

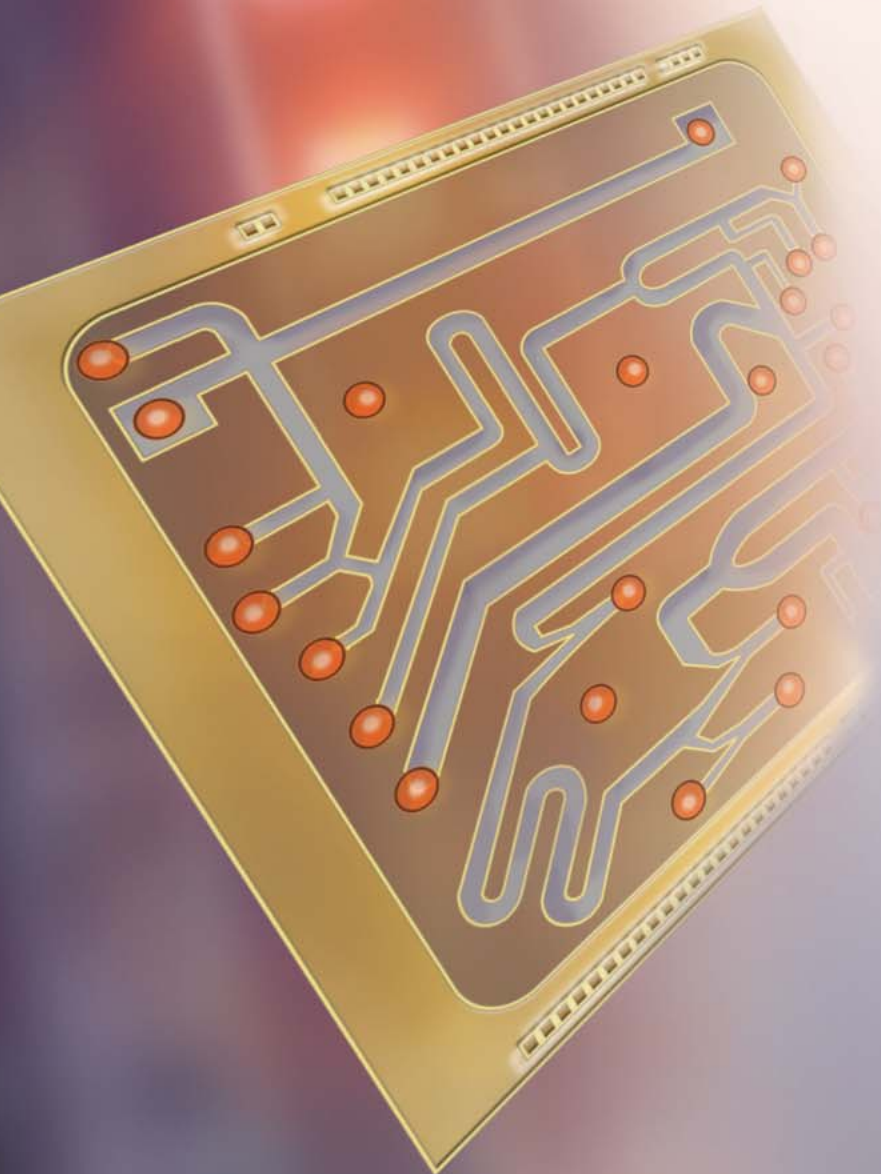
Technical Program


SPIE  
**OpticsEast**

*Photonics for Applications in Industry,  
Life Sciences, and Communications*

*1–4 October 2006*

*Hynes Convention Center, Boston, Massachusetts USA*



 The International Society  
for Optical Engineering

# SPIE OpticsEast

*Photonics for Applications in Industry, Life Sciences, and Communications*

*1–4 October 2006 Hynes Convention Center • Boston, Massachusetts USA*

Conferences • Courses • Exhibition

## Welcome!

Optics East is a multidisciplinary event made up of 30 conferences focusing on sensors, life sciences, advanced telecom, and core technologies such as optomechanics, photonic crystals and nanotechnology.

Interdisciplinary collaboration, and the blurring of the distinction between basic research and product development in science, engineering and technology, has become the norm, rather than the exception. The diverse topical reach of the Optics East Technical Program, combined with events focused on the market for optic and photonic systems, components, devices and services, will help you move your research forward and find the solutions to the technical challenges you face in your work.

Sponsored by



The International Society  
for Optical Engineering

*SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, 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.*

*SPIE's Event Manager for this symposium is Bonnie Peterson. For information about the technical program, email: [meetinginfo@spie.org](mailto:meetinginfo@spie.org).*

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



**Tuan Vo-Dinh,**  
Duke Univ.  
*Sensors and Industry  
Applications Symposium  
Chair*



**Achyut K. Dutta,**  
Banpil Photonics  
*Communications/ITCom  
Symposium Chair*



**Robert A. Lieberman,**  
Intelligent Optical  
Systems, Inc.  
*Sensors and Industry  
Applications Symposium  
Chair*



**Werner Weiershausen,**  
T-Systems Enterprise  
Services GmbH  
(Germany)  
*Communications/ITCom  
Symposium Chair*



**Joseph P. Robinson,**  
Purdue Univ.  
*Life Sciences Symposium  
Chair*

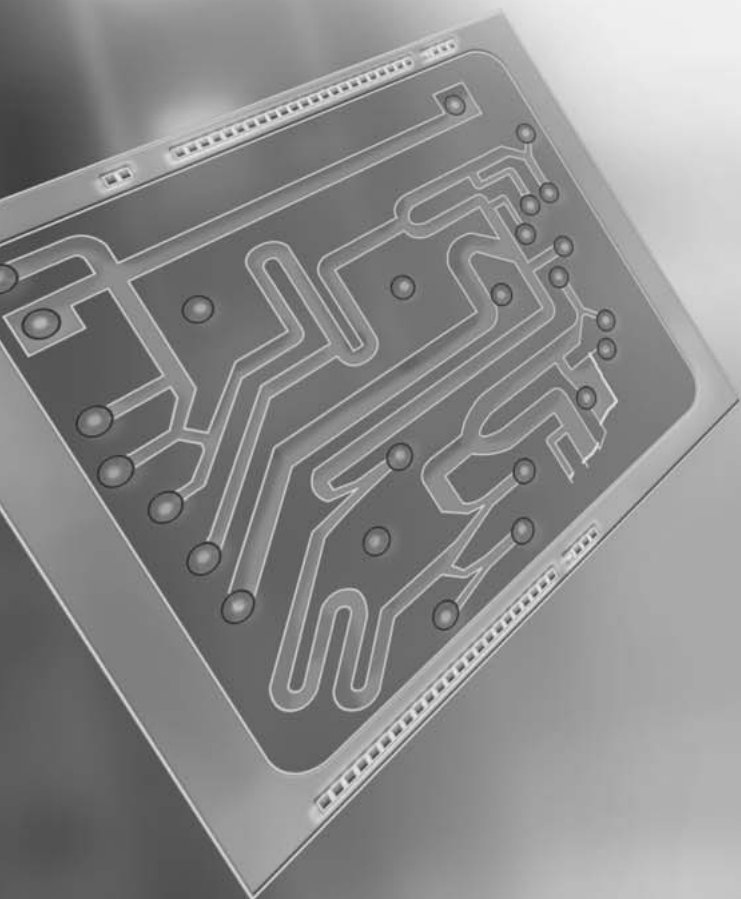
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**Don't Miss the Exhibition!**

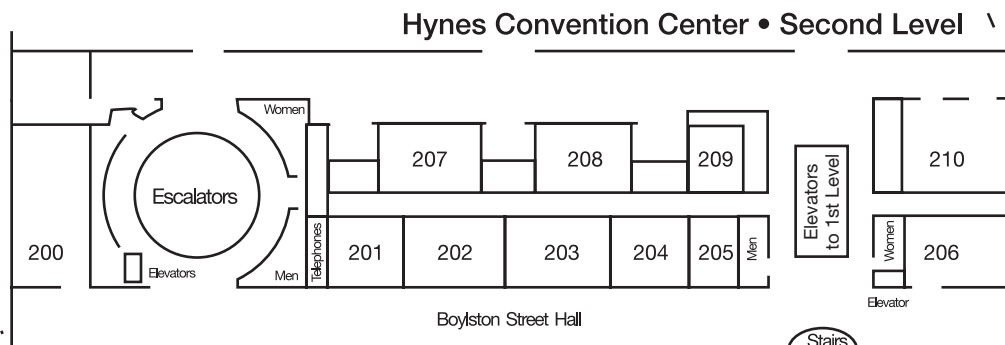
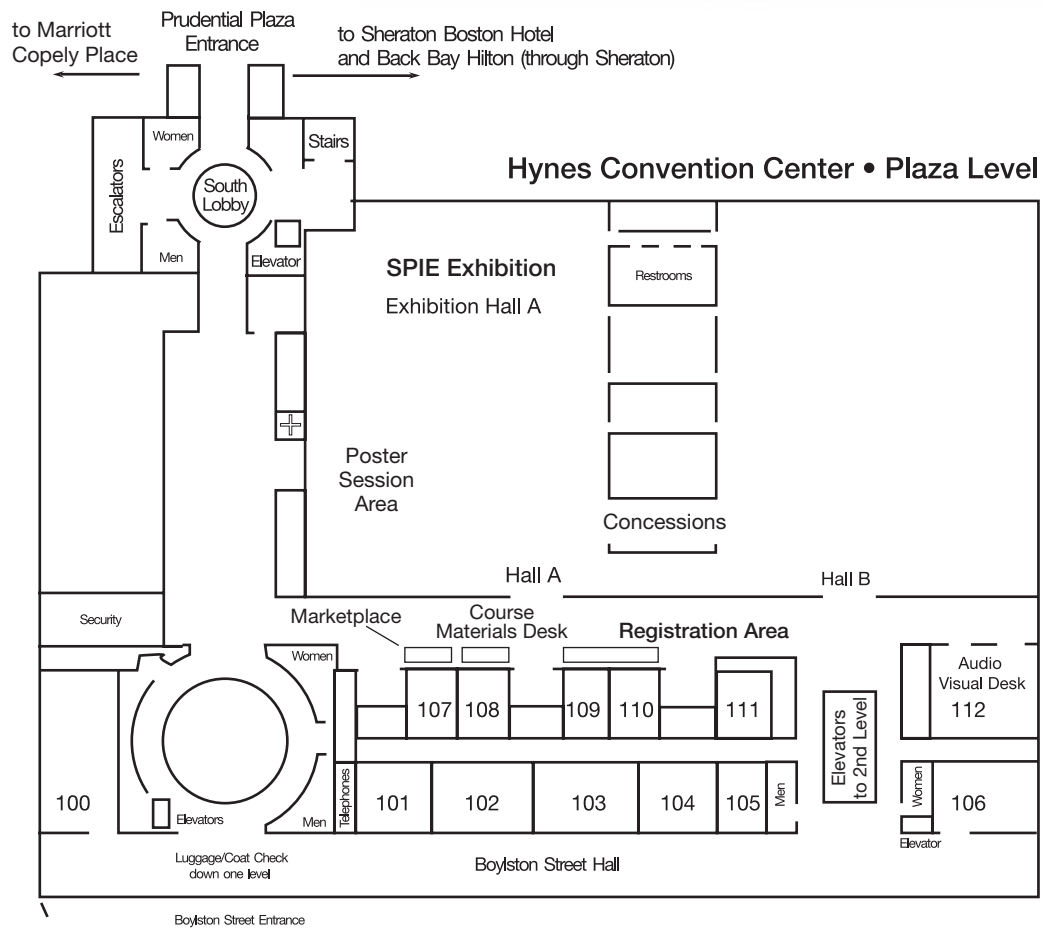
Tuesday · 10:00 am to 5:00 pm  
Wednesday · 10:00 am to 4:00 pm  
*See p. 10 for details.*



*Thank you to the following  
Promotional Partners:*

- Electro Optics**
- Laser Focus World**
- New England Fiberoptic Council**
- Optronics Magazine**
- Photonics Online**
- Photonics Spectra**
- Spectroscopy Magazine**
- Research in Nondestructive Testing**
- International Journal of Distributed  
Sensor Networks**
- U.S. Naval Research Lab.**

# Hynes Convention Center



## Core Technology Conferences

- 6368 **Optoelectronic Devices: Physics, Fabrication, and Application III**, (Piprek/Wang) . . . . . 12
- 6369 **Photonic Crystals and Photonic Crystal Fibers for Sensing Applications II**, (Du/Bise) . . . . . 14
- 6370 **Nanomaterial Synthesis and Integration for Sensors, Electronics, Photonics, and Electro-Optics**, (Dhar/Dutta/Islam) . . . . . 16
- 6371 **Photonic Sensing Technologies**, (Marcus/Culshaw/Dakin) 19
- 6372 **Advanced Photon Counting Techniques**, (Becker) . . . . . 21
- 6373 **Terahertz Physics, Devices, and Systems**, (Anwar/DeMaria/Shur) . . . . . 23

Plus conferences featuring **Optomechatronic Technologies**

- 6374A **Optomechatronic Actuators and Manipulation II**, (Otani) 25
- 6374B **Optomechatronic Systems Control II**, (Janabi-Sharifi) . . 27
- 6375A **Optomechatronic Sensors and Instrumentation II**, (Takaya) . . . . . 28
- 6375B **Optomechatronic Computer-Vision Systems**, (Kofman) . 29
- 6376 **Optomechatronic Micro/Nano Devices and Components II**, (Katagiri) . . . . . 30

## Sensors and Industry Applications

*Symposium Chairs:* **Tuan Vo-Dinh**, Duke Univ.; **Robert A. Lieberman**, Intelligent Optical Systems, Inc.

- 6377 **Advanced Environmental, Chemical, and Biological Sensing Technologies IV**, (Vo-Dinh/Lieberman/Gauglitz) . 32
- 6378 **Chemical and Biological Sensors for Industrial and Environmental Monitoring**, (Christesen/Sedlacek/Gillespie/Ewing) . . . . . 34
- 6379A **Sensors for Harsh Environments III**, (Wang) . . . . . 36
- 6379B **Photonics in Automotive and Transportation**, (Baldwin/Kazemi) . . . . . 37
- 6380 **Smart Medical and Biomedical Sensor Technology IV**, (Cullum/Carter) . . . . . 38
- 6381 **Optics for Natural Resources, Agriculture, and Foods**, (Chen/Meyer/Tu) . . . . . 40
- 6382 **Two- and Three-Dimensional Methods for Inspection and Metrology IV**, (Huang) . . . . . 42
- 6383 **Wavelet Applications in Industrial Processing IV**, (Truchetet/Laligant) . . . . . 43
- 6384 **Intelligent Robots and Computer Vision XXIV: Algorithms, Techniques, and Active Vision**, (Casasent/Hall/Röning) . . . . . 45
- 6385 **Environmentally Conscious Manufacturing VI**, (Gupta) . 47

## Life Sciences

*Symposium Chair:* **J. Paul Robinson**, Purdue Univ.

- 6386A **Optical Methods in Drug Discovery and Development II**, (Analoui) . . . . . 48
- 6386B **Infrared, Mid-IR, and THz Technologies for Health and the Environment**, (Belyanin/Drezek/Gmachl) . . . . . 49
- Conferences of Related Interest*
- 6380 **Smart Medical and Biomedical Sensor Technology IV**, (Cullum/Carter) . . . . . 38
- 6381 **Optics for Natural Resources, Agriculture, and Foods**, (Chen/Meyer/Tu) . . . . . 40

### Special Session Smart Medical Home

*Wednesday 4 October • 2:00 to 4:00 pm*  
*Hynes Convention Center, Room 100*

*Chair:* **Israel Gannot**, Tel-Aviv Univ. (Israel) and George Washington Univ.

This special session will deal with different aspects of the smart medical home idea. The panelists come from different disciplines: medicine, biomedical sciences, architecture, and engineering, and they will present the projects that they are heading in their universities. After the presentations there will be a panel discussion with active participation from the audience on the presented issues, as well as psychological and philosophical aspects of the smart medical home concept.

*See p. 5 for more information.*

## Communications/ITCom

*Symposium Chairs:* **Achyut K. Dutta**, Banpil Photonics; **Werner Weiershausen**, T-Systems International GmbH (Germany)

- 6387 **Next-Generation Communication and Sensor Networks 2006**, (Atiquzzaman/Balandin) . . . . . 51
- 6388 **Optical Transmission Systems and Equipment for Networking V**, (Dingel/Sato/Weiershausen/Dutta) . . . . . 52
- 6389 **Active and Passive Optical Components for Communications VI**, (Dutta/Ohishi/Dutta/Moerk) . . . . . 54
- 6390 **Broadband Access Communication Technologies**, (Jain/Dingel/Komaki/Ovadia) . . . . . 56
- 6391 **Multimedia Systems and Applications IX**, (Rahardja/Kim/Tian/Chen) . . . . . 58
- 6392 **Three-Dimensional TV, Video, and Display V**, (Javidi/Okano/Son) . . . . . 60
- 6393 **Nanophotonics for Communication: Materials, Devices, and Systems III**, (Gerken/Dhar/Dutta/Islam) . . . . . 62

# Special Events

Sunday October 1	Monday October 2	Tuesday October 3	Wednesday October 4
<b>Welcome Reception</b> , 5:30 to 6:30 pm, p. 4	<b>Communications/ITCom Plenary Presentations</b> , 9:30 am to 12:00 pm, p. 6  <b>Women in Optics Lunch</b> , 12:00 to 1:00 pm, p. 4  <b>Student Lunch with the Experts</b> , 12:30 to 1:30 pm, p. 5  <i>Technical Group Meeting: Fiber Optics</i> , 5:30 to 6:00 pm, p. 7  <i>Technical Group Meeting: Optomechatronics</i> , 5:30 to 7:00 pm, p. 7  <i>Technical Group Meeting: Robotics &amp; Machine Perception</i> , 5:30 to 7:00 pm, p. 7  <b>Fiber Optic Sensor Consortium</b> , 6:00 to 6:25 pm, p. 7  <b>ASTM Subcommittee E13.09 on Fiber Optics, Waveguides, and Optical Sensors</b> , 6:25 to 7:00 pm, p. 7	<b>Exhibition</b> 10:00 am to 5:00 pm  <b>Poster Session</b> , 6:00 to 7:30 pm, p. 4  <b>Optomechatronic Technologies Banquet</b> , 7:30 to 10:00 pm, p. 4	10:00 am to 4:00 pm  <b>Industry Perspectives: Market analysis, technology review and ideas for business</b> , 8:30 to 11:30 am, p. 8  <b>Special Session Smart Medical Home</b> , 2:00 to 4:00 pm, p. 5

## Welcome Reception

Boston Marriott Copley Place, 3rd Floor Atrium

Sponsored by



Sunday 1 October . . . . . 5:30 to 6:30 pm

All attendees are invited to the Welcome Reception. Relax, socialize, and enjoy refreshments. Please remember to wear your conference registration badges. Dress is casual.

## SPIE Women in Optics Lunch

Sponsored by

**Boston Scientific**

*Delivering what's next.™*

Monday 2 October . . . . . 12:00 to 1:00 pm

**Speaker: Judy Largesse**

Sr. Manager, Electro-Optics Systems  
Endovations Division, Boston Scientific Corporation

Join us for an opportunity to network with other optics professionals, generate new contacts, and expand your resources and referrals. This SPIE hosted luncheon at Optics East is the perfect way to meet and develop relationships with others in your field. Register for this lunch at the SPIE Cashier by 3:00 Sunday; location information provided upon sign-up.

## Optomechatronic Technologies Banquet

See purchased ticket for location.

Tuesday 3 October . . . . . 7:30 to 10:00 pm

Enjoy networking with your peers at this gala event. Banquet tickets are \$65 each. Tickets for the banquet may be purchased onsite at the SPIE Cashier Desk until 5:00 pm on Sunday 1 October. All authors and attendees interested in optomechatronic technologies are welcome.

## Interactive Poster Session

Exhibition Hall A

Sponsored by



Tuesday 3 October . . . . . 6:00 to 7:30 pm

### Poster Set-Up

Monday 2 October . . . . . 12:00 to 5:00 pm

Tuesday 3 October . . . . . 10:00 am to 5:00 pm

Poster authors will be able to set up starting at Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. Poster Presenters who have not set up by 5:00 pm on Tuesday will be considered a "no show" and their manuscript will not be published.

Presenters will be at their poster papers to answer questions from 6:00 pm to 7:30 pm on Tuesday.

It is the author's responsibility to remove their posters at the end of the session. Papers not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of the poster session.



### Student Lunch with the Experts

See ticket for location.

Monday 2 October . . . . . 12:30 to 1:30 pm

Combine fun, food and networking at this engaging, free event open to all students. 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 open to all student attendees. Please come early as space is limited; tickets will be collected at the door.

### Special Session Smart Medical Home

Hynes Convention Center, Room 100

Wednesday 4 October . . . . . 2:00 to 4:00 pm

Chair: **Israel Gannot**, Tel-Aviv Univ. (Israel) and George Washington Univ.



A Design for Duke Smart Home Project. Courtesy of Tom Rose, Duke Univ.

*Panel Participants:*

**Alice Pentland**, Chair of the Center of Future Health, Rochester Univ.

**Kent Larson**, Chair of the House\_n project, Massachusetts Institute of Technology

**Majd Alwan**, Eldercare Technologies Program Director, Univ. of Virginia

**Diane Cook**, Director of the MavHome Project, Univ. of Texas/ Arlington

**Tom Rose**, SmartHouse Program Director, Duke Univ.

As people grow older they find it more difficult to remain in their houses and they move into retirement homes, nursery homes, assisted living projects, or other special housing for the elderly. This transition surely has an affect on their state of mind. A move from their natural surroundings may also impact their health condition for the worse.

With the advance of medicine, technologies of sensing, monitoring, and health informatics there is a big potential in creating a smart medical home where elderly people can continue to live their normal lives in their natural and recognized surroundings.

This special session will deal with different aspects of the smart medical home idea. The panelists come from different disciplines: medicine, biomedical sciences, architecture, and engineering, and they will present the projects that they are heading in their universities.

After the presentations there will be a panel discussion with active participation from the audience on the presented issues, as well as psychological and philosophical aspects of the smart medical home concept.

**Don't Miss the Exhibition!**  
Tuesday · 10:00 am to 5:00 pm  
Wednesday · 10:00 am to 4:00 pm  
See p. 10 for details.



## Jumpstart Your Job Search.

Regardless of your status—recent graduate, newly unemployed, or considering a career move—find the job that’s right for you.

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# Plenary Presentations

## Communications/ITCom Plenary Presentations

Hynes Convention Center, Room 100

Monday . . . . . 9:30 am to 12:00 pm

Chairs: **Achyut K. Dutta**, Banpil Photonics, Inc.; **Werner Weiershausen**, T-Systems International GmbH (Germany)

9:30 to 10:10 am

### The NSF/SBIR Innovation Model



**Murali S. Nair**, National Science Foundation

Abstract: General information about the Small Business Innovation Research/Small Business Technology Transfer Programs at the National Science Foundation will be provided. The presentation will then describe the NSF/SBIR Innovation Model and provide key program statistics. The review criteria and the review process will then be explained.

Insight into upcoming topics areas and the development of various future solicitations, with special focus on the "Electronics" solicitation will be provided. The funding of small businesses pursuing electro-optics, photonics, MEMS, RF, Instrumentation and sensor technologies is described. Finally, commercialization strategies used by the NSF/SBIR program to help portfolio companies will be presented.

Biography: Dr. Murali S. Nair is a Program Director with the Small Business Innovation Research (SBIR) Program at the National Science Foundation (NSF). Prior to joining NSF, he was the Founder and CEO of a wireless company. In this capacity, he raised equity capital for worldwide operations in US, India, China and Brazil. He designed, planned and implemented the product development cycle, and managed the marketing strategy, strategic alliances and business development processes. Before that, Dr. Nair was a Senior Systems Engineer at L-3 Communications where he provided strategic advice to the EVP for a complete re-plan of the Hughes contract for real-time, embedded ground control software for the \$350M PANAMSAT communications satellite. Prior to joining L-3 Communications, he was a Mission Planner at Motorola Iridium where he was involved in all aspects of satellite operations including orbit determination, generating guidance targets and orbital slot placement. Before joining Iridium, Dr. Nair was a faculty member at Embry-Riddle Aeronautical University, where he developed a Space Systems Design Lab from concept inception to fully operational mode and national prominence. Dr. Nair is a registered professional engineer in the State of Florida.

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

10:40 to 11:20 am



### Prospects of Silicon Photonics for future VLSI Interconnects

**Dr Mario Paniccia**, Intel Corporation, Director, Photonics Technology Lab., Communications Technology Lab.

Abstract: 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 one billion transistors and has the computing power that only a decade ago would take up an entire room 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.

Recent advances and research breakthroughs in silicon photonic device performance over last few years have shown that silicon can be considered as a material onto which one can build future optical devices. While significant efforts are needed to improve device performance and to "commercialize" these technologies, progress is moving at a rapid rate. If successful, silicon photonics may similarly come to dominate the optical communications as it has the electronics industry.

In this session, Dr. Paniccia will provide an overview of silicon photonics research at Intel and discuss the key building blocks needed for "siliconizing" photonics. The talk will also discuss if and how the combination of advanced CMOS electronics with photonics could be used for future optical interconnects and discuss what key challenges are needed to be addressed in order to make this transition happen. In addition the presentation will discuss some of the practical issues and challenges with processing silicon photonic devices in a high volume CMOS manufacturing environment.

Biography: **Dr. Mario Paniccia** is a Senior Principal Engineer and Director of the Photonic Technology Lab. at Intel Corporation. Mario currently directs a research group with activities in the area of Silicon Photonics. The team is focused on developing silicon-based photonic building blocks 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. His teams pioneering activities in silicon photonics have led to first silicon modulator with bandwidth >1GHz (2004) and the first continuous wave Silicon laser breakthrough (2005). Mario has won numerous including in November 2004 Mario was awarded by Scientific American to be one of the top 50 researchers for his teams work in the area of silicon photonics. He has published numerous papers, including 3 Nature papers, 2 book chapters, and has over 65 patents issued or pending. He is a senior member of IEEE and a fellow of OSA. 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.

11:20 am to 12:00 pm

### Flexible optical transport networks: Demands and trends on new Layer 2 techniques



**Gert J. Eilenberger**, Alcatel SEL AG, Research & Innovation Centre

Abstract: This talk deals with potential evolution scenarios from today's networks towards long term network architectures for multi-layer transport with a novel Layer 2 transport service based on optical and opto-electronic burst/packet techniques providing the flexibility, scalability, reliability and Quality of Service to support all future higher layer services optimizing both CAPEX and OPEX. An integrated control plane on the basis of GMPLS protocols will support the mostly automatic network operation by a vertical integration of Layer 1-2-3 technologies and a horizontal integration of domains providing end-to-end control and QoS. This long term evolutionary process needs to cover as well the necessary steps in the evolution of current standards.

Biography: **Gert J. Eilenberger** is heading the unit for optical networking at the Alcatel Research & Innovation Center, Stuttgart, Germany. He holds a Dr.-Ing. degree in communication engineering from the University of Stuttgart, Germany. His main interests are on next generation multi-layer optical transport networks based on WDM and burst/packet techniques and integrated control plane concepts. He has authored many technical papers on electronic and optical broadband telecommunications and holds several patents. Since 1985, he has been involved in various national and European research projects (currently BMBF EIBONE and IST FP6 NOBEL 2).



# Technical Events

## Technical Group Meeting

### Fiber Optics

Hynes Convention Center, Room 104

Monday 2 October ..... 5:30 to 6:00 pm

Chair: **Michael Marcus**, Eastman Kodak Co.

The Fiber Optics Technical Group serves as a forum for sharing information concerning research, development, and business opportunities in the areas of fiber optic sensors, components and materials, and communications. The sensor field includes measurement of rotation, acceleration, strain, temperature, pressure, magnetic and electric field, acoustic properties, particle size, chemical and biochemical analytes, thickness, index of refraction, optical retardation, in short, virtually every fiber optic sensor now under development. The field also covers the application of these sensors in smart structures, harsh environments, industrial control, mobile platforms, biomedical and environmental sensing. Multiplexing and distributed sensing techniques and sensor calibration schemes are also covered in the sensor group. The components and materials field covers infrared and plastic fibers, integrated optics and microstructures, Bragg gratings, optical materials reliability and testing, and the basic physics and chemistry principles that define component operation. The communications field covers high-speed networks, fiber networks that support voice and video transmission, and advanced fiber communication technologies.

The Technical Group activities include conference coordination and planning, standards development, and communications of interest to workers in the field.

Please join us at our annual meeting to interact and network between members. You do not need to be a member to attend.

### Fiber Optic Sensor Consortium Meeting

Hynes Convention Center, Room 104

Monday 2 October ..... 6:00 to 6:25 pm

Led by **David A. Krohn**, Light Wave Venture Consulting, LLC

The Fiber Optic Sensor Consortium will hold a brief meeting to provide an update of recent activities, review the future focus of Consortium efforts as well as organizational structure. Various strategic partnering opportunities will also be discussed.

### ASTM Subcommittee E13.09 on Fiber Optics, Waveguides, and Optical Sensors

Hynes Convention Center, Room 104

Monday 2 October ..... 6:25 to 7:00 pm

Chair: **Robert A. Lieberman**, Intelligent Optical Systems, Inc.

Interested in developing standards for optical chemical sensors? Please attend the meeting of ASTM Subcommittee E13.09, on "Fiber Optics, Waveguides, and Optical Sensors".

SCOPE: The focus of this subcommittee is on the formation and development of methods for testing, specifying, and using fiber optics, integrated optics, and other advanced optical and guided-wave techniques for analytical spectroscopy and chemical sensing. It is also engaged in the promotion of the exchange of information, standardization of nomenclature, and coordination of scientific and engineering practices in this field.

E13.09 is a duly constituted subcommittee of ASTM, and has so far published standards for characterizing fibers used in applications ranging from remote Raman spectroscopy to time-resolved fluorescence studies. Currently under development are standards for distributed fiber optic chemical sensors, optical cables used in benchtop UV-VIS-NIR spectroscopy, and optrode-style chemical sensors. Participation by members of academic, national laboratory, and industrial organizations assures that broadly applicable standards are developed. Anyone interested in practical applications of fiber optic chemical sensors is encouraged to attend this meeting.

## Technical Group Meeting

### Optomechanics

Hynes Convention Center, Room 106

Monday 2 October ..... 5:30 to 7:00 pm

Chair: **Jonathan Kofman**, Univ. of Waterloo

About the Group: As an engineering discipline, optomechanics strives to effectively integrate optical and photonic devices with electro-mechanical systems in order to create innovative products and processes. Key optomechanical technologies include optical sensors and actuators, flexible fiber optic and lightwave communication, smart machine vision systems, reconfigurable structures, and embedded control. These technologies provide components for enhanced system performance, high precision, rapid data processing, flexible circuits, and circuit miniaturization.

The SPIE sponsored technical group has been established to fulfill the need for closer collaboration between researchers, academics, product designers, manufacturers, industry, and end-users by bringing them together at a single forum to interact, exchange technical knowledge, and discuss their experiences. The primary objectives of the technical group are to:

- facilitate networking with the other international optics and mechatronic organizations, industry, consortia, national labs, and universities
- organize meetings, conferences and short courses on the integration and application of optical, photonic, and imaging technologies to intelligent products and manufacturing processes
- promote education and research in optomechanics and optical engineering design
- disseminate information about new technologies and processes by contributing to conference proceedings, newsletters, and online discussion forum
- expand membership and participation in the technical group.

### Annual Group Meeting

The annual meeting of the Optomechanics technical group will follow a panel discussion on 'Optomechanics - Directions and Opportunities'. We warmly welcome new participants. All Optics East 2006 attendees interested in Optomechanics are cordially invited to this event.

## Technical Group Meeting

### Robotics & Machine Perception

Hynes Convention Center, Room 109

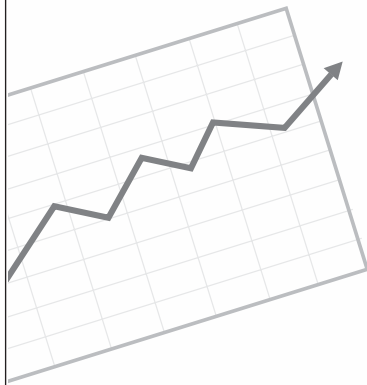
Monday 2 October ..... 5:30 to 7:00 pm

Chair: **Bruce R. Altschuler**, Cobalt Research, LLC

Co-Chair: **Andre Samberg**, AVAPROeod

About the Group: SPIE's Robotics and Machine Perception (R&MP) Technical Group addresses robotics and automation R&D and end-user applications. Current areas of topical interest include image sensing, sensor fusion, active vision; computer vision for navigation, inspection and metrology; mobile robots, microrobotics and microassembly; multi-robot systems, network and embedded robotics; telemanipulation and telepresence technologies; and enabling computational concepts and algorithms, for example neural networks and evolutionary computing techniques.

The R&MP Technical Group annual meeting provides an opportunity for active workers in the area of robotics and machine perception technologies to meet others working in this area and to contribute to group activities. All are welcome.



# Industry Perspectives

Market analysis, technology review and ideas for business



*Location: Exhibition Hall A*

Wednesday 4 October . . . . . 8:30 to 11:30 am

*FREE SESSION open to all exhibition visitors, exhibitors and technical conference attendees. Hear industry experts share their views on the opportunities, innovations and applications that impact strategy, planning and implementation.*



Special session topics:

- Imaging for Industrial Applications
- Visual Data Analysis in the Life Sciences
- Sensor Technology Alert: breakthroughs that matter
- The Back-end of Optical R&D: process for delivery
- Optoelectronics Industry Trends and Forecasts
- Tech Commercialization: Tips, Traps and Tricks



# Course Daily Schedule

Sunday October 1	Monday October 2	Tuesday October 3	Wednesday October 4
<b>Optics &amp; Optomechanics</b>			
SC156 <b>Basic Optics for Engineers</b> (Ducharme) 8:30 am to 5:30 pm, \$475 / \$565	SC003 <b>Practical Optical System Design</b> (Fischer) 8:30 am to 5:30 pm, \$515 / \$595	SC192 <b>Introduction to Optics for Non-Optical Personnel</b> (Kahan) 8:30 am to 5:30 pm, \$440 / \$520	
SC220 <b>Optical Alignment Mechanisms</b> (Guyer) 1:30 to 5:30 pm, \$270 / \$310		SC447 <b>Principles for Mounting Optical Components</b> (Yoder, Jr.) 8:30 am to 5:30 pm, \$955 / \$1105	
SC700 <b>Understanding Scratch and Dig Specifications</b> (Aikens) 1:30 to 5:30 pm, \$305 / \$345			
<b>Biomedical Technologies</b>			
	SC673 <b>Optical Fiber Sensing Technology: Principles, Components &amp; Applications</b> (Méndez) 1:30 to 5:30 pm, \$270 / \$310		SC309 <b>Fluorescent Markers: Usage and Optical System Optimization</b> (Levi) 8:30 am to 12:30 pm, \$270 / \$310
			SC461 <b>Bio-Optical Detection Systems</b> (Levi) 1:30 to 5:30 pm, \$270 / \$310
<b>Spectroscopy</b>			
	SC802 <b>Practical Near Infrared and Raman Spectroscopy Applications</b> (McDermott, Bottonjic) 8:30 am to 12:30 pm, \$270 / \$310		
	SC800 <b>Instruments for Light Spectroscopy</b> (Saptari) 1:30 to 5:30 pm, \$270 / \$310		
<b>Sensors</b>			
	SC194 <b>Multispectral and Hyperspectral Image Sensors</b> (Lomheim) 8:30 am to 12:30 pm, \$270 / \$310		
	SC673 <b>Optical Fiber Sensing Technology: Principles, Components &amp; Applications</b> (Méndez) 1:30 to 5:30 pm, \$270 / \$310		
<b>Optoelectronics &amp; Photonics</b>			
		SC801 <b>Optoelectronic Devices: Introduction to Physics and Simulation</b> (Piprek) 8:30 am to 12:30 pm, \$360 / \$400	SC747 <b>Semiconductor Optoelectronic Device Fundamentals</b> (Linden) 8:30 am to 5:30 pm, \$440 / \$520
<b>Image &amp; Signal Processing</b>			
	SC189 <b>Image Recognition Using Statistical Filtering Techniques, Wavelets and Neural Networks</b> (Javidi) 8:30 am to 5:30 pm, \$495 / \$575		

Register for courses at the SPIE Registration Desk!

# Conference Daily Schedule

Sunday October 1	Monday October 2	Tuesday October 3	Wednesday October 4
<b>Core Technology Conferences</b>			
6368 <b>Optoelectronic Devices: Physics, Fabrication, and Application III</b> (Piprek/Wang), p.12		6369 <b>Photonic Crystals and Photonic Crystal Fibers for Sensing Applications II</b> (Du/Bise), p.14	
6370 <b>Nano-Material Synthesis and Integration for Sensors, Electronics, Photonics, and Electro-Optics</b> (Dhar/Dutta/Islam), p.16	6371 <b>Photonic Sensing Technologies</b> (Marcus/Culshaw/Dakin), p.19		
6372 <b>Advanced Photon Counting Techniques</b> (Becker), p.21			
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6374A <b>Optomechatronic Actuators and Manipulation II</b> (Otani), p.25			
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		6375B <b>Optomechatronic Computer-Vision Systems</b> (Kofman), p.29	
		6376 <b>Optomechatronic Micro/Nano Devices and Components II</b> (Katagiri), p.30	
<b>Sensors and Industry Applications</b>			
6377 <b>Advanced Environmental, Chemical, and Biological Sensing Technologies IV</b> (Vo-Dinh/Lieberman/Gauglitz), p.32			
		6378 <b>Chemical and Biological Sensors for Industrial and Environmental Monitoring</b> (Christesen/Sedlacek/Gillespie/Ewing), p.34	
		6379A <b>Sensors for Harsh Environments III</b> (Wang), p.36	
		6379B <b>Photonics in Automotive and Transportation</b> (Baldwin/Kazemi), p.37	
		6380 <b>Smart Medical and Biomedical Sensor Technology IV</b> (Cullum/Carter), p.38	
		6381 <b>Optics for Natural Resources, Agriculture, and Foods</b> , (Chen/Meyer/Tu), p.40	
6382 <b>Two- and Three-Dimensional Methods for Inspection and Metrology IV</b> (Huang), p.42			
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		6384 <b>Intelligent Robots and Computer Vision XXIV: Algorithms, Techniques, and Active Vision</b> (Casasent/Hall/Röning), p.45	
6385 <b>Environmentally Conscious Manufacturing VI</b> (Gupta), p.47			
<b>Life Sciences</b>			
6386A <b>Optical Methods in Drug Discovery and Development II</b> (Analoui), p.48	6386B <b>Infrared, Mid-IR, and THz Technologies for Health and the Environment</b> (Belyanin/Drezek/Gmachl), p.49		
<b>Communications/ITCom</b>			
	6387 <b>Next-Generation Communication and Sensor Networks IV</b> (Atiqzaman/Balandin), p.51		
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		6392 <b>Three-Dimensional TV, Video, and Display V</b> (Javidi/Okano/Son), p.60	
	6393 <b>Nanophotonics for Communication: Materials, Devices, and Systems III</b> (Gerken/Dhar/Dutta/Islam) p.62		

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# Optoelectronic Devices: Physics, Fabrication, and Application III

Conference Chairs: **Joachim Piprek**, NUSOD Institute; **Jian Jim Wang**, NanoOpto Corp.

Program Committee: **Silvano Donati**, Univ. degli Studi di Pavia (Italy); **Lingjie J. Guo**, Univ. of Michigan; **Archie L. Holmes, Jr.**, The Univ. of Texas at Austin; **Zhengyu Huang**, RSoft Design Group, Inc.; **Bernd Kriegel**, Silicon Sensor International AG (Germany); **Norbert Linder**, OSRAM Opto Semiconductors GmbH (Germany); **Ekmel Özbay**, Bilkent Univ. (Turkey); **Richard P. Ratowsky**, Lawrence Livermore National Lab.; **Spilios Riyopoulos**, Science Applications International Corp.; **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan); **Günther Tränkle**, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); **Wei Wu**, Hewlett-Packard Labs.; **Ping P. Xie**, NeoPhotonics Corp.

## Sunday 1 October

### SESSION 1

Hynes Conv. Ctr. Room 104 ..... Sun. 8:30 to 10:10 am

#### Silicon Photonics

Chair: **Joachim Piprek**, NUSOD Institute

8:30 am: **Photoluminescence of Si nanocrystals embedded in microcavities**, R. D. Kekatpure, Stanford Univ.; A. Tewary, Stanford Univ. and Intel Corporation, Santa Clara; M. L. Brongersma, Stanford Univ. .... [6368-01]

8:50 am: **Photonic crystal cavities for low-power light sources on Si: a simplified model development**, Z. Qiang, W. Zhou, The Univ. of Texas at Arlington ..... [6368-02]

9:10 am: **Optically pumped Si emitting device for mid-infrared band**, V. K. Malyutenko, S. Chyrchyk, Institute of Semiconductor Physics (Ukraine) ..... [6368-03]

9:30 am: **All optically driven MEMS deformable device via a photodetector array**, J. Khoury, K. Vaccaro, C. L. Woods, Air Force Research Lab.; B. Hajisaheed, Univ. of Massachusetts/Lowell; S. K. Sengupta, Air Force Research Lab.; W. D. Goodhue, Univ. of Massachusetts/Lowell; J. Kierstead, Solid State Scientific Corp.; A. Davis, Air Force Research Lab. .... [6368-04]

9:50 am: **Light down conversion process in Si with >100% external efficiency**, V. K. Malyutenko, V. V. Bogatyrenko, Institute of Semiconductor Physics (Ukraine) ..... [6368-05]

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

### SESSION 2

Hynes Conv. Ctr. Room 104 ..... Sun. 10:40 am to 12:10 pm

#### Photodetectors

Chair: **Ping P. Xie**, NeoPhotonics

10:40 am: **MOS Si/Ge photodetectors (Invited Paper)**, C. Liu, C. Lin, National Taiwan Univ. (Taiwan) ..... [6368-06]

11:10 am: **Equalize APD-based receiver for ultrafast optical communication system**, P. Sun, M. M. Hayat, The Univ. of New Mexico ..... [6368-07]

11:30 am: **Design and development of high quantum efficiency large area UV focal plane arrays for photon counting applications**, E. J. Egerton, A. K. Sood, R. A. Bell, Y. R. Puri, Magnolia Optical Technologies, Inc.; T. A. Cook, Boston Univ.; J. Roginsky, Naval Surface Warfare Ctr. .... [6368-08]

11:50 am: **A method for measuring of modulation transfer function of HgCdTe infrared detector cell**, L. Liu, Nanjing Univ. of Science & Technology (China) ..... [6368-09]

Lunch Break ..... 12:10 to 1:40 pm

### SESSION 3

Hynes Conv. Ctr. Room 104 ..... Sun. 1:40 to 3:00 pm

#### Light Emitters

Chair: **Zhengyu Huang**, RSoft Design Group, Inc.

1:40 pm: **Development of a new laser-surgery tool using high-brightness laser arrays and specially designed beam-shaping optics**, F. Causa, Univ. of Bath (United Kingdom); S. Bonora, Univ. degli Studi di Padova (Italy); D. Masanotti, Univ. of Bath (United Kingdom); P. Villorosi, Univ. degli Studi di Padova (Italy) ..... [6368-10]

2:00 pm: **Microthermographic investigations of aging processes in diode lasers**, A. Kozłowska, R. Kozłowski, M. Kozubal, P. Kaminski, A. Malag, P. Wawrzyniak, Instytut Technologii Materiałów Elektronicznych (Poland); J. W. Tomm, M. Ziegler, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) ..... [6368-11]

2:20 pm: **Improvement of SLD efficiency by focussed ion beam post-fabrication processing**, F. Causa, Univ. of Bath (United Kingdom); M. Milani, Univ. degli Studi di Milano-Bicocca (Italy); J. Sarma, Univ. of Bath (United Kingdom); L. Ferraro, Univ. degli Studi di Milano-Bicocca (Italy) ..... [6368-13]

2:40 pm: **Mid-infrared LEDs versus thermal emitters in IR dynamic scene simulation devices**, V. K. Malyutenko, A. V. Zinovchuk, Institute of Semiconductor Physics (Ukraine) ..... [6368-14]

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

### SESSION 4

Hynes Conv. Ctr. Room 104 ..... Sun. 3:30 to 5:30 pm

#### Optoelectronic Integrated Circuits

Chair: **Wei Wu**, Hewlett-Packard Labs.

3:30 pm: **Plasmonics: the missing link between nano-electronics and microphotonics (Invited Paper)**, M. L. Brongersma, Stanford Univ. .... [6368-15]

4:00 pm: **Integrated photonic devices for FTTX applications (Invited Paper)**, P. P. Xie, NeoPhotonics ..... [6368-16]

4:30 pm: **Advanced photonic design automation (PDA) software for integrated optoelectronic devices (Invited Paper)**, Z. Huang, RSoft Design Group, Inc. .... [6368-17]

5:00 pm: **Reconfigurable all-optical universal logic gates (Invited Paper)**, L. L. Goddard, J. S. Kallman, T. C. Bond, Lawrence Livermore National Lab. .... [6368-18]

**Monday 2 October**

**SESSION 5**

**Hynes Conv. Ctr. Room 104** ..... Mon. 8:40 to 10:00 am

**Novel Materials**

- Chair: Spilios Riyopoulos*, Science Applications International Corp.  
 8:40 am: **Negative index metamaterials in the optical range** (*Invited Paper*), A. Bratkovsky, Hewlett-Packard Labs. .... [6368-19]  
 9:10 am: **Advances in organic optoelectronic integration, packaging, and interconnects** (*Invited Paper*), L. A. Eldada, DuPont Photonics Technologies ..... [6368-20]  
 9:40 am: **High single-pass gain in Nd<sup>3+</sup> doped ceramic material with side pumping**, P. Huang, Wheaton College; J. Zhang, Boston Applied Technologies Inc.; X. Chen, Wheaton College; K. K. Li, R. Zhang, Q. Chen, Y. Wang, Y. K. Zou, H. Jiang, Boston Applied Technologies Inc. .... [6368-21]  
 Coffee Break ..... 10:00 to 10:30 am

**SESSION 6**

**Hynes Conv. Ctr. Room 104** ..... Mon. 10:30 to 11:50 am

**Nanostructures**

- Chair: Jian J. Wang*, NanoOpto Corp.  
 10:30 am: **Quantum information processing with nanophotonic structures** (*Invited Paper*), S. M. Spillane, R. G. Beausoleil, D. Fattal, M. Fiorentino, C. M. Santori, Hewlett-Packard Labs. .... [6368-23]  
 11:00 am: **Carrier localization and enhanced spontaneous emission due to spontaneous plasma nanosheath formation in polar nanostructured materials** (*Invited Paper*), S. Riyopoulos, Science Applications International Corp. .... [6368-24]  
 11:30 am: **Carrier dynamics in active-region materials for diode laser applications**, J. W. Tomm, V. Talalaev, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) ..... [6368-25]  
 Lunch/Exhibition Break ..... 11:50 am to 1:30 pm

**SESSION 7**

**Hynes Conv. Ctr. Room 104** ..... Mon. 1:30 to 3:00 pm

**Novel Devices**

- Chair: Jens W. Tomm*, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany)  
 1:30 pm: **Applications of reflective silicon substrates in optoelectronics and sensing** (*Invited Paper*), M. S. Unlu, Boston Univ.; M. K. Emsley, Analog Devices, Inc.; D. A. Bergstein, Boston Univ. .... [6368-27]  
 2:00 pm: **THz oscillations from optically anisotropic planar microcavities and organic microcavity lasers**, R. Gehlhaar, M. Swoboda, M. Sudzius, M. Hoffmann, H. Fröb, V. G. Lyssenko, K. Leo, Technische Univ. Dresden (Germany) ..... [6368-28]  
 2:20 pm: **Neodymium photoluminescence in whispering gallery modes of toroidal microcavities**, F. Orucevic, J. Hare, V. Lefèvre-Seguin, École Normale Supérieure (France); J. Verbert, E. Hadji, J. Gérard, CEA Grenoble (France) ..... [6368-29]  
 2:40 pm: **Microstructures for enhanced light-matter interactions: light trapping and controlled emissions**, X. Deng, NanoOpto Corp. .... [6368-30]  
 Coffee Break ..... 3:00 to 3:30 pm

**Courses of Related Interest**

Register for courses and get full course descriptions at the SPIE Registration desk.

SC747 Semiconductor Optoelectronic Device Fundamentals (Linden)  
 Wednesday, 8:30 am to 5:30 pm

SC801 Optoelectronic Devices: Introduction to Physics and Simulation (Pipek)  
 Tuesday, 8:30 am to 12:30 pm

**SESSION 8**

**Hynes Conv. Ctr. Room 104** ..... Mon. 3:30 to 4:30 pm

**Fiber Optics**

*Chair: Matthew K. Emsley*, Analog Devices, Inc.

- 3:30 pm: **An electro-optically tunable optical filter with an ultra-large wavelength tuning range**, R. Samarth, Univ. of Massachusetts/Lowell; M. Li, People's Insurance Company of China (China); X. Lu, Univ. of Massachusetts/Lowell ..... [6368-53]  
 3:50 pm: **Simulating the gain flattening filter for EDFA**, A. Khare, A. Khare, Government Engineering College Bhopal (India) ..... [6368-31]  
 4:10 pm: **Characteristics of triple-cladding long-period optical fiber grating with refractive index modulation**, X. Zhao, Z. Gu, Univ. of Shanghai for Science and Technology (China) ..... [6368-34]

**✓ Posters-Monday**

The Conference Chairmen have arranged for the posters from Conference 6368 to be presented on Monday evening from 5:00 to 6:00 pm in the Hynes Convention Center Exhibit Hall A. Poster authors may begin displaying their posters after Noon on Monday, and all posters must be posted by 5:00 pm on Monday. Poster authors are welcome to take part in the Tuesday evening poster session in addition to the Monday poster presentation, and are asked to leave their posters up through 7:30 pm on Tuesday.

- ✓ **Femtosecond dynamics and optical properties of TbDyFe thin film**, L. Chen, JiangSu Univ. (China) ..... [6368-22]
- ✓ **A modified full-vectorial finite-difference beam propagation method based on H-fields for optical waveguides with step-index profiles**, J. Xiao, X. Sun, Southeast Univ. (China) ..... [6368-36]
- ✓ **Analysis of the mode structure in high-power diode lasers based on a double barrier separate confinement heterostructure**, A. Kozłowska, A. Malag, P. Wawrzyniak, Instytut Technologii Materiałóv Elektronicznych (Poland); R. Pomraenke, J. Renard, C. Lienau, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) ..... [6368-39]
- ✓ **Analysis of mechanical strain and temperature profiling in high-brightness parabolic bow-tie laser arrays**, F. Causa, D. Masanotti, Univ. of Bath (United Kingdom); T. Q. Tien, F. Weick, Max-Born-Institut (Germany); J. W. Tomm, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) ..... [6368-40]
- ✓ **Analysis of noise properties in a violet laser diode and its frequency stabilization based on Fabry-Perrot resonators**, H. Yashiro, Y. Miura, H. Tsuboi, W. Sasaki, Doshisha Univ. (Japan) ..... [6368-41]
- ✓ **Study on the spatial resolution and microstructure fabrication of two-photon polymerization technique**, Y. Haifeng, JiangSu Univ. (China) ..... [6368-42]
- ✓ **Optimal tolerance allocation in the optical head of near-field recording system**, J. Lee, Korea Institute of Machinery and Materials (South Korea); H. Yoon, LG Electronics Inc. (South Korea); J. Jeong, D. Gweon, Korea Advanced Institute of Science and Technology (South Korea); W. Kim, Korea Institute of Machinery and Materials (South Korea) ..... [6368-43]
- ✓ **Numerical simulation of InAlGaN ultraviolet light-emitting diodes**, Y. Kuo, S. Yen, J. Chen, National Changhua Univ. of Education (Taiwan) . . [6368-45]
- ✓ **Effects of built-in polarization and carrier overflow on InGaN quantum-well lasers with AlGaN or InAlGaN electronic blocking layers**, S. Chang, J. Chen, C. Lee, C. Yang, National Changhua Univ. of Education (Taiwan) ..... [6368-46]
- ✓ **Numerical study for 1.55- $\mu$ m AlGaInAs/InP semiconductor lasers with compensated tensile strain in barriers**, B. Liou, Hsiuping Institute of Technology (Taiwan); S. Yen, M. Yao, M. Chen, Y. Kuo, S. Chang, National Changhua Univ. of Education (Taiwan) ..... [6368-47]
- ✓ **A multimode thermo-optic beam steering switch**, J. Rogers, C. Ma, M. Paranjape, E. R. Van Keuren, Georgetown Univ. .... [6368-49]
- ✓ **Antireflection coating for photo-pumped IV-VI semiconductor light-emitting devices**, D. Ray, Z. Guan, S. Jain, F. Zhao, D. Li, S. Mukherjee, Z. Shi, Univ. of Oklahoma ..... [6368-50]
- ✓ **ZnCdSeTe radiation detectors**, V. Valdna, J. Hiie, M. Strandberg, R. Traksmaa, Tallinn Univ. of Technology (Estonia) ..... [6368-51]

# Photonic Crystals and Photonic Crystal Fibers for Sensing Applications II

Conference Chairs: **Henry H. Du**, Stevens Institute of Technology; **Ryan Bise**, OFS Fitel, LLC

Program Committee: **Paul V. Braun**, Univ. of Illinois at Urbana-Champaign; **Steven D. Christesen**, U.S. Army Edgewood Chemical Biological Ctr.; **Philippe M. Fauchet**, Univ. of Rochester; **Yoel Fink**, Massachusetts Institute of Technology; **Hiroshi Fudouzi**, National Institute for Materials Science (Japan); **Venkatraman Gopalan**, The Pennsylvania State Univ.; **Victor I. Kopp**, Chiral Photonics, Inc.; **Tanya M. Monro**, The Univ. of Adelaide (Australia); **Marco N. Petrovich**, Univ. of Southampton (United Kingdom); **Svetlana A. Sukhishvili**, Stevens Institute of Technology; **Younan Xia**, Univ. of Washington

## Tuesday 3 October

### SESSION 1

Hynes Conv. Ctr. Room 206 ..... Tues. 8:20 to 10:00 am

#### Photonic Crystal Fiber I

Chair: **Ryan Bise**, OFS Fitel, LLC

##### Keynote

8:20 am: **Microstructured optical fibers, fundamental properties, and biosensor applications** (*Invited Paper*), J. B. Jensen, G. A. Emillyanov, L. Rindorf, Danmarks Tekniske Univ. (Denmark); P. E. Hoiby, Bioneer A/S (Denmark); O. Bang, T. P. Hansen, O. Geschke, Danmarks Tekniske Univ. (Denmark); L. H. Pedersen, Bioneer A/S (Denmark); A. O. Bjarklev, Danmarks Tekniske Univ. (Denmark) ..... [6369-01]

9:00 am: **Tapered photonic crystal fibers**, R. Albandakji, A. Safaai-Jazi, R. H. Stolen, Virginia Polytechnic Institute and State Univ. .... [6369-02]

9:20 am: **Fabrication and characterization of solid-core microstructured optical fiber with steering-wheel air cladding for sensor applications**, Y. Zhu, D. Pristiniski, H. H. Du, A. S. Raspopin, R. Martini, S. A. Sukhishvili, Stevens Institute of Technology; R. Bise, OFS Fitel, LLC ..... [6369-03]

9:40 am: **Characterization of photonic crystal fibers by using a full-vectorial finite element method**, A. B. M. Rahman, S. A. K. M. Kabir, K. Namassivayane, I. N. M. Wijeratne, M. Rajarajan, K. T. V. Grattan, City Univ. (United Kingdom) ..... [6369-04]

Coffee Break ..... 10:00 to 10:20 am

### SESSION 2

Hynes Conv. Ctr. Room 206 ..... Tues. 10:20 am to 12:00 pm

#### Photonic Crystal Fiber II

Chair: **Pier J. A. Sazio**, Univ. of Southampton (United Kingdom)

10:20 am: **Surface functionalization of photonic crystal fibers for SERS-based water monitoring** (*Invited Paper*), S. A. Sukhishvili, Stevens Institute of Technology ..... [6369-05]

10:50 am: **Surface enhanced Raman scattering using metal modified microstructured optical fibre substrates** (*Invited Paper*), J. Yang, The Univ. of Nottingham (United Kingdom); A. Amezcua Correa, A. Peacock, C. E. Finlayson, J. J. Baumberg, Univ. of Southampton (United Kingdom); S. Howdle, The Univ. of Nottingham (United Kingdom); P. J. A. Sazio, Univ. of Southampton (United Kingdom) ..... [6369-06]

11:20 am: **Absorption measurement in the near-infrared using solid-core microstructured and hollow optical fibers**, A. S. Raspopin, Y. Zhu, H. H. Du, Stevens Institute of Technology ..... [6369-07]

11:40 am: **A high-resolution refractometer using long-period grating induced by mechanical stress relaxation in photonic crystal fibers**, Y. Zhu, Z. He, H. Du, Stevens Institute of Technology; R. Bise, OFS Fitel, LLC [6369-08]

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

### SESSION 3

Hynes Conv. Ctr. Room 206 ..... Tues. 1:00 to 3:20 pm

#### Photonic Crystal I

Chair: **Henry H. Du**, Stevens Institute of Technology

1:00 pm: **Optical properties and microstructures of colloidal crystalline arrays composed of titania nanosheets coated core-shell structured spheres** (*Invited Paper*), H. Nakamura, Toyota Central Research and Development Labs., Inc. (Japan) ..... [6369-09]

1:30 pm: **Mesoporous photonic crystals for sensor applications**, A. V. Baryshev, Toyohashi Univ. of Technology (Japan) and Ioffe Physico-Technical Institute (Russia); R. Fujikawa, A. Khanikaev, Toyohashi Univ. of Technology (Japan); A. B. Granovsky, M.V. Lomonosov Moscow State Univ. (Russia); K. Shin, Toyohashi Univ. of Technology (Japan) and Kyungshung Univ. (South Korea); P. B. Lim, Toyohashi Univ. of Technology (Japan); M. Inoue, Toyohashi Univ. of Technology (Japan) and Japan Science and Technology Corp. (Japan) ..... [6369-10]

1:50 pm: **Structural colored gel** (*Invited Paper*), Y. Takeoka, Nagoya Univ. (Japan) ..... [6369-11]

2:20 pm: **Tuning stop band of soft opal film by deformation for strain sensing applications**, H. Fudouzi, T. Sawada, National Institute for Materials Science (Japan) ..... [6369-12]

2:40 pm: **Stimulated globular scattering in photonic crystals**, A. D. Kudryavtseva, V. S. Gorelik, N. V. Tcherniega, P.N. Lebedev Physical Institute (Russia) [6369-13]

3:00 pm: **Rapid fabrication of large-area photonic crystals containing well-defined defects by two-photon photopolymerization**, J. Kong, JiangSu Univ. (China) ..... [6369-14]

Coffee Break ..... 3:20 to 3:40 pm

### SESSION 4

Hynes Conv. Ctr. Room 206 ..... Tues. 3:40 to 4:50 pm

#### Photonic Crystal II

Chair: **Hiroshi Fudouzi**,

National Institute for Materials Science (Japan)

3:40 pm: **Optimizing surface-enhanced Raman scattering with resonant localized plasmons** (*Invited Paper*), J. J. Baumberg, Y. Sugawara, N. M. B. Perney, Univ. of Southampton (United Kingdom); M. E. Zoorob, M. D. B. Charlton, C. M. Netti, Mesophotonics Ltd. (United Kingdom) ..... [6369-15]

4:10 pm: **Flexible bandwidth control of the single-mode guided band in a 2D photonic crystal coupled-cavity waveguide**, J. J. Hu, Nanyang Technological Univ. (Singapore); X. Chen, Minjiang Univ. (China); P. Shum, X. Yu, Nanyang Technological Univ. (Singapore) ..... [6369-18]

4:30 pm: **Single quantum dot inside a high-Q photonic crystal cavity**, G. Shan, S. Bao, Fudan Univ. (China) ..... [6369-20]



✓ **Posters-Tuesday**

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Investigation of photonic crystal fiber based long-period gratings with aqueous solution inclusions**, X. Yu, P. Shum, P. Xie, Nanyang Technological Univ. (Singapore) ..... [6369-21]
- ✓ **Magnetic field sensors using magnetophotonic crystals**, R. Fujikawa, K. Tanizaki, A. V. Baryshev, K. Shin, P. Lim, H. Uchida, M. Inoue, Toyohashi Univ. of Technology (Japan) ..... [6369-23]
- ✓ **Exact analytical solutions of planar photonic crystal waveguides**, A. Safaai-Jazi, R. Albandakji, S. Mirolohi, Virginia Polytechnic Institute and State Univ. .... [6369-24]

Don't Miss the Exhibition!  
Tuesday · 10:00 am to 5:00 pm  
Wednesday · 10:00 am to 4:00 pm  
*See p. 10 for details.*

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**Courses of Related Interest**

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- 
- SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

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  - SC747 Semiconductor Optoelectronic Device Fundamentals (Linden) Wednesday, 8:30 am to 5:30 pm

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  - SC801 Optoelectronic Devices: Introduction to Physics and Simulation (Piprek) Tuesday, 8:30 am to 12:30 pm

# Nanomaterial Synthesis and Integration for Sensors, Electronics, Photonics, and Electro-Optics

Conference Chairs: **Nibir K. Dhar**, Army Research Lab.; **Achyut K. Dutta**, Banpil Photonics; **M. Saif Islam**, Univ. of California/Davis

Program Committee: **Rajeevan Amirtharajah**, Univ. of California/Davis; **Mehdi Anwar**, Univ. of Connecticut; **Jeyadevan Balachandran**, Tohoku Univ. (Japan); **Burhan Bayraktaroglu**, Air Force Research Lab.; **Connie J. Chang-Hasnain**, Univ. of California/Berkeley; **Frederic T. Chong**, Univ. of California/Santa Barbara; **Yi Cui**, Stanford Univ.; **Nicolaas F. de Rooij**, Univ. de Neuchâtel (Switzerland); **Yoel Fink**, Massachusetts Institute of Technology; **Martina Gerken**, Univ. Karlsruhe (Germany); **Zhixiong Guo**, Rutgers Univ.; **Roland Harig**, Technische Univ. Hamburg-Harburg (Germany); **David A. Horsley**, Univ. of California/Davis; **Satoshi Kawata**, Osaka Univ. (Japan); **Sehun Kim**, Korea Advanced Institute of Science and Technology (South Korea); **Andres H. La Rosa**, Portland State Univ.; **Jing Li**, NASA Ames Research Ctr.; **Jia G. Lu**, Univ. of California/Irvine; **Samuel S. Mao**, Lawrence Berkeley National Lab.; **Gilberto Medeiros-Ribeiro**, Lab. Nacional de Luz Sincrotron (Brazil); **Shuming Nie**, Emory Univ.; **Robert Olah**, Banpil Photonics, Inc.; **Ekmel Özbay**, Bilkent Univ. (Turkey); **Sharka M. Prokes**, Naval Research Lab.; **Regina Ragan**, Univ. of California/Irvine; **Ant Ural**, Univ. of Florida; **Ruxandra Vidu**, Q1 Nanosystems; **Kang L. Wang**, Univ. of California/Los Angeles; **Zhong Lin Wang**, Georgia Institute of Technology; **Richard T. Webster**, Air Force Research Lab.; **Cary Y. Yang**, Santa Clara Univ.; **Sungsoo Yi**, Lumileds Lighting, LLC; **Yuegang Zhang**, Intel Corp.; **Chongwu Zhou**, Univ. of Southern California

## Sunday 1 October

### SESSION 1

Hynes Conv. Ctr. Room 102 ..... Sun. 10:30 am to 12:00 pm

#### Synthesis, Organization, and Incorporation of Nano-Structures I

Chairs: **Sharka M. Prokes**, Naval Research Lab.; **Shashi P. Karna**, U.S. Army Research Lab.

10:30 am: **Transport, assembly, and rotation of nanowires in suspension**, D. Fan, F. Q. Zhu, R. C. Cammarata, C. Chein, Johns Hopkins Univ. . [6370-01]

10:45 am: **A nanotube-on-insulator (NOI) approach toward scalable and integratable nanotube devices on sapphire**, C. Zhou, Univ. of Southern California ..... [6370-02]

11:00 am: **Luminescent quantum dots for cellular analysis (Invited Paper)**, Z. Rosenzweig, L. Shi, N. Rosenzweig, Univ. of New Orleans ..... [6370-03]

11:25 am: **Self-assembly for nanointegration (Tutorial)**, Y. Cui, Stanford Univ. .... [6370-04]

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 2

Hynes Conv. Ctr. Room 102 ..... Sun. 1:30 to 3:40 pm

#### Synthesis, Organization, and Incorporation of Nano-Structures III

Chairs: **Nibir K. Dhar**, Army Research Lab.; **Sharka M. Prokes**, Naval Research Lab.

#### Keynote

1:30 pm: **Nanodevices and electric nanogenerators based on ZnO nanobelts and nanowires (Invited Paper)**, Z. L. Wang, Georgia Institute of Technology ..... [6370-05]

2:10 pm: **Germanium nanowire based devices (Invited Paper)**, S. Guha, E. Tutuc, IBM Thomas J. Watson Research Ctr. .... [6370-06]

2:35 pm: **Epitaxial III-V nanowires on a Si substrate (Invited Paper)**, L. C. Chuang, M. J. Moewe, S. M. Crankshaw, N. P. Kobayashi, C. C. Chang, C. J. Chang-Hasnain, Univ. of California/Berkeley ..... [6370-07]

3:00 pm: **A physics based model for transport in semiconductor nanowires**, M. S. Islam, I. Kimukin, Univ. of California/Davis; M. Anwar, Univ. of Connecticut ..... [6370-08]

3:15 pm: **Semiconductor nanowires for electronics: hierarchical growth and applications (Invited Paper)**, D. Wang, Univ. of California/San Diego . [6370-09]

Coffee Break ..... 3:40 to 4:00 pm

### SESSION 3

Hynes Conv. Ctr. Room 102 ..... Sun. 4:00 to 5:30 pm

#### Synthesis, Organization, and Incorporation of Nano-Structures III

Chairs: **Shashi P. Karna**, U.S. Army Research Lab.; **Nibir K. Dhar**, Army Research Lab.

4:00 pm: **Polar-surface induced novel growth configurations of piezoelectric nanobelts**, Z. L. Wang, Georgia Institute of Technology [6370-10]

4:15 pm: **Catalyst-free selective-area MOVPE of semiconductor nanowires (Invited Paper)**, J. Motohisa, T. Fukui, Hokkaido Univ. (Japan) ..... [6370-11]

4:40 pm: **Magnetically assembled and magneto-transport studies of single ferromagnetic nanowires (Invited Paper)**, N. V. Myung, B. Yoo, Y. Rheem, W. Beyermann, Univ. of California/Riverside ..... [6370-12]

5:05 pm: **Laser nanoprocessing using near-field probes (Invited Paper)**, C. P. Grigoropoulos, Univ. of California/Berkeley ..... [6370-13]

## Monday 2 October

### SESSION 4

Hynes Conv. Ctr. Room 102 ..... Mon. 8:30 to 10:10 am

#### CNT: Material Synthesis, Properties, Devices, and Sensors II

Chairs: **Yi Cui**, Stanford Univ.; **Burhan Bayraktaroglu**, Air Force Research Lab.

8:30 am: **A modified high-resolution TEM for thermoelectric properties measurements of nanowires and nanotubes (Invited Paper)**, C. Dames, Massachusetts Institute of Technology; S. Chen, Boston College; C. T. Harris, Massachusetts Institute of Technology; J. Huang, Z. Ren, Boston College; M. S. Dresselhaus, G. Chen, Massachusetts Institute of Technology . [6370-14]

8:55 am: **Electrical properties of single-walled carbon nanotube films (Invited Paper)**, A. Ural, Univ. of Florida ..... [6370-15]

9:20 am: **A computational study of carbon nanotube optoelectronic devices (Invited Paper)**, Y. Yoon, Univ. of Florida; M. Alam, Purdue Univ.; J. Guo, Univ. of Florida ..... [6370-16]

9:45 am: **Structure and property studies on carbon nanotubes (Invited Paper)**, Z. Ren, S. Chen, J. Huang, Z. Wang, Boston College; G. Chen, M. S. Dresselhaus, Massachusetts Institute of Technology ..... [6370-17]

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

**SESSION 5**

Hynes Conv. Ctr. Room 102 . . . . . Mon. 10:30 am to 12:25 pm

**CNT: Material Synthesis, Properties, Devices, and Sensors II**

Chairs: **Burhan Bayraktaroglu**, Air Force Research Lab.;  
**Nibir K. Dhar**, Army Research Lab.

**Keynote**

10:30 am: **Analysis and design of key phenomena in electronics: integrated circuits, devices and nanostructures** (*Invited Paper*), N. Goldman, Univ. of Maryland/College Park . . . . . [6370-18]

11:10 am: **Carbon nanotube-based electronics and sensors: opportunities and challenges** (*Invited Paper*), S. P. Karna, U.S. Army Research Lab. . . . . [6370-19]

11:35 am: **Manufacturable biosensors based on carbon nanotubes and In<sub>2</sub>O<sub>3</sub> nanowires** (*Invited Paper*), C. Zhou, Univ. of Southern California . . . . . [6370-20]

12:00 pm: **Advances in carbon nanotube-based chemical sensors** (*Invited Paper*), F. K. Perkins, E. S. Snow, J. A. Robinson, Naval Research Lab. [6370-21]

**Tuesday 3 October**

**SESSION 6**

Hynes Conv. Ctr. Room 102 . . . . . Tues. 1:30 to 3:40 pm

**Synthesis, Assembly, Characteristics, and Integration of Nanostructure for Device Applications II**

Chairs: **Ant Ural**, Univ. of Florida; **Yi Cui**, Stanford Univ.

**Keynote**

1:30 pm: **Sensing and catalysis on the nano-scale** (*Invited Paper*), M. Moskovits, X. H. Chen, Univ. of California/Santa Barbara; A. A. Kolmakov Southern Illinois Univ./Carbondale; Y. Lilach, Pacific Northwest National Lab.; A. Morrill, Univ. of California/Santa Barbara . . . . . [6370-64]

2:10 pm: **Nanowire based chemical and biosensors** (*Tutorial*), C. Zhou, Univ. of Southern California . . . . . [6370-22]

2:45 pm: **Synthesis, characterization, and physical properties of transition metal silicide nanowires** (*Invited Paper*), S. Jin, Univ. of Wisconsin/Madison . . . . . [6370-23]

3:10 pm: **A novel technique for precise positioning of metal-catalyzed semiconductor nanowires**, C. W. Edgar, C. D. Johns, L. VJ, M. S. Islam, Univ. of California/Davis . . . . . [6370-24]

3:25 pm: **Growth and characterization of single crystal InAs nanowire arrays using a simple vapor growth method**, S. M. Prokes, Naval Research Lab.; H. D. Park, Johns Hopkins Univ. and Naval Research Lab.; A. Gaillot, R. C. Cammarata, Johns Hopkins Univ. . . . . [6370-25]

Coffee Break . . . . . 3:40 to 4:00 pm

**SESSION 7**

Hynes Conv. Ctr. Room 102 . . . . . Tues. 4:00 to 5:45 pm

**Synthesis, Assembly, Characteristics, and Integration of Nanostructure for Device Applications II**

Chairs: **Jia G. Lu**, Univ. of California/Irvine;  
**M. Saif Islam**, Univ. of California/Davis

4:00 pm: **Integration of phase-change and silicon nanowires for nanoelectronics** (*Invited Paper*), Y. Cui, S. Meister, H. Peng, J. Zhu, Stanford Univ. . . . . [6370-27]

4:25 pm: **Unique mechanism of semiconductor nanowire growth**, N. P. Kobayashi, S. Wang, R. S. Williams, Hewlett-Packard Labs. . . . . [6370-28]

4:40 pm: **New bio-inorganic photo-electronic devices based on photosynthetic proteins**, N. Lebedev, Naval Research Lab.; A. Spano, Univ. of Virginia; S. A. Trammell, Naval Research Lab.; I. Griva, George Mason Univ. . . . . [6370-29]

4:55 pm: **Controlling electrochemical growth of conducting polymer nanotube: ultrafast electrochromics** (*Invited Paper*), S. B. Lee, S. I. Cho, R. Xiao, R. Liu, Univ. of Maryland/College Park . . . . . [6370-30]

5:20 pm: **Ozone sensing utilizing nanostructured metal oxide thin films** (*Invited Paper*), G. Kiriakidis, Foundation for Research and Technology-Hellas (Greece) . . . . . [6370-31]

**✓ Posters-Tuesday**

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

✓ **A study on very thin sheet microformability by using laser ultrafast microforming**, H. Tao, JiangSu Univ. (China) . . . . . [6370-49]

✓ **Using scanning near-field optical microscope couple with femtosecond laser to lithograph**, F. Yan, JiangSu Univ. (China) . . . . . [6370-50]

✓ **Demonstration of integrated optical functions by multiscale composite microstructures**, X. Deng, NanoOpto Corp. . . . . [6370-51]

✓ **Determination of residual deformation of polymeric nanostructures using microscopic Moiré interferometry**, X. Zheng, Y. Zhao, X. Zhang, Boston Univ. . . . . [6370-52]

✓ **Gallium nitride nanowires: polar surface controlled growth, ohmic contact patterning by focused ion beam induced direct Pt deposition and disorder effects, variable range hopping, and resonant electromechanical properties**, C. Nam, D. Tham, P. Jaroenapibal, J. Kim, D. E. Luzzi, Univ. of Pennsylvania; S. Evoy, Univ. of Alberta (Canada); J. E. Fischer, Univ. of Pennsylvania . . . . . [6370-53]

✓ **The Wigner function in signal processing of nanostructures**, M. Palmoor, D. George, T. Materdey, Univ. of Massachusetts . . . . . [6370-55]

✓ **A silicon-based biosensor using subwavelength structures for sensitive molecular detection**, G. J. Sonek, Merrimack College . . . . . [6370-57]

✓ **Spectral selectivity of photonic crystal infrared photodetectors**, L. Chen, W. Zhou, The Univ. of Texas at Arlington; G. J. Brown, Air Force Research Lab. . . . . [6370-58]

✓ **Template-synthesized multifunctional nanotubes for biomedical applications**, S. B. Lee, S. J. Son, B. He, X. Bai, Univ. of Maryland/College Park . . . . . [6370-59]

✓ **Nanostructure based sensors for environmental monitoring and control**, B. Das, Univ. of Nevada/Las Vegas . . . . . [6370-61]

✓ **Nanostructured multispectral sensors**, B. Das, Univ. of Nevada/Las Vegas . . . . . [6370-62]

**Wednesday 4 October**

**SESSION 8**

Hynes Conv. Ctr. Room 102 . . . . . Wed. 8:30 to 10:10 am

**Quantum Structures, Organic, and Inorganic and Photonic Devices for Sensing and Imaging**

Chairs: **Regina Ragan**, Univ. of California/Irvine; **Sang Bok Lee**, Univ. of Maryland/College Park

8:30 am: **Nanoscale antimony pH sensor** (*Invited Paper*), J. G. Lu, Univ. of California/Irvine . . . . . [6370-32]

8:55 am: **Gas sensors from quasi-1D metal oxide nanostructures: fabrication, sensitization, performance** (*Invited Paper*), A. A. Kolmakov, Southern Illinois Univ. Carbondale . . . . . [6370-33]

9:20 am: **Nanosensors based on lanthanide compounds** (*Invited Paper*), S. Petoud, A. M. Yingling, D. A. Chengelis, C. M. Chade, G. R. Filipczyk, D. S. Oxley, P. D. Badger, Univ. of Pittsburgh . . . . . [6370-34]

9:45 am: **Nanoparticles superstructures** (*Invited Paper*), N. A. Kotov, Univ. of Michigan . . . . . [6370-35]

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

**SESSION 9**

**Hynes Conv. Ctr. Room 102 . . . . . Wed. 10:30 am to 12:05 pm**

**Nano-Systems Fabrications and Hybrid Systems for  
Biological and Molecular Sensing, Diagnosis and  
Recognition**

*Chairs: Regina Ragan, Univ. of California/Irvine;  
Jia G. Lu, Univ. of California/Irvine*

- 10:30 am: **Creating optimized platforms for biosensor systems**  
*(Invited Paper)*, R. Ragan, Univ. of California/Irvine . . . . . [6370-36]
- 10:55 am: **Surface modification of nanocrystalline ZnO for bio-sensing applications**, D. M. Steeves, J. W. Soares, U.S. Army Research, Development and Engineering Command . . . . . [6370-37]
- 11:10 am: **Ordered DNA arrays prepared via soft lithography techniques**, M. Rahman, B. Day, C. Meadows, M. L. Norton, Marshall Univ. . . . . [6370-38]
- 11:25 am: **Block-copolymer/Au-nanoparticle hybrid thin films for hydrocarbon sensing application**, N. Madamopoulos, A. Tsigara, G. Manasis, L. Athanasekos, A. Meristoudi, S. Pispas, N. A. Vainos, National Hellenic Research Foundation (Greece) . . . . . [6370-39]
- 11:40 am: **Resonant-enhanced localized surface plasmon resonance spectroscopy** *(Invited Paper)*, A. J. Haes, The Univ. of Iowa and Northwestern Univ.; S. Zou, J. Zhao, G. C. Schatz, R. P. Van Duyne, Northwestern Univ. . . . . [6370-40]
- Lunch Break . . . . . 12:05 to 1:15 pm

**SESSION 10**

**Hynes Conv. Ctr. Room 102 . . . . . Wed. 1:15 to 4:10 pm**

**Novel Synthesis, Characterization, and Applications of  
Organic and Inorganic Nano-Structures**

*Chairs: Sang Bok Lee, Univ. of Maryland/College Park;  
Achyut K. Dutta, Banpil Photonics, Inc.*

- 1:15 pm: **Concentration gradient donor-acceptor profiles in polymer solar cells** *(Invited Paper)*, J. R. Heflin, Virginia Polytechnic Institute and State Univ. . . . . [6370-41]
- 1:40 pm: **Venturi-assisted nanospray protein ion generation by a micromachined ultrasonic electro-spray array** *(Invited Paper)*, F. M. Fernandez, C. Y. Hampton, M. Meacham, A. Fedorov, L. F. Degertekin, Georgia Institute of Technology . . . . . [6370-42]
- 2:05 pm: **Nonlithographic nanostructure devices and circuits**, B. Das, A. N. Banerjee, Univ. of Nevada/Las Vegas . . . . . [6370-43]
- 2:20 pm: **Transmission line circuit representation of surface plasmon waves** *(Invited Paper)*, A. Talias, J. Sarma, F. Causa, Univ. of Bath (United Kingdom) . . . . . [6370-44]
- 2:45 pm: **Functional 1D nanostructures as photoconductor, molecular sensor, and wavelength-selective nanoswitch** *(Invited Paper)*, L. Chen, National Taiwan Univ. (Taiwan); K. Chen, Academia Sinica (Taiwan) . . . [6370-45]
- Coffee Break . . . . . 3:10 to 3:30 pm
- 3:30 pm: **Heterogeneous integration of semiconducting and carbide nanowires** *(Invited Paper)*, L. Tsakalacos, GE Global Research . . . . . [6370-63]
- 3:55 pm: **Image-based nanocrystallography: fringe fingerprinting in two and three dimensions and methodology to derive the morphology of nanocrystals**, P. Moeck, B. Seipel, Portland State Univ.; P. B. Fraundorf, Univ. of Missouri/St. Louis . . . . . [6370-46]

**Course of Related Interest**

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SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

# Photonic Sensing Technologies

Conference Chairs: **Michael A. Marcus**, Eastman Kodak Co.; **Brian Culshaw**, Univ. of Strathclyde (United Kingdom); **John P. Dakin**, Univ. of Southampton (United Kingdom)

Program Committee: **Christopher S. Baldwin**, System Planning and Analysis, Inc.; **Catherine Ciardiello**, OFS Fitel, LLC; **Boris Elinkrig**, Photonic Research Ontario (Canada); **Robert S. Fielder**, Luna Innovations, Inc.; **Kazuo Hotate**, The Univ. of Tokyo (Japan); **Alex A. Kazemi**, The Boeing Co.; **David A. Krohn**, Light Wave Venture Consulting, LLC; **Robert A. Lieberman**, Intelligent Optical Systems, Inc.; **Alexis Méndez**, MCH Engineering LLC; **Gary R. Pickrell**, Virginia Polytechnic Institute and State Univ.; **Adrian G. Podoleanu**, Univ. of Kent (United Kingdom); **Gregory B. Tait**, Virginia Commonwealth Univ.

## Monday 2 October

### Fiber Optics

Hynes Conv. Ctr. Room 104 ..... Mon. 5:30 to 7:00 pm

Please join us for the following three meetings on fiber optics:

- Fiber Optics Technical Group Meeting
- Fiber Optic Sensor Consortium Meeting
- ASTM Subcommittee E13.09 on Fiber Optics, Waveguides, and Optical Sensors.

See p. xx in Special Events for details.

## Tuesday 3 October

### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Design of temperature insensitive refractometer by waveguide and Bragg grating structure optimization**, X. Dai, R. B. Walker, S. J. Mihailov, C. L. Callender, C. Blanchetiere, Communications Research Ctr. Canada (Canada) ..... [6371-21]
- ✓ **Planar waveguide photonic crystals for sensing applications: a general proposal**, J. R. García, S. Fernández Fernández, M. G. García Granda, D. F. Pozo Ayuso, Univ. de Oviedo (Spain) ..... [6371-22]
- ✓ **Analysis of the transient response of erbium fiber lasers and application for sensors**, G. Stewart, G. Whitenett, B. Culshaw, Univ. of Strathclyde (United Kingdom) ..... [6371-23]
- ✓ **Low-cost high-sensitivity fiber optic accelerometer with wide operation range**, F. Borin, CPqD Foundation (Brazil); C. Florida, J. B. Rosolem, CPqD Foundation (Brazil); C. F. Chaves, Light S.A. (Brazil) ..... [6371-25]
- ✓ **Methane detection with 1.65- $\mu$ m LED**, S. Yang, D. Song, S. Li, T. Koszica, D. Y. Li, H. Cui, Stevens Institute of Technology ..... [6371-26]
- ✓ **Characterization of micromaterials using laser speckles**, R. Kothbauer, S. J. Rupitsch, Johannes Kepler Univ. Linz (Austria); P. Zimprich, Univ. Wien (Austria); B. G. Zagar, Johannes Kepler Univ. Linz (Austria) ..... [6371-27]
- ✓ **A new method for demodulation of fiber Bragg grating**, J. Ning, H. Cui, Y. Zhang, Stevens Institute of Technology ..... [6371-28]
- ✓ **Detection of seismic signal using fiber Bragg grating sensors**, Y. Zhang, S. Li, R. A. Pastore, Jr., Z. Yin, H. Cui, Stevens Institute of Technology ..... [6371-29]
- ✓ **Fast-tuning narrow-linewidth all polarization-maintaining fiber ring laser**, Z. Meng, Y. Hu, Z. Hu, S. Xiong, C. Cao, National Univ. of Defense Technology (China) ..... [6371-30]
- ✓ **Benefits of wireless networks integrated with distributed fiber optic sensing systems**, P. Lefebvre, R. Caporuscio, LxSIX Photonics Inc. (Canada) ..... [6371-32]
- ✓ **High resolution underwater fiber optic threat detection system**, A. Berger, S. Hermesh, E. Durets, L. U. Kempen, Intelligent Optical Systems, Inc. .... [6371-33]

## Wednesday 4 October

### SESSION 1

Hynes Conv. Ctr. Room 101 ..... Wed. 8:10 to 10:00 am

Chair: **Michael A. Marcus**, Eastman Kodak Co.

- 8:10 am: **Tunable fiber Bragg grating ring lasers using macro fiber composite actuators for real-time health monitoring of aerospace vehicles (Invited Paper)**, D. L. Geddis, Norfolk State Univ.; S. G. Allison, Q. A. Shams, NASA Langley Research Ctr. .... [6371-01]
- 8:40 am: **Damage detection in bridges through fiber optic structural health monitoring**, J. D. Doornink, B. M. Phares, T. J. Wipf, D. L. Wood, Iowa State Univ. .... [6371-02]
- 9:00 am: **Optimization of Brillouin optical correlation domain analysis based on intensity modulation to enlarge the measurable strain limit**, K. Song, Z. He, K. Hotate, The Univ. of Tokyo (Japan) ..... [6371-03]
- 9:20 am: **Analysis on the influence of intrinsic thermal stress on Brillouin gain spectra in optical fibers**, W. Zou, Z. He, K. Hotate, The Univ. of Tokyo (Japan) ..... [6371-04]
- 9:40 am: **Novel Brillouin fiber sensing system using extremely narrow linewidth fiber lasers**, S. Jiang, NP Photonics, Inc. .... [6371-05]
- Coffee Break ..... 10:00 to 10:30 am

### SESSION 2

Hynes Conv. Ctr. Room 101 ..... Wed. 10:30 am to 12:10 pm

Chair: **Brian Culshaw**, Univ. of Strathclyde (United Kingdom)

- 10:30 am: **Real-time control of micro-reactors by Raman spectroscopy**, C. S. Shende, P. Maksymiuk, F. E. Inscore, S. R. Farquharson, Real-Time Analyzers, Inc. .... [6371-06]
- 10:50 am: **Temperature-insensitive open top ridge waveguide refractometer by using core and cladding Bragg resonances**, X. Dai, S. J. Mihailov, R. B. Walker, C. L. Callender, C. Blanchetiere, Communications Research Ctr. Canada (Canada) ..... [6371-07]
- 11:10 am: **Analysis of environmental factors affecting the performance of packaged FBG strain sensors**, S. Ferguson, Micron Optics, Inc.; A. Méndez, MCH Engineering LLC; T. W. Graver, Micron Optics, Inc. .... [6371-20]
- 11:30 am: **Fiber Bragg grating chemical sensor**, G. Sethuraman, P. M. Boland, D. Pestov, Virginia Commonwealth Univ.; A. Mendez, MCH Engineering, LLC; T. W. Graver, Micron Optics, Inc.; G. B. Tait, Virginia Commonwealth Univ. .... [6371-09]
- 11:50 am: **Chemically robust platform for optical solid state conducting polymer sensor**, A. L. Holt, S. A. Carter, Univ. of California/Santa Cruz; J. P. Bearinger, Lawrence Livermore National Lab. .... [6371-10]
- Lunch Break ..... 12:10 to 1:30 pm

# Conference 6371 • Hynes Conv. Ctr. Room 101

## SESSION 3

**Hynes Conv. Ctr. Room 101 . . . . . Wed. 1:30 to 3:20 pm**

*Chair: John P. Dakin, Univ. of Southampton (United Kingdom)*

1:30 pm: **Advanced optoelectronic devices for optical fuzing technology** (*Invited Paper*), J. J. Liu, Army Research Lab.; C. M. von der Lippe, U.S. Army Research, Development and Engineering Command . . . . . [6371-11]

2:00 pm: **Digital balanced detection for fast optical computerized tomography**, R. Hafiz, K. B. Ozanyan, The Univ. of Manchester (United Kingdom) . . . . . [6371-12]

2:20 pm: **Analysis of fiber-based coherent detection employing optical preamplifier and time-domain filter**, Y. Chen, Fibertek, Inc.; W. E. Torruellas, Fibertek, Inc; R. L. Burnham, H. R. Verdun, Fibertek, Inc.; B. Mark, George Mason Univ. . . . . [6371-13]

2:40 pm: **Photonic sensor opportunities for distributed and wireless systems in security applications**, D. A. Krohn, Light Wave Venture Consulting, LLC . . . . . [6371-14]

3:00 pm: **Compact high-resolution wavelength detectors for read-out of optical sensors**, P. Kiesel, O. Schmidt, S. Mohta, N. M. Johnson, Palo Alto Research Ctr. Inc. . . . . [6371-15]

Coffee Break . . . . . 3:20 to 3:50 pm

## SESSION 4

**Hynes Conv. Ctr. Room 101 . . . . . Wed. 3:50 to 5:30 pm**

*Chair: Michael A. Marcus, Eastman Kodak Co.*

3:50 pm: **Modeling and measurement of accuracy/distortion in an operationally-passive FBG demodulation technique**, M. D. Todd, Univ. of California/San Diego; M. E. Seaver, F. Bucholtz, J. M. Nichols, S. T. Trickey, Naval Research Lab. . . . . [6371-16]

4:10 pm: **A fiber grating based distributed light source**, G. E. Carver, T. Koch, D. Salvemini, Princeton Lightwave, Inc.; K. S. Feder, P. S. Westbrook, OFS Fitel, LLC . . . . . [6371-17]

4:30 pm: **A novel temperature independent electric field sensor based on FBG technology**, C. Florida, F. Borin, J. B. Rosolem, F. E. Nallin, CpqD Foundation (Brazil); U. H. Bezerra, A. Á. A. Tupiassú, Univ. Federal do Par (Brazil) . . . . . [6371-18]

4:50 pm: **Long-period gratings functionalized with ionic self-assembled multilayers for biosensor applications**, S. Ramachandran, Lucent Technologies/Bell Labs.; Z. Wang, E. Gifford, J. R. Heflin, Virginia Polytechnic Institute and State Univ. . . . . [6371-19]

5:10 pm: **Luminescence spectrometer employs a nanosecond gated photomultiplier to detect emission from lanthanide chelates excited by a pulsed-UV LED**, R. E. Connally, J. D. Yong, J. A. Piper, Macquarie Univ. (Australia) . . . . . [6371-08]

## Courses of Related Interest

*Register for courses and get full course descriptions at the SPIE Registration desk.*

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SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm

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SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

---

SC747 Semiconductor Optoelectronic Device Fundamentals (Linden) Wednesday, 8:30 am to 5:30 pm

---

SC801 Optoelectronic Devices: Introduction to Physics and Simulation (Piprek) Tuesday, 8:30 am to 12:30 pm

# Advanced Photon Counting Techniques

Conference Chair: **Wolfgang Becker**, Becker & Hickl GmbH (Germany)

Program Committee: **Brian J. Bacskaï**, Massachusetts General Hospital; **Chris D. Geddes**, Univ. of Maryland/Baltimore; **Enrico Gratton**, Univ. of California/Irvine; **Alan L. Migdall**, National Institute of Standards and Technology; **Alexandre Pauchard**, Id Quantique SA (Switzerland); **Ammasi Periasamy**, Univ. of Virginia; **Frederick S. Perry**, Boston Electronics Corp.; **Peter T. C. So**, Massachusetts Institute of Technology

## Sunday 1 October

### SESSION 1

Hynes Conv. Ctr. Room 109 ..... Sun. 8:30 to 10:25 am

#### Photon Counting Techniques in Biomedical Applications I

Chair: **Heidrun Wabnitz**,  
Physikalisch-Technische Bundesanstalt (Germany)

##### Keynote

8:30 am: **Multidimensional time-correlated single photon counting** (*Invited Paper*), W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany) ..... [6372-01]

9:05 am: **Differentiation of ocular fundus fluorophores by fluorescence lifetime imaging using multiple excitation and emission wavelengths** (*Invited Paper*), M. Hammer, D. Schweitzer, S. Schenke, Friedrich-Schiller-Univ. Jena (Germany); W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany) ..... [6372-02]

9:35 am: **Time-resolved photon counting allows for new temporal and spatial insights into nanoworld** (*Invited Paper*), A. A. Gaiduk, R. Kühnemuth, M. Antonik, Heinrich-Heine-Univ. Dusseldorf (Germany); W. Becker, Becker & Hickl GmbH (Germany); S. Felekyan, V. Kudryavtsev, Heinrich-Heine-Univ. Dusseldorf (Germany); M. Koenig, Stanford Univ.; F. Oesterhelt, Heinrich-Heine-Univ. Dusseldorf (Germany); C. Sandhagen, Opsolution Spectroscopic Systems GmbH (Germany); C. A. M. Seidel, Heinrich-Heine-Univ. Dusseldorf (Germany) ..... [6372-03]

10:05 am: **Multiwavelength fluorescence lifetime imaging by TCSPC**, A. Bergmann, W. Becker, Becker & Hickl GmbH (Germany) ..... [6372-04]

Coffee Break ..... 10:25 to 10:55 am

### SESSION 2

Hynes Conv. Ctr. Room 109 ..... Sun. 10:55 am to 12:35 pm

#### Photon Counting Techniques in Biomedical Applications II

Chair: **Wolfgang Becker**, Becker & Hickl GmbH (Germany)

10:55 am: **In vivo diffuse optical imaging and spectroscopy based on TCSPC** (*Invited Paper*), H. Wabnitz, D. Grosenick, Physikalisch-Technische Bundesanstalt (Germany); M. Moeller, Physikalisch-Technische Bundesanstalt (Germany) and Hochschule für Technik und Wirtschaft des Saarlandes (Germany); A. Liebert, Physik-Tech Bundesanstalt (Poland); J. Steinbrink, Charité-Univ. Medizin Berlin (Germany); R. Macdonald, Physikalisch-Technische Bundesanstalt (Germany) ..... [6372-05]

##### Keynote

11:25 am: **Time-resolved fluorescence diffuse optical tomography using ultrafast time-correlated single photon counting** (*Invited Paper*), Y. Bérubé-Lauzière, V. Robichaud, Univ. de Sherbrooke (Canada) [6372-06]

11:55 am: **Application of low-intensity non-scanning fluorescence lifetime imaging microscopy for monitoring excited states dynamics in individual chloroplasts and living cells of photosynthetic organisms**, H. H. Eckert, Technische Univ. Berlin (Germany); Z. Petrasek, Technische Univ. Dresden (Germany); K. Kernnitz, EuroPhoton GmbH (Germany) ..... [6372-07]

12:15 pm: **Time-correlated single photon counting as the principle technique in a plate reader for assay development and high-throughput screening**, D. U. Näther, Edinburgh Instruments Ltd. (United Kingdom)[6372-08]

Lunch Break ..... 12:35 to 1:50 pm

### SESSION 3

Hynes Conv. Ctr. Room 109 ..... Sun. 1:50 to 3:30 pm

#### Photon Counting Techniques in Biomedical Applications III

Chair: **Wolfgang Becker**, Becker & Hickl GmbH (Germany)

1:50 pm: **Monitoring mechanotransduction in cells by time-correlated single photon counting**, T. Tabouillot, R. R. Gullapalli, P. J. Butler, The Pennsylvania State Univ. .... [6372-09]

2:10 pm: **Fluorescence lifetime microscopy with a time- and space-resolved single-photon counting detector**, X. Michalet, Univ. of California/Los Angeles; O. H. W. Siegmund, J. V. Vallerga, P. N. Jelinsky, Univ. of California/Berkeley; J. E. Millaud, Lawrence Livermore National Lab.; S. Weiss, Univ. of California/Los Angeles ..... [6372-10]

2:30 pm: **Correction of dead-time related distortions for TCSPC measurements at very high count rates**, H. Wabnitz, Physikalisch-Technische Bundesanstalt (Germany); M. Moeller, Physikalisch-Technische Bundesanstalt (Germany) and Hochschule für Technik und Wirtschaft des Saarlandes (Germany); R. Macdonald, Physikalisch-Technische Bundesanstalt (Germany); W. Becker, Becker & Hickl GmbH (Germany) ..... [6372-11]

2:50 pm: **Photon counting by large-area detection with multianode photomultiplier tube in high-throughput multiphoton microscopy**, D. Kim, P. T. C. So, Massachusetts Institute of Technology ..... [6372-12]

3:10 pm: **New light sources for time-correlated single photon counting in commercially available spectrometers**, D. U. Näther, Edinburgh Instruments Ltd. (United Kingdom) ..... [6372-13]

Coffee Break ..... 3:30 to 4:00 pm

### SESSION 4

Hynes Conv. Ctr. Room 109 ..... Sun. 4:00 to 5:40 pm

#### Single Photon Avalanche Detectors and Superconducting Detectors I

Chair: **Wolfgang Becker**, Becker & Hickl GmbH (Germany)

4:00 pm: **A view on progress of silicon single-photon avalanche diodes and quenching circuits** (*Invited Paper*), S. D. Cova, M. Ghioni, F. Zappa, I. Rech, A. Gulinatti, Politecnico di Milano (Italy) ..... [6372-14]

4:30 pm: **Verifying a two-photon calibration method for photon-counting detectors to high accuracy** (*Invited Paper*), S. V. Polyakov, National Institute of Standards and Technology; M. J. Ware, Brigham Young Univ.; J. C. Bienfang, A. L. Migdall, National Institute of Standards and Technology ..... [6372-15]

5:00 pm: **Recent developments in pixellated Geiger mode APDs**, J. D. Swain, S. Reucroft, Y. Musienko, Northeastern Univ. .... [6372-16]

5:20 pm: **Geiger-mode InGaAsP/InP APDs optimized for single photon counting at 1.06  $\mu\text{m}$** , K. W. Forsyth, N. Clay, Sensors Unlimited, Inc. [6372-17]

## Monday 2 October

### SESSION 5

Hynes Conv. Ctr. Room 109 ..... Mon. 8:30 am to 12:20 pm  
**Single Photon Avalanche Detectors and Superconducting Detectors II**

Chair: Sergio D. Cova, Politecnico di Milano (Italy)

8:30 am: **Millimeter precision laser ranging using solid state photon counting**, I. Prochazka, Czech Technical Univ. in Prague (Czech Republic) ..... [6372-18]

8:50 am: **Ultra compact CMOS single photon detector**, A. Rochas, A. Pauchard, L. Monat, O. Guinnard, A. Matteo, G. Ribordy, id Quantique SA (Switzerland) ..... [6372-19]

9:10 am: **Low dark count rate 4H-SiC Geiger mode avalanche photodiodes operated under gated quenching at 325 nm**, A. L. Beck, The Univ. of Texas at Austin; X. Guo, H. Liu, Univ. of Virginia; A. Ghatak-Roy, The Univ. of Texas at Austin; J. C. Campbell, Univ. of Virginia ..... [6372-20]

9:30 am: **In orbit performance of Si avalanche photodiode single-photon counting modules in the Geoscience Laser Altimeter System on ICESat**, X. Sun, NASA Goddard Space Flight Ctr.; P. L. Jester, Stinger Ghaffarian Technologies, Inc.; S. P. Palm, J. B. Abshire, J. D. Spinhirne, M. A. Krainak, NASA Goddard Space Flight Ctr. .... [6372-21]

9:50 am: **Gated operation of InGaAs SPADs with active-quenching and fast timing circuits**, A. Tosi, A. Gallivanoni, F. Zappa, S. D. Cova, Politecnico di Milano (Italy) ..... [6372-22]

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

10:40 am: **Planar silicon SPADs with 200- $\mu$ m diameter and 35-ps photon timing resolution**, M. Ghioni, A. Gulinatti, Politecnico di Milano (Italy); P. Maccagnani, Istituto per la Microelettronica e Microsistemi (Italy); I. Rech, S. D. Cova, Politecnico di Milano (Italy) ..... [6372-23]

11:00 am: **A single-photon avalanche diode array fabricated in .35  $\mu$ m CMOS and based on an event-driven readout for TCSPC experiments**, C. Niclass, M. Sergio, E. Charbon, Ecole Polytechnique Fédérale de Lausanne (Switzerland) ..... [6372-24]

11:20 am: **High-efficiency single-photon detectors**, R. Rangarajan, N. A. Peters, O. Hosten, J. B. Altepeter, E. R. Jeffrey, P. G. Kwiat, Univ. of Illinois at Urbana-Champaign ..... [6372-25]

11:40 am: **Time-correlated single photon counting with superconducting single-photon detectors**, M. J. Stevens, R. H. Hadfield, R. E. Schwall, S. W. Nam, R. P. Mirin, National Institute of Standards and Technology [6372-26]

12:00 pm: **Fast single photon detection using superconducting Nb nanowires**, D. E. Prober, Yale Univ.; A. Frydman, Yale Univ. and Bar-Ilan Univ. (Israel); M. O. Reese, A. J. Annunziata, Yale Univ.; M. Rooks, IBM Thomas J. Watson Research Ctr. .... [6372-27]

Lunch/Exhibition Break ..... 12:20 to 1:50 pm

### SESSION 6

Hynes Conv. Ctr. Room 109 ..... Mon. 1:50 to 5:00 pm  
**Quantum Communication, Entangled Photons, and Controllable Sources**

Chair: Robert H. Hadfield,  
National Institute of Standards and Technology

#### Keynote

1:50 pm: **Fast and practical single photon detection at telecom wavelengths** (*Invited Paper*), R. T. Thew, H. Zbinden, N. Gisin, Univ. de Genève (Switzerland) ..... [6372-28]

2:20 pm: **Do we count indivisible photons or discrete quantum events experienced by detectors?**, C. Roychoudhuri, Univ. of Connecticut; N. Tirfessa, Manchester Community College ..... [6372-29]

2:40 pm: **Ultrafast infrared superconducting single-photon detector system** (*Invited Paper*), R. H. Hadfield, M. J. Stevens, R. E. Schwall, R. P. Mirin, S. W. Nam, National Institute of Standards and Technology; J. L. Habif, BBN Technologies ..... [6372-30]

Coffee Break ..... 3:10 to 3:40 pm

3:40 pm: **Application of a new time-correlated single-photon counting instrument in a fiber-based quantum cryptography system**, I. P. S. Choi, H. N. J. Fernando, P. D. Townsend, Tyndall National Institute (Ireland); M. Wahl, PicoQuant GmbH (Germany) ..... [6372-31]

4:00 pm: **High-speed photon counting techniques for broadband quantum key distribution**, D. J. Rogers, National Institute of Standards and Technology and Univ. of Maryland; J. C. Bienfang, A. Mink, B. J. Hershman, A. Nakassis, X. Tang, L. Ma, D. H. Su, C. J. Williams, C. W. Clark, National Institute of Standards and Technology ..... [6372-32]

4:20 pm: **High-rate photon-counting optical communication with a superconducting nanowire single-photon detector**, E. A. Dauler, Massachusetts Institute of Technology; B. S. Robinson, A. J. Kerman, R. J. Barron, D. O. Caplan, M. L. Stevens, J. J. Carney, S. A. Hamilton, MIT Lincoln Lab.; J. K. W. Yang, K. K. Berggren, Massachusetts Institute of Technology ..... [6372-33]

4:40 pm: **Optical entanglement for quantum communication**, A. V. Sergienko, M. A. Jaspán, B. E. A. Saleh, M. C. Teich, Boston Univ. .... [6372-34]

## Tuesday 3 October

### ✓ Posters-Tuesday

*A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.*

✓ **Timing stability of TCSPC experiments**, W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany) ..... [6372-35]

✓ **Development of a high-speed combined spectral and lifetime detector for fluorescence microscopy of living specimens**, M. Z. Nazir, K. W. Elceiri, J. G. White, Univ. of Wisconsin/Madison ..... [6372-36]

✓ **Highly sensitive single-photon detection system for multi-lane DNA sequencer**, D. Gavrilov, B. Gorbovitski, G. Gudkov, A. Stepukhovich, M. Tcherevishnik, G. Tyshko, A. Tsupryk, V. B. Gorfinkel, Stony Brook Univ. .... [6372-37]

✓ **32-channel single-photon counting module for ultrasensitive detection of DNA sequences**, V. H. Dhulla, G. Gudkov, D. Gavrilov, O. Kosobokova, A. Tsupryk, A. Stepoukhovitch, B. Gorbovitski, Stony Brook Univ. . [6372-38]

✓ **Controllable photon source**, D. Oszetzky, A. Nagy, A. Czitrovszky, Magyar Tudományos Akadémia Szilárdtestfizikai és Optikai (Hungary) . . . . [6372-39]

✓ **An ultra-fast Geiger-mode single photon avalanche diode in 0.18  $\mu$ m CMOS technology**, H. Finkelstein, M. J. Hsu, S. C. Esener, Univ. of California/San Diego ..... [6372-40]

### Courses of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

SC747 Semiconductor Optoelectronic Device Fundamentals (Linden)  
Wednesday, 8:30 am to 5:30 pm

SC801 Optoelectronic Devices: Introduction to Physics and Simulation  
(Piprek) Tuesday, 8:30 am to 12:30 pm



# Conference 6373 • Hynes Conv. Ctr. Room 108

Monday-Wednesday 2-4 October 2006 • Proceedings of SPIE Vol. 6373

## Terahertz Physics, Devices, and Systems

*Conference Chairs:* Mehdi Anwar, Univ. of Connecticut; Anthony J. DeMaria, Coherent DEOS; Michael S. Shur, Rensselaer Polytechnic Institute

*Program Committee:* Alexander G. Davies, Univ. of Leeds (United Kingdom); Frank C. De Lucia, The Ohio State Univ.; Gottfried H. Döhler, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Achyut K. Dutta, Banpil Photonics; John F. Federici, New Jersey Institute of Technology; Qing Hu, Massachusetts Institute of Technology; M. Saif Islam, Univ. of California/Davis; Hiroshi Ito, Nippon Telegraph and Telephone Corp. (Japan); Peter U. Jepsen, Danmarks Tekniske Univ. (Denmark); James Kolodzey, Univ. of Delaware; Edmund H. Linfield, Univ. of Leeds (United Kingdom); Yalin Lu, Univ. of Colorado at Colorado Springs; Robert Magnusson, Univ. of Connecticut; Amir Hamed Majedi, Univ. of Waterloo (Canada); Richard A. Soref, Air Force Research Lab.; Geoff W. Taylor, Univ. of Connecticut; Simon Verghese, MIT Lincoln Lab.; Richard T. Webster, Air Force Research Lab.; Sigfrid K. Yngvesson, Univ. of Massachusetts/Amherst; Weili Zhang, Oklahoma State Univ.

### Monday 2 October

#### SESSION 1

Hynes Conv. Ctr. Room 108 ..... Mon. 1:00 to 3:00 pm

#### THz Spectroscopy

*Chairs:* Robert Magnusson, Univ. of Connecticut;  
Richard T. Webster, Air Force Research Lab.

1:00 pm: **Signature science in the terahertz** (*Invited Paper*), F. C. De Lucia, The Ohio State Univ. .... [6373-01]

1:30 pm: **THz dynamics of the metal-insulator transition in vanadium dioxide** (*Invited Paper*), P. U. Jepsen, Danmarks Tekniske Univ. (Denmark); B. M. Fischer, Univ. of Adelaide (Australia); A. Thoman, H. Helm, Albert-Ludwigs-Univ. Freiburg (Germany); R. Lopez, R. F. Haglund, Jr., Vanderbilt Univ. .... [6373-02]

2:00 pm: **Ab-initio prediction of terahertz vibrational modes in crystalline systems**, P. U. Jepsen, Danmarks Tekniske Univ. (Denmark); S. J. Clark, Univ. of Durham (United Kingdom) .... [6373-03]

2:15 pm: **Terahertz spectroscopy of molten sulfur using a tunable THz source**, M. Mross, T. Lowell, Vermont Photonics, Inc.; G. C. Vezzoli, New Hampshire Community Technical College .... [6373-04]

2:30 pm: **Broadband terahertz spectroscopy** (*Invited Paper*), A. G. Davies, E. H. Linfield, Univ. of Leeds (United Kingdom) .... [6373-05]

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

#### SESSION 2

Hynes Conv. Ctr. Room 108 ..... Mon. 3:30 to 6:00 pm

#### THz Sources I: Advanced Material

*Chairs:* M. Saif Islam, Univ. of California/Davis;  
Frank C. De Lucia, The Ohio State Univ.

3:30 pm: **Fabrication and characterization of GaN/AlGaIn multilayer structure for terahertz quantum cascade laser** (*Invited Paper*), S. C. Wang, National Chiao Tung Univ. (Taiwan); R. A. Soref, Air Force Research Lab.; G. Sun, Univ. of Massachusetts .... [6373-06]

4:00 pm: **A 200-GHz low phase noise photonic local oscillator module**, R. S. Kimberk, T. R. Hunter, E. Tong, R. Blundell, Harvard-Smithsonian Ctr. for Astrophysics .... [6373-07]

4:20 pm: **The properties of terahertz sources based on dopant transitions in semiconductors** (*Invited Paper*), J. Kolodzey, P. Lv, S. Kim, Univ. of Delaware .... [6373-08]

4:50 pm: **Continuous-wave submillimeter-wave gyrotrons**, S. Han, Massachusetts Institute of Technology .... [6373-09]

5:10 pm: **Electrical domains and submillimeter signal generation in AlGaIn/GaN superlattices** (*Invited Paper*), V. I. Litvinov, I. Gordion, WaveBand Corp.; A. Manasson, Univ. of Maryland/College Park .... [6373-10]

5:40 pm: **Spectral properties of very deep zero-order metallic gratings with subwavelength slits at THz frequency region**, Z. Tian, Q. Xing, D. Liang, N. Zhang, S. Li, J. Gu, L. Chai, Q. Wang, Tianjin Univ. (China) .... [6373-11]

### Tuesday 3 October

#### SESSION 3

Hynes Conv. Ctr. Room 108 ..... Tues. 8:30 to 10:00 am

#### THz Propagation and Detection I: Advanced Concepts

*Chairs:* Peter U. Jepsen, Danmarks Tekniske Univ. (Denmark);  
Simon Verghese, MIT Lincoln Lab.

8:30 am: **Subwavelength plastic fiber for terahertz wave guiding** (*Invited Paper*), C. Sun, L. Chen, H. Chen, J. Lu, National Taiwan Univ. (Taiwan) .... [6373-12]

9:00 am: **Terahertz sources, sensors, and components: performance and capabilities** (*Invited Paper*), G. Chattopadhyay, J. S. Ward, I. Mehdi, P. H. Siegel, Jet Propulsion Lab. .... [6373-14]

9:30 am: **Toward the modulation of negative index materials by photoconductive coupling**, V. J. Logeeswaran, M. S. Islam, Univ. of California/Davis; E. Ponzovskaya, A. Bratkovsky, W. Wu, S. Wang, R. S. Williams, Hewlett Packard Labs. .... [6373-15]

9:45 am: **Tailoring quaternary buffer/channel/barrier metamorphic HEMTs for THz operation**, R. T. Webster, Air Force Research Lab.; M. Anwar, Univ. of Connecticut .... [6373-16]

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

#### SESSION 4

Hynes Conv. Ctr. Room 108 ..... Tues. 10:30 am to 12:20 pm

#### THz Imaging

*Chairs:* James Kolodzey, Univ. of Delaware;  
Alexander G. Davies, Univ. of Leeds (United Kingdom)

10:30 am: **Terahertz interferometric imaging of a concealed object** (*Invited Paper*), A. M. Sinyukov, A. Bandyopadhyay, A. Sengupta, R. B. Barat, D. E. Gary, Z. Michalopoulos, J. F. Federici, New Jersey Institute of Technology .... [6373-17]

11:00 am: **Imaging and spectroscopy at terahertz frequencies using hot electron bolometer technology** (*Invited Paper*), E. Gerecht, D. Gu, National Institute of Standards and Technology; K. S. Yngvesson, F. Rodriguez, Univ. of Massachusetts/Amherst .... [6373-18]

11:30 am: **Scene simulation of terahertz images**, M. R. Fetterman, W. Kiser, Jr., The Pennsylvania State Univ. .... [6373-19]

11:50 am: **Si-based tunnel junction devices for sub-terahertz communication and imaging** (*Invited Paper*), P. R. Berger, The Ohio State Univ.; P. E. Thompson, Naval Research Lab. .... [6373-20]

Lunch/Exhibition Break ..... 12:20 to 1:50 pm

**SESSION 5**

Hynes Conv. Ctr. Room 108 ..... Tues. 1:50 to 3:30 pm

**Keynote Session**

*Chairs:* **Anthony J. DeMaria**, Coherent DEOS;  
**Michael S. Shur**, Rensselaer Polytechnic Institute

**Keynote**

1:50 pm: **Quantum cascade lasers from quantum design to a high performance technology for mid-infrared and THz photonics** (*Invited Paper*), F. Capasso, Harvard Univ. .... [6373-21]

2:30 pm: **THz-photomixer based on vertical quasi-ballistic transport** (*Invited Paper*), G. H. Döhler, S. Preu, F. Renner, M. Eckardt, A. Schwanhäusser, S. Malzer, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); M. P. Hanson, A. C. Gossard, J. Chan, E. R. Brown, Univ. of California/Santa Barbara; L. J. Wang, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); G. Loata, T. Löffler, H. G. Roskos, Johann Wolfgang Goethe-Univ. (Germany) .. [6373-22]

3:00 pm: **Photonic terahertz-wave generation using uni-traveling-carrier photodiodes** (*Invited Paper*), H. Ito, Nippon Telegraph and Telephone Corp. (Japan) ..... [6373-23]

Coffee Break ..... 3:30 to 4:00 pm

**SESSION 6**

Hynes Conv. Ctr. Room 108 ..... Tues. 4:00 to 5:50 pm

**THz Propagation and Detection II**

*Chairs:* **Richard T. Webster**, Air Force Research Lab.;;  
**Amir H. Majedi**, Univ. of Waterloo (Canada)

4:00 pm: **Coherent CW THz transceivers** (*Invited Paper*), E. Mueller, Coherent, Inc. .... [6373-24]

4:30 pm: **Extraordinary terahertz transmission of subwavelength plasmonic structures** (*Invited Paper*), W. Zhang, A. K. Azad, Oklahoma State Univ. .... [6373-25]

5:00 pm: **Surface plasmon modes for metal-clad optical and terahertz waveguides** (*Invited Paper*), A. B. M. Rahman, City Univ. (United Kingdom); C. Themistos, Frederick Institute of Technology (Cyprus); M. Rajarajan, K. T. V. Grattan, City Univ. (United Kingdom) ..... [6373-26]

5:30 pm: **Research progress of terahertz wave technology in food safety**, Z. Yan, Y. Ying, H. Zhang, Zhejiang Univ. (China) ..... [6373-27]

**✓ Posters-Tuesday**

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

✓ **Effect of microwave radiation on the stability of terahertz hot-electron bolometer mixers**, S. Ryabchun, Harvard-Smithsonian Ctr. for Astrophysics ..... [6373-39]

**Wednