(Invited Paper),* K. K. Li, S. Inatsugu, Wavien, Inc. [6135-32]

10:00 am: **Imaging properties of dual parabolic reflector and its application in lamp manufacturing,** Y. J. Wang, S. Inatsugu, K. K. Li, Wavien, Inc. [6135-33]

10:20 am: **Low cost spatial color LCOS projection engine using automotive HID burners in dual paraboloid reflector system,** K. K. Li, S. Inatsugu, Wavien, Inc.; H. S. Kwok, The Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6135-41]

Coffee Break . . . . . 10:40 to 11:00 am

Session 6 and Session 10 run concurrently

SESSION 6

RM: Conv. Ctr. Room N . . . . . Sun. 10:30 am to 12:00 pm

New Materials and Emerging Applications II

Chair: **Shin-Tson Wu**,
College of Optics and Photonics/Univ. of Central Florida

10:30 am: **Electronic and ionic conduction in liquid crystals** *(Invited Paper),* J. Hanna, Tokyo Institute of Technology (Japan) . . . . . [6135-18]

11:00 am: **Liquid crystalline supramolecular polymers formed via complementary nucleobase pair interactions** *(Invited Paper),* P. T. Mather, Case Western Reserve Univ. and Univ. of Connecticut; S. Sivakova, Case Western Reserve Univ.; J. Wu, Univ. of Connecticut; C. Campo, S. J. Rowan, Case Western Reserve Univ. . . . . [6135-19]

11:30 am: **To be announced** *(Invited Paper),* Y. B. Kim, Konkuk Univ. (South Korea) . . . . . [6135-20]

SESSION 10

RM: Conv. Ctr. Room B4 . . . . . Sun. 11:00 am to 12:30 pm

Emissive Displays

Chair: **Hans I. Bjelkhagen**, Optic Technium (United Kingdom)

11:00 am: **Highly efficient fluorescent materials and device structures for AM-OLED** *(Invited Paper),* S. Kim, H. Oh, M. Kim, Y. Han, LG Electronics Inc. (South Korea) . . . . . [6135-34]

11:30 am: **OLEDs for lighting: challenges and opportunities** *(Invited Paper, Presentation Only),* P. Duine, Philips Central Development Lighting (Netherlands); D. Bertram, Philips Central Development Lighting (Germany) . . . . . [6135-36]

12:00 pm: **Circularly polarized luminescence from chiral thin films** *(Invited Paper),* B. S. Szeto, P. C. Hrudey, M. J. Brett, Univ. of Alberta (Canada) . . . . . [6135-37]

SESSION 7

RM: Conv. Ctr. Room N . . . . . Sun. 1:30 to 3:10 pm

Display Technologies III

Chair: **Hiroyuki Mori**, Fuji Photo Film Co., Ltd. (Japan)

1:30 pm: **2D/3D switchable displays** *(Invited Paper),* T. Dekker, S. De Zwart, O. Willemsen, Philips Research Labs. (Netherlands) . . . . . [6135-21]

2:00 pm: **Designing rules for weak anchoring nematic mixtures used in bistable displays** *(Invited Paper),* D. N. Stoenescu, D. Gallaire, L. Faget, S. Lamarque-Forget, S. Joly, J. Dubois, P. Martinot-Lagarde, I. Dozov, Nemoptic (France) . . . . . [6135-22]

2:30 pm: **A novel WV film for fast-response-time OCB-LCD,** R. Matsubara, Y. Ito, S. Nakamura, H. Mori, K. Mihayashi, Fuji Photo Film Co., Ltd. (Japan) . . . . . [6135-23]

2:50 pm: **Lasing in a wide-temperature range liquid crystal blue phase I,** M. N. Pivnenko, A. D. Ford, H. J. Coles, Univ. of Cambridge (United Kingdom) . . . . . [6135-24]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 8

RM: Conv. Ctr. Room N . . . . . Sun. 3:30 to 4:50 pm

Photonic Applications III

Chair: **Gregory P. Crawford**, Brown Univ.

3:30 pm: **Doubling the output power of dye-doped cholesteric liquid crystal lasers,** Y. Zhou, Y. Huang, A. Rapaport, M. A. Bass, S. Wu, College of Optics and Photonics/Univ. of Central Florida . . . . . [6135-25]

3:50 pm: **Ultrafast optical nonlinearity enhancement of azo-dye doped liquid crystals,** L. Xu, X. Liu, L. Ji, L. Liu, Fudan Univ. (China) . . . . . [6135-26]

4:10 pm: **Liquid crystal fresnel lens using a surface relief structure,** D. Wang, L. Chien, Kent State Univ. . . . . [6135-27]

4:30 pm: **Anisotropic layers in waveguides for mode tuning and tunable filtering,** I. S. Abdulhalim, Ben-Gurion Univ. of the Negev (Israel) . . . . [6135-28]

Technical Group Meeting

Holography

7:30 to 9:00 pm · RM: Fairmont, Cupertino

Chairs: **Hans I. Bjelkhagen,** De Montfort Univ. (United Kingdom); **Raymond K. Kostuk,** The Univ. of Arizona

See p. 20 for details.

Wednesday 25 January

✔ Posters-Wednesday

Posters will be placed on display after 10:00 am on Wednesday in the Parkside Hall. A poster session, with authors present at their posters, will be held Wednesday evening from 6:00 to 8:00 pm. Light refreshments will be served.

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a "no show" and their manuscript will not be published. Presenters must remove their posters immediately after the poster session.

✔ **Finite-difference time-domain method simulation of light propagation through H-PDLC film,** K. O. Viacheslav, V. Y. Reshetnyak, National Taras Shevchenko Univ. of Kyiv (Ukraine); T. V. Galstian, Univ. Laval (Canada) . . . . . [6135-39]

✔ **Development of desktop display for collaborative tasks,** K. Sakamoto, M. Yoshigi, M. Nishida, Shimane Univ. (Japan) . . . . . [6135-40]

OPTO

Sunday-Monday 22-23 January 2006 • Proceedings of SPIE Vol. 6136

Practical Holography XX: Materials and Applications

Conference Chairs: **Hans I. Bjelkhagen**, Optic Technium (United Kingdom); **Roger A. Lessard**, Univ. Laval (Canada)

Program Committee: **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland); **Gerald L. Heidt**, Wasatch Photonics; **Toshio Honda**, Chiba Univ. (Japan); **Fujio Iwata**, Toppan Printing Co., Ltd. (Japan); **Tung H. Jeong**, Lake Forest College; **Raymond K. Kostuk**, The Univ. of Arizona; **Junchang Li**, Kunming Univ. of Science and Technology (China); **Vladimir B. Markov**, MetroLaser, Inc.; **Gaylord E. Moss**, MossOptics; **Nadya O. Reingand**, Celight, Inc.; **Martin J. Richardson**, THIS Ltd (United Kingdom); **Christopher W. Slinger**, QinetiQ (United Kingdom); **Steven L. Smith**, Massachusetts Institute of Technology; **Fred D. Unterseher**, Columbia Career Center

Sunday 22 January

SESSION 1

RM: Conv. Ctr. Room M . . . . . Sun. 8:30 to 10:00 am

Materials I

Chairs: **Hans I. Bjelkhagen**, Optic Technium (United Kingdom); **Fujio Iwata**, Toppan Printing Co., Ltd. (Japan)

8:30 am: **Engineering applications of HOEs manufactured with enhanced performance DCG films.** *(Invited Paper),* C. G. Stojanoff, RWTH Aachen (Germany) and Holotec GmbH (Germany) . . . . . [6136-01]

9:00 am: **High-spatial resolution measurement of volume holographic gratings,** G. J. Steckman, F. Havermeyer, Ondax, Inc. . . . . [6136-02]

9:20 am: **Hologram in acrylic copolymer adhesive,** S. Toxqui López, A. Olivares Pérez II, A. L. V. Padilla, G. P. Trujillo Páez, I. Fuentes Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-03]

9:40 am: **Transparent acrylic enamel holograms,** E. L. Ponce-Lee, A. Olivares Pérez II, J. B. R. Ruiz-Limón, M. de la Paz Hernández-Garay, S. Toxqui López, I. Fuentes Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-04]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

RM: Conv. Ctr. Room M . . . . . Sun. 10:30 am to 12:30 pm

Can We Do Business With Holography?

Chairs: **Roger A. Lessard**, Univ. Laval (Canada); **Vladimir B. Markov**, MetroLaser, Inc.

10:30 am: **Managing and directing innovation in the holography business** *(Invited Paper),* J. E. Gortych, Opticus IP; H. Abilock, JapanLink Translations . . . . . [6136-05]

11:00 am: **Intellectual property analysis of holographic materials business** *(Invited Paper),* N. O. Reingand, D. Hunt, Landon IP, Inc. . . . . [6136-06]

11:30 am: **Intellectual property licensing issues in the holography business** *(Invited Paper),* J. E. Gortych, Opticus IP; H. Abilock, JapanLink Translations . . . . . [6136-07]

12:00 pm: **Intellectual property analysis of embossed hologram business** *(Invited Paper),* N. O. Reingand, D. Hunt, Landon IP, Inc. . . . . [6136-08]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 3

RM: Conv. Ctr. Room M . . . . . Sun. 1:30 to 3:10 pm

Applications of Holography I

Chairs: **Fred D. Unterseher**, Columbia Career Ctr.; **Raymond K. Kostuk**, The Univ. of Arizona

1:30 pm: **Bronze rainbow hologram mirrors,** P. H. Dawson, Univ. of New South Wales (Australia) . . . . . [6136-09]

1:50 pm: **Physical aspects of digital synthesis and reconstruction of the multiview diffractive images,** I. S. Borisov, V. I. Grygoruk, National Taras Shevchenko Univ. of Kyiv (Ukraine); S. A. Kostyukevych, Institute of Semiconductor Physics (Ukraine) . . . . . [6136-10]

2:10 pm: **Optimal design and evaluation for color separation gratings using rigorous coupled wave analysis,** M. Nagayoshi, Japan Women's Univ. (Japan); K. Oka, Hitachi, Ltd. (Japan); Y. Komai, Japan Women's Univ. (Japan); W. Klaus, National Institute of Information and Communications Technology (Japan); K. Kodate, Japan Women's Univ. (Japan) . . . . . [6136-11]

2:30 pm: **Recording and reconstruction of 3D color images by phase-shifting in-line holography,** H. Fujiwara, Y. Hamada, K. Sato, K. Fujii, M. Morimoto, Univ. of Hyogo (Japan) . . . . . [6136-12]

2:50 pm: **3D display with wide-viewing zone using holograms with reduced information,** S. Hamada, K. Sato, K. Fujii, M. Morimoto, Univ. of Hyogo (Japan) . . . . . [6136-13]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

RM: Conv. Ctr. Room M . . . . . Sun. 3:30 to 5:30 pm

Materials II

Chairs: **Christo G. Stojanoff**, RWTH Aachen; **Nadya O. Reingand**, Landon IP, Inc.

3:30 pm: **Photopolymer films based on triazine functionalized monomers,** E. Kim, H. Lee, J. Park, B. Sarwade, Yonsei Univ. (South Korea); N. Kim, Chungbuk National Univ. (South Korea); C. W. Shin, Prism Technology, Inc. (South Korea) and Chungbuk National Univ. (South Korea) . . . . . [6136-14]

3:50 pm: **Advances with holographic DESA emulsions,** L. Duenkel, J. P. Eichler, C. Schneeweiss, G. K. Ackermann, Technische Fachhochschule Berlin (Germany) . . . . . [6136-15]

4:10 pm: **Lactose Holograms,** I. I. Olvera-Bautista, S. Toxqui López, A. Olivares Pérez II, M. Palacios-Ortiz, I. Fuentes Tapia, E. L. Ponce-Lee, J. B. R. Ruiz-Limón, M. Garay Hernández, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-16]

4:30 pm: **Polymerization-induced diffusion as a tool to generate periodic relief structures: A combinatorial study,** C. Sanchez, Technische Univ. Eindhoven (Netherlands) and Univ. de Zaragoza (Spain); B. J. de Gans, D. Kozodaev, A. Alexeev, Technische Univ. Eindhoven (Netherlands); M. J. Escuti, Technische Univ. Eindhoven (Netherlands) and North Carolina State Univ.; C. M. van Heesch, Technische Univ. Eindhoven (Netherlands); T. Bel, Philips Research Labs. (Netherlands); U. Schubert, C. W. Bastiaansen, Technische Univ. Eindhoven (Netherlands); D. J. Broer, Technische Univ. Eindhoven (Netherlands) and Philips Research Labs. (Netherlands) . . [6136-17]

4:50 pm: **Pineapple holograms,** S. Toxqui-Lopez, L. Calixte, A. Olivares Pérez II, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); A. L. V. Padilla, Benemérita Univ. Autónoma de Puebla (Mexico); E. L. Ponce-Lee, J. B. R. Ruiz-Limón, I. Fuentes Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-18]

5:10 pm: **The recent holographic material, Konica P7000,** M. Iwasaki, T. Kubota, Kyoto Institute of Technology (Japan); M. Watanabe, T. Yamauchi, T. Kumasawa, K. Ueda, Dai Nippon Printing Co., Ltd. (Japan) . . . . . [6136-19]

Monday 23 January

SESSION 5

RM: Conv. Ctr. Room M . . . . . Mon. 8:30 to 9:50 am

Applications of Holography II

Chairs: **Gerald L. Heidt**, Wasatch Photonics;
Toshio Honda, Chiba Univ. (Japan)

8:30 am: **An application of polymethylmethacrylate (PMMA) holographic grating with frustrated-total-internal-reflection coupling structure to space-time coding for optical wireless communication,** S. Chung, S. Han, Y. J. Lim, Y. Kim, B. Lee, Seoul National Univ. (South Korea) . . . . . [6136-20]

8:50 am: **A PMMA-metal lamella grating-based surface plasmon resonance device,** Y. J. Lim, K. Choi, S. Han, B. Lee, Seoul National Univ. (South Korea) . . . . . [6136-21]

9:10 am: **Digital in-line holographic microscopy with enhance resolution power,** J. I. Garcia-Sucerquia, Dalhousie Univ. (Canada) . . . . . [6136-22]

9:30 am: **Ulexite-based animation recording system by random reference patterns,** M. Irisawa, Y. Ishii, Japan Women's Univ. (Japan); Y. Takayama, Japan Aerospace Exploration Agency (Japan); E. Watanabe, K. Kodate, Japan Women's Univ. (Japan) . . . . . [6136-23]

Coffee Break . . . . . 9:50 to 10:30 am

SESSION 6

RM: Conv. Ctr. Room M . . . . . Mon. 10:30 to 11:50 am

Digital and Computer Holography

Chairs: **Gaylord E. Moss**, MossOptics;
Steven L. Smith, Massachusetts Institute of Technology

10:30 am: **Impact measurements using double pulse digital holography,** J. Müller, J. Geldmacher, C. von Kopylow, W. P. Jüptner, Bremer Institut für Angewandte Strahltechnik (Germany) . . . . . [6136-24]

10:50 am: **A fully computer-synthesized holographic display for medical 3D data,** Y. Sakamoto, Hokkaido Univ. (Japan); K. Matsushima, Kansai Univ. (Japan); A. Myojoyama, Tokyo Metropolitan Univ. (Japan) . . . . . [6136-25]

11:10 am: **3D CGH registration on organic and non-organic resists: comparative analysis,** E. V. Braginets, National Taras Shevchenko Univ. of Kyiv (Ukraine); S. A. Kostyukevych, Institute of Semiconductor Physics (Ukraine); V. I. Girnyk, National Taras Shevchenko Univ. of Kyiv (Ukraine) and Optronics, Ltd. (Ukraine) . . . . . [6136-27]

11:30 am: **Applications of the high-resolution optical reconstruction of digital holograms,** G. K. Wernicke, Humboldt-Univ. zu Berlin (Germany); S. Krueger, HOLOEYE Photonics AG (Germany) . . . . . [6136-28]

Lunch Break . . . . . 11:50 am to 1:30 pm

SESSION 7

RM: Conv. Ctr. Room M . . . . . Mon. 1:30 to 3:10 pm

Display

Chairs: **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland);
Christopher W. Slinger, QinetiQ (United Kingdom)

1:30 pm: **New type holographic 3D display system using two liquid crystal panels,** X. Chen, X. Liu, Zhejiang Univ. (China) . . . . . [6136-29]

1:50 pm: **Real time calculation for holographic video display,** T. Yamaguchi, H. Yoshikawa, Nihon Univ. (Japan) . . . . . [6136-31]

2:10 pm: **Holographic stereogram using graphic accelerator,** G. Kanno, Y. Sakamoto, Hokkaido Univ. (Japan) . . . . . [6136-32]

2:30 pm: **Reconstruction of color images of high-quality by a holographic display,** K. Sato, Univ. of Hyogo (Japan) . . . . . [6136-33]

2:50 pm: **Hologram technology in the display field,** L. M. Murillo-Mora, H. Honma, F. Iwata, Toppan Printing Co., Ltd. (Japan) . . . . . [6136-34]

Technical Group Meeting

Holography

7:30 to 9:00 pm · RM: Fairmont, Cupertino

Chairs: **Hans I. Bjelkhagen,** De Montfort Univ. (United Kingdom);
Raymond K. Kostuk, The Univ. of Arizona

See p. 20 for details.

Wednesday 25 January

✔ Posters-Wednesday

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✔ **Electro-holography system using an array of water particle 3D screen,** K. Sato, Shonan Institute of Technology (Japan) . . . . . [6136-30]

✔ **Photo-induced birefringence and cooperative molecular reorientation in azo copolymer,** T. Fukuda, J. Y. Kim, D. Barada, K. Yase, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6136-35]

✔ **Optical characteristics of holographic input-beam coupler using a photopolymer,** C. W. Shin, Prism Technology, Inc. (South Korea) and Chungbuk National Univ. (South Korea); N. Kim, Chungbuk National Univ. (South Korea); D. W. Suh, M. C. Paek, Y. J. Sohn, H. S. Chung, K. Y. Kang, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6136-36]

✔ **Stability of holographic gratings recorded in photopolymer films using different dyes,** K. Tsuchida, Nagaoka Univ. of Technology (Japan); M. Ohkawa, S. Sekine, Niigata Univ. (Japan) . . . . . [6136-37]

✔ **Real-time holographic gratings recorded in NOA 65 and crystal violet dye,** M. Ortíz-Gutiérrez, A. M. Martínez-Basurto, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); J. C. Ibarra-Torres, Univ. de Guadalajara (Mexico); A. Olivares Pérez II, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); M. Pérez-Cortés, Univ. Autónoma de Yucatán (Mexico) and Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [6136-38]

✔ **Properties comparison of holograms using PVA doped with MgCl2 as conductor polymer,** M. de la Paz Hernández-Garay, L. Calixte, A. Olivares Pérez II, I. Fuentes-Tapia, E. L. Ponce-Lee, J. B. R. Ruiz-Limón, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-39]

✔ **Holograms using PVA doped with CoCl2 as conductor polymer,** M. de la Paz Hernández-Garay, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); L. Calixte, Instituto Nacional de Astrofísica, Óptica y Electrónica (France); A. Olivares Pérez II, I. Fuentes-Tapia, E. L. Ponce-Lee, J. B. R. Ruiz-Limón, S. Toxqui-López, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-40]

✔ **Epoxy resin holograms,** J. B. R. Ruiz-Limón, G. Wetzel, A. Olivares Pérez II, E. L. Ponce-Lee, M. de la Paz Hernández-Garay, S. Toxqui López, I. Fuentes Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6136-41]

✔ **Successive encryption and transmission with phase-shifting digital holography,** S. Gil, Univ. of Suwon (South Korea); S. Jeon, Univ. of Inchon (South Korea); N. Kim, Chungbuk National Univ. (South Korea); J. Jeong, Suwon Science College (South Korea) . . . . . [6136-42]

✔ **Fabrication of holographic optical elements by use of laser direct lithogrpahy system,** S. Nakahara, T. Fujita, Kansai Univ. (Japan); T. Tuchitani, Opticom Research (Japan); H. Tottori, Hanshin Expressway Public Corp. (Japan); S. Shinguhara, S. Hisada, J. Nakaichi, Kansai Univ. (Japan) [6136-43]

✔ **High-resolution fringe printer for studying synthetic holograms,** K. Matsushima, S. Kobayashi, Kansai Univ (Japan); H. Miyauchi, Kansai Univ. (Japan) . . . . . [6136-44]

✔ **Stude of methode of reconstruction of object wave plane in digital holography,** J. Li, Kunming Univ. of Science and Technology (China); Y. Li, Purple Labs. (France) . . . . . [6136-45]

✔ **Data compression for transmission of holographic 3D images using digital-SSTV,** K. Takano, Tokyo Metropolitan College of Aeronautical Engineering (Japan); K. Sato, Shonan Institute of Technology (Japan) . . . . . [6136-46]

✔ **Development of interactive tabletop hologram,** K. Sakamoto, T. Nishida, T. Morii, Shimane Univ. (Japan) . . . . . [6136-47]

✔ **Color evaluation of full-color hologram,** T. Kumasawa, A. Tanaka, T. Yamauchi, M. Watanabe, K. Ueda, Dai Nippon Printing Co., Ltd. (Japan); M. Iwasaki, T. Kubota, Kyoto Institute of Technology (Japan) . . . . . [6136-48]

Participants List

Bold = SPIE Member

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Photonics WEST
An SPIE Event

21 – 26 January 2006
San Jose McEnery Convention Center
408 Almaden Blvd., San Jose, CA 95110

Onsite Registration and Information Hours

San Jose Convention Center, Street Level

Saturday 21 January . . . . . 7:15 am to 5:00 pm
Sunday 22 January . . . . . 7:15 am to 5:00 pm
Monday 23 January . . . . . 7:00 am to 5:00 pm
Tuesday 24 January . . . . . 7:30 am to 5:00 pm
Wednesday 25 January . . . . . 7:30 am to 5:00 pm
Thursday 26 January . . . . . 7:30 am to 4:00 pm

Multiple facilities in downtown San Jose are used for conferences and courses, so please allow yourself enough time to register, pick up your materials, and possibly walk to a nearby facility before your meeting or course begins.

Exhibition Hours

Biomedical Optics Exhibition

San Jose Convention Center, Exhibition Hall 1

Saturday 21 January . . . . . 1:00 to 5:00 pm
Sunday 22 January . . . . . 10:00 am to 4:00 pm

Photonics West Exhibition

San Jose Convention Center, Exhibition Halls 1-3, Exhibit foyer, and South Hall

Tuesday 24 January . . . . . 10:00 am to 5:00 pm
Wednesday 25 January . . . . . 10:00 am to 5:00 pm
Thursday 26 January . . . . . 10:00 am to 4:00 pm

Speaker Audiovisual Desk

San Jose Convention Center, Concourse 1

Saturday-Thursday 21-26 January . . . . . 7:30 am to 5:00 pm

Speakers using a laptop are requested to come to the Audiovisual Desk to confirm display compatibility with LCD projectors prior to their presentation. Speakers who did not pre-request required special audiovisual equipment are asked to stop at the Audiovisual Desk upon arrival to see if these special requests can be fulfilled.

Audio/Video/Digital Recording Policy

Because of copyright restrictions, no recordings of any kind are permitted without prior written consent of the presenter in any conference session, short course, or poster session. Consent forms are available at the SPIE Audiovisual Desk, and anyone wishing to record must have a written consent form signed and filed for each presenter being recorded. Individuals not complying with this policy will be asked to leave a given session and asked to surrender their film or recording media.

In the Exhibition Hall: For security and courtesy reasons, photographing or videotaping individual booths and displays in the exhibit hall is allowed ONLY with explicit permission from onsite company representatives. Individuals not complying with this policy will be asked to surrender their film and to leave the exhibition hall.

Course Materials Desk

Located near the SPIE Registration Area

Open during Registration hours

If you have registered to attend a course, please stop by the Course Materials Desk, AFTER you pick up your badge, to pick up your course notes and to find out where the class will be located. You may also get a copy of the latest Education Services catalog to see the many courses SPIE has available at symposia, on video and CD-ROM, and to discover the opportunities for customized In-Company courses.

Message Center

San Jose Convention Center, located near SPIE registration

Messages will be taken during registration hours Saturday through Thursday by calling 408-271-6000.

Internet Access

San Jose Convention Center, Arcade Area, Street Level

Saturday – Wednesday . . . . . 7:30 am to 6:00 pm
Thursday . . . . . 7:30 am to 4:00 pm

San Jose Convention Center, South Hall

Tuesday . . . . . 10:00 am to 5:00 pm
Wednesday . . . . . 10:00 am to 5:00 pm
Thursday . . . . . 10:00 am to 4:00 pm

At each of these locations will be multiple workstations allowing attendees to access their internet e-mail during the conference, and several Ethernet connections to use with your personal laptop. There is a 10-minute time limit for each internet session.

WiFi

Complimentary WiFi access for attendees with wireless-enabled laptops and PDAs will be available Saturday through Thursday in the Ballroom concourse (east end) and Almaden concourse (west end) of the Convention Center, and in South Exhibition Hall Tuesday-Thursday during exhibition hours.

SPIE Copy Center

Convention Center, Street Level registration area Saturday-Thursday 21-26 January

San Diego Copy will provide a copy service for attendees during registration hours for the week of the symposium. The rates are 5 cents per copy and $1 per transparency ($2.50 for color).

Coffee Breaks

Coffee will be served at approximately 10:00 am and 3:00 pm each day. Check individual conferences for actual break times and locations.

Cash Continental Breakfast

Cash continental breakfast service will be available Saturday through Thursday in the Convention Center Foyer.

Lunch Service

Exhibition Halls 1-3 and South Hall Concessions

Food concession booths and concession seating will be located in all the exhibit halls. Concessions will be open during exhibit hours for your convenience and serve a variety of deli-style sandwiches, salads, hot entrees, pastries, hot and cold snacks, and beverages on a cash basis.

Free lunch!

San Jose Convention Center, South Hall

Tuesday–Thursday 24-26 January

Starting at 12 noon, until supply runs out

A free lunch item will be available to attendees on a first-come, first-served basis until those limited quantities are gone. The free lunch item will vary per day. Take advantage of this free lunch offer and optimize your time by visiting the South Hall exhibitors.

Desserts

Dessert snacks will be served in the BiOS exhibition Saturday and Sunday, and in the Photonics West exhibition halls Tuesday through Thursday, from 3:00 to 3:30 pm. Complimentary tickets for the dessert snacks will be included in attendee registration packets.

Welcome Reception

Fairmont Hotel, Imperial Ballroom

Monday 23 January . . . . . 6:00 to 7:30 pm

All attendees are invited to relax, socialize, and enjoy refreshments while establishing and renewing connections with colleagues. Please remember to wear your conference registration badges. Dress is casual.

Poster Sessions

Parkside Hall

For BiOS conferences

Tuesday 24 January . . . . . 6:00 to 7:30 pm

For OPTO, LASE, and MOEMS/MEMS conferences

Wednesday 25 January . . . . . 6:00 to 8:00 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors.

Poster Setup

Poster presenters may set up between 10:00 am and 5:30 pm on the day of their assigned presentation. Poster presenters are asked check in at the Poster Desk located at the entrance to Parkside Hall. Poster presenters who have not checked in and set up by 5:30 pm on the day of their presentation will be considered a “no show” and their manuscript will not be published. Presenters must remove their posters immediately after the poster session. Posters not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from (Tuesday, 6:00 pm - 7:30 pm; Wednesday, 6:00 - 8:00 pm) to answer questions from attendees. Attendees are requested to wear their conference registration badges.

SPIE Marketplace

A variety of SPIE’s Publications, Distance Education, and Membership products and services will be available at the Photonics West Marketplace. A large selection of Proceedings, technical and reference books, selected papers on CD-ROM, and educational courses on videotape, CD-ROM, and DVD will be offered for sale, in addition to monogrammed premiums.

SPIE Digital Library

While attending the meeting, stop by the SPIE Marketplace to try out the new SPIE Digital Library. The SPIE Digital Library contains 175,000 full-text papers from SPIE Journals and Proceedings published since 1990. It also includes citations and abstracts for most SPIE papers published since 1995.

Photonics West Media Center

The on-site Media Center provides press conference facilities, refreshments, and convenient one-stop-shopping for press releases. Credentialed media are invited to communicate news via the provided telephone and computer connections. Registration and exhibition fees are waived for credentialed media representatives. You are encouraged to pre-register by e-mailing: name, organization, title, address, e-mail, and phone number to media@spie.org. For more information about SPIE media services, see

http://spie.org/info/media

Special 2-Day Event!

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SPIEWorks Career Fair

Convention Center Street Level near Hilton Hotel

Tuesday 24 January . . . . . 10:00 am to 5:00 pm
Wednesday 25 January . . . . . 10:00 am to 5:00 pm

Connect with companies involved in the commercial development of optical engineering, remote sensing, materials and devices, signal and image processing, and x-ray optical technologies. This event includes the entire spectrum of light - driven technologies and attracts employers representing a wide range of industries, production processes, and products. If you’re a physicist, optical engineer, applied scientist, engineer or product developer this event should be of interest.

- Network with technical staff and human resource recruiters
- Post your resume to the online Career Fair
- Search job postings online (24 hours a day)
- Interview for positions
- Learn more about employment opportunities

Membership in SPIE is not required.

Online Career Services

In addition to the onsite recruitment activities listed above, SPIEWorks offers you online services to help you with your search for employment before, during and after the conference. Visit the online Career Fair being held in conjunction with Photonics West; post your resume, view jobs, or sign-up for “Job Alerts” and receive opportunities by email long after this event is over.

spieworks.com

Free Services for Employers

- Stop by the SPIEWorks booth in the Career Fair and gain access to our proprietary resume database at no charge.
- Post jobs for free. That’s right, there’s no charge to post jobs to the Photonics West Career Fair. Go to spieworks.com, create an account and sign-in to post jobs online. Your free job(s) will be live 23 – 29 January.

For information on future recruiting events contact Robert Dentel or Dave Baggenstos at +1 360 715 3705 or email sales@spieworks.com

Luggage/Package Storage/ Coat Check

Convention Center, Street Level Arcade

Saturday through Thursday . . . . . 7:30 am to 6:00 pm

Complimentary luggage/package and coat storage will be available to attendees.

Please note hours of operation. If you intend to stay later than closing time, you will need to claim your checked items before it closes.

Sightseeing/Restaurants

The San Jose Convention and Visitors Bureau will be operating an Information Desk on the street level of the Convention Center near the main entrance. They will be open during core hours of the convention and will be able to help attendees with lodging, sightseeing, shopping, and restaurant arrangements. Many fine restaurants are located in the downtown business district of San Jose in the vicinity of the Convention Center and adjacent to the light rail system.

Visitor Information Center

A Visitor's Information kiosk is located in the main lobby of the convention center and will be open during show hours for sightseeing, shopping, and restaurant information.

Child Care

A few child sitting services available in San Jose are as follows.

Bay Area 2nd MOM Inc., Hotel Nanny Service,
Toll Free Phone: 1-888-926-3666,
or (650) 858-2469, ext. 109.
Fax: (650) 493-6598, Email: oncall@2ndmom.com
or parentcounselor@2ndmom.com,
www.2ndmom.com

Sitters Unlimited
Toll Free Phone: (408) 452-0225,
E-mail: rfosorio@peoplepc.com or www.sittersunlimited.com

Note: SPIE does not imply an endorsement or recommendation of these services. They are provided on an "information-only" basis for your further analysis and decision. Other services may be available.

Headquarters Hotel

Fairmont Hotel
170 South Market St.
Hotel Phone: 408 998 1900
Hotel Fax: 408 287 1648

Other Accommodations

San Jose Marriott
301 South Market St.
Hotel Phone: 408 280 1300
Hotel Fax: 408 278 4444

Hilton San Jose and Towers
300 Almaden Blvd.
Hotel Phone: 408 287 2100
Hotel Fax: 408 947 4489

Crowne Plaza San Jose Hotel
282 Almaden Blvd.
Hotel Phone: 408 998 0400
Hotel Fax: 408 289 9081

The Sainte Claire, a Larkspur Hotel
302 South Market St.
Hotel Phone: 408 885 1234
Hotel Fax: 408 977 0403

Ramada Ltd.
455 South Second St.
Hotel Phone: 408 298 3500
Hotel Fax: 408 298 2477

Wyndham Hotel San Jose
1350 North First St.
Hotel Phone: 408 453 6200
Hotel Fax: 408 437 9693

Hyatt San Jose
1740 North First St.
Hotel Phone: 408 993 1234
Hotel Fax: 408 453 0259

Clarion San Jose Hotel
1355 North Fourth St.
Hotel Phone: 408 453 5340
Hotel Fax: 408 453 5208

Radisson Plaza Hotel
1471 North Fourth St.
Hotel Phone: 408 452 0200
Hotel Fax: 408 437 8819

Hertz Car Rental is the official car rental agency for this Symposium. To reserve a car, identify yourself as a **Photonics West Conference attendee** using the **Hertz Meeting Code CV# 029B0009.**

In the United States call 1-800-654-2240.

Transportation from San Jose Airport to San Jose Hotels by Scheduled Shuttle

The San Jose Convention Center is located three miles from the San Jose International Airport (www.sjc.org). **The South and East Bay Airport Shuttle,** (408) 225-4444, will deliver to specific San Jose hotels from the San Jose Airport for $32.00 for the first person and $9.00 for each additional person in the same group, one way (credit cards, cash & local checks accepted). From a courtesy phone in the baggage area dial #66; you will be given instructions as to where to board the shuttle, which usually arrives within 15-20 minutes from the time of your call. *Rates are current from August, 2005 - rates are subject to change without notice.*

Transportation from San Jose Airport to San Jose Hotels by Reserved Limousine Service "On Demand"

Bauer's Limousine and Worldwide Transportation is offering transportation between Mineta San Jose International Airport and any downtown San Jose hotel. **Advance reservations are required for this service.** Credit cards are the accepted form of payment. Passengers will be met at the airport in the baggage claim area by the driver , who will be holding a sign with the passenger's name displayed. The Lincoln Town Car will take up to three passengers at one time for a flat rate of $75.52 **per carload,** which includes taxes and gratuities. Reservations can be made by calling 1-800-LIMO.OUT (or 1-800-546-6688) or 1-415-522-1212, or online at www.bauerslimousine.com.

Transportation from San Francisco Airport

The San Jose Convention Center is one hour from San Francisco International Airport. Transportation options from San Francisco International Airport to downtown San Jose hotels consist of:

- Taxicab from San Francisco Airport to downtown San Jose Hotels approximately $130-$140 (+ gratuities) (one-way)
- San Francisco Limousine Service, Lincoln executive town car flat rate $85 + $12.50 tax (+ gratuity generally 15-20%) to downtown San Jose Hotels. If arriving between the hours of 10:00 pm – 6:00 am, an extra late fee will apply ($10 - $30 extra depending on time of arrival).Town car holds 3-4 people, Reservations are required, cash or credit cards accepted (no checks). Call 1-888-876-1777 or 650-877-0909 24 hrs/day, 7 days/wk, or book on-line at– www.sfolimousine.com. One to four passengers can ride for the price of one.
- The South and East Bay Shuttle directly to the San Jose International Airport (see below).

The South and East Bay Airport Shuttle between San Francisco and San Jose Airports

The South and East Bay Shuttle runs between the San Francisco International Airport and the San Jose Airport. The fare is $45.00 for the first person and $9.00 for each additional person in your group. Rates are subject to change without notice. Credit cards, cash or checks accepted. The trip takes approximately 1 hour and 15 minutes. **From SFO (San Francisco Airport), call 408-225-4444** from the baggage claim area DEPARTURE LEVEL and the shuttle will pick you up within 10-20 minutes. **From SJC (San Jose Airport) call the following number which only works from the San Jose Airport 1-800-548-4664** and you will be told where to meet the shuttle. *Rates are current from August, 2005 - rates are subject to change without notice***.**

Free AIRPORT FLYER to/from Norman Y. Mineta San Jose International Airport

The free VTA/SJC **AIRPORT FLYER #10 Bus** departs for San Jose International Airport (SJIA) daily from 5:00 am until midnight - weekdays every 12 minutes, weekends every 15 minutes. Catch the Airport Flyer at VTA's Metro/Airport Light Rail stop and at the Santa Clara Caltrain Bus Station.

Light Rail to Convention Center

Local attendees to the symposium and those staying at hotels outside of walking distance are encouraged to make use of the excellent, inexpensive commuter light rail systems. The San Jose Convention Center is adjacent to the light rail line that extends from South San Jose to Milpitas and East San Jose. From the San Jose International Airport take the free Airporter Flyer and transfer to the Metro/Airport Light Rail Station (see light rail fares below). Go southbound (sign reads Santa Teresa) and get off at the Convention Center Station. Or assuming the new Winchester line has opened (scheduled for the fall of 2005), take the Winchester Transit Center Line and get off at the Convention Center Station.

Light rail transit stations connect with a number of bus routes. See the Downtown San Jose map for location (www.sjdowntownparking.com) in relationship to the convention center and the hotels. For more information on light rail stops, connections, and transit times, please call Santa Clara Valley Transportation Authority (VTA) Customer Service at (408) 321-2300. Information Service Representatives are available Monday through Friday, 6:00 a.m. am to 7:00 p.m., and weekends, 7:30 a.m. to 4:00 p.m. Automated schedule information is available 24 hours a day by calling the same number. You may also find this information on the web at **www.vta.org**.

Fares

The adult single-ride fare for regular service buses and light rail will be $1.75. A single-ride ticket purchased at a ticket vending machine (TVM) is valid on light rail for two hours. An adult Day Pass will be $5.25. Day passes are valid for unlimited rides on both light rail and regular service buses for a one-day period and can be purchased on the light rail platforms at the ticket vending machines. *Rates are subject to change without notice.*

Park and Ride

VTA provides ample parking for those who want to park and ride. To see a full listing of Park and Ride lots, visit www.vta.org and click on "Schedules, Maps & Fares" and then "Park and Ride." It is **complimentary to park** at the Park and Ride lots.

Since parking at the Convention Center can be quite congested at times, try the Park and Ride alternative transportation method, utilizing VTA's complimentary Park & Ride parking lots to commute to the Convention Center. Free regular Park & Ride parking is limited to 72 hours. VTA also offers Airport Long-Term Parking for up to seven days at select VTA Park and Ride Lots.

Park & Ride, with directions to the Convention Center:

From the north, park in the Evelyn Park-and-Ride Lot in Mountain View. **Tentatively** effective the fall of 2005, the new Winchester Line (formerly Mountain-View-Baypointe Line) will begin operating between downtown Mountain View and the Convention Center Station in downtown San Jose. The Mountain View trains will no longer stop at the Baypointe Station.

From the south, park in the Santa Teresa Park-and-Ride lot located at the Santa Teresa Light Rail Station. Board the light rail with the headsign "Alum Rock" and get off at the Convention Center Station.

From the west, park at the Valco Fashion Park Park-and-Ride lot. Board the eastbound Route 23, with the sign "Downtown San Jose", and get off at the Convention Center Station.

From the east, park in the Capitol and Alum Rock Avenue Park-and-Ride lot. Board the southbound Route 64, with the sign "Almaden Light Rail Station". Get off at the Market Street and Santa Clara Station, which is two blocks away from the Convention Center.

DASH (Downtown Area Shuttle)

Attendees may also use the DASH (Downtown Area Shuttle) to reach the Convention Center. The DASH operates free service between the San Jose Diridon CalTrain Bus Station and downtown San Jose, Monday through Friday, from 6:15 am to 6:35 p.m. every 10 minutes. Extra morning commute shuttles provide service every 5 minutes. For DASH routes and parking lots visit the VTA website at www.vta.org. For more information, call VTA Customer Service at (408) 321-2300.

Convention Center Parking

Special event parking at the San Jose Convention Center is $12 per day for (24 hours) with no in/out privileges). For short time parking the rate is $1 for each 20 minutes (Maximum $12). (With in/out privileges, the rate is $20 per day). There are approximately 650 spaces for the public to use.

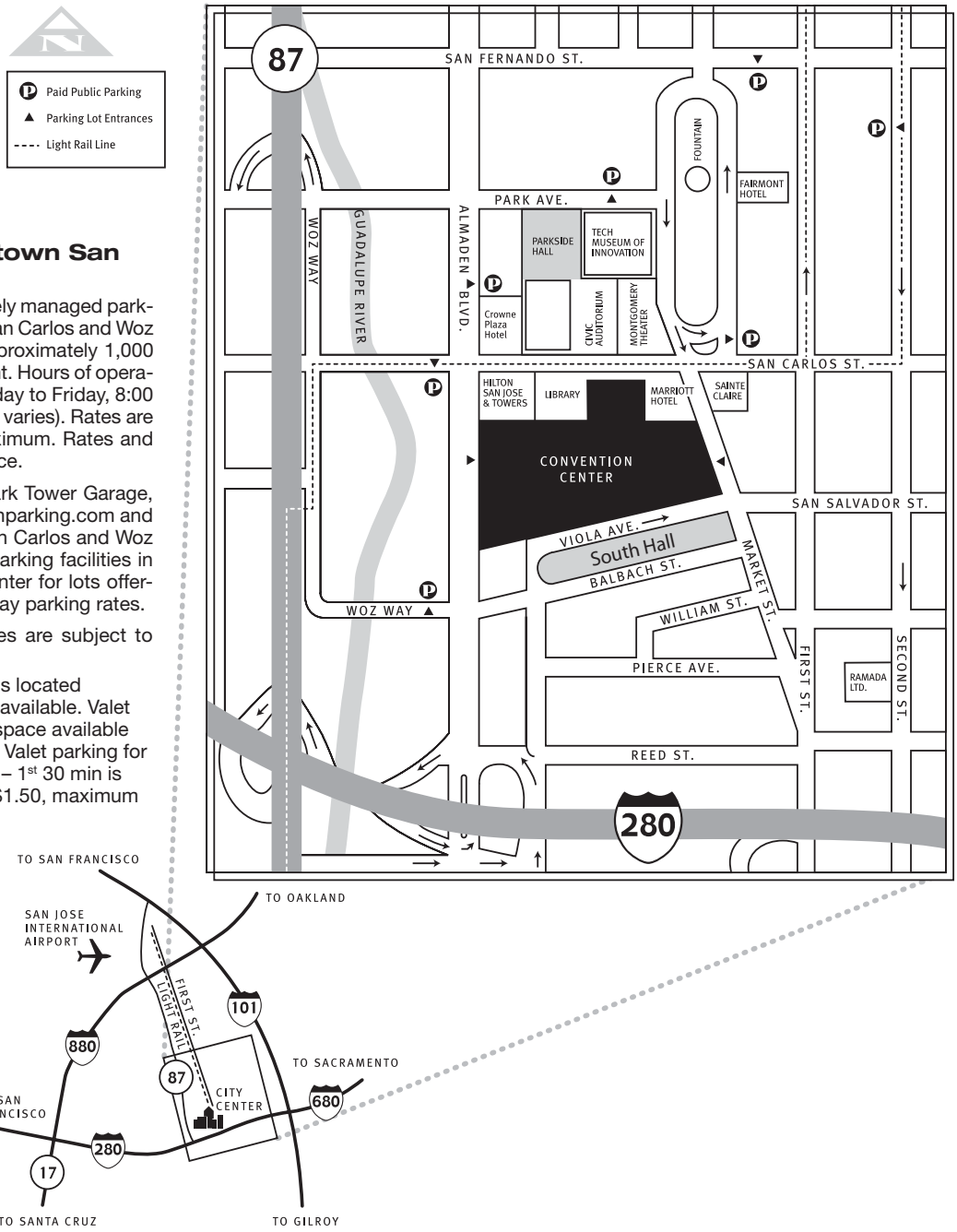
Alternate Parking Downtown San Jose

River Park Tower Garage is a privately managed parking garage located on the corner of San Carlos and Woz Way, 333 W. San Carlos St., with approximately 1,000 spaces available each day of the event. Hours of operation 6:30 am to 12:00 midnight, Monday to Friday, 8:00 am to 12 midnight Saturday; (Sunday varies). Rates are $1.25 per 20 minutes, $18 daily maximum. Rates and hours subject to change without notice.

For driving directions to the River Park Tower Garage, check their website www.sjdowntownparking.com and click on the area on the corner of San Carlos and Woz Way. You may also view additional parking facilities in close proximity to the convention center for lots offering convention center hourly or per day parking rates.

Parking at Individual Hotels (All rates are subject to change without notice)

- **Fairmont Hotel** – Parking garage is located beneath the hotel. No self parking available. Valet parking for **overnight guests** (on space available basis) is $22 with in/out privileges. Valet parking for **visitors** (on space available basis) – 1st 30 min is $5, each additional 20 minutes is $1.50, maximum per day is $22.
- **San Jose Marriott** – Parking for guests is available for $19 per day with in/out privileges. Non-guests pay $4.00 per hour with a maximum of $19/day.
- **Hilton San Jose & Towers** – For self parking for guests $12 max. with in/out privileges, for non-guests $18 max. For valet parking $20 max. with in/out privileges. With validation at City Bar & Grille for up to 5 hours $8.
- **Crowne Plaza** – For Guests – self parking, $12 per day (subject to change) with in/out privileges. No valet. For non-guests $1.25 per 20 minutes, max. $18 per day.
- **The Sainte Claire** – For Guests & visitors, valet parking only with in/out privileges, $6 for 1-3 hours, $9 for 3-8 hours, over 8 hours is $15, and $18 for overnight.
- **Ramada Ltd.** – Guest parking is complimentary.



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Biomedical Optics

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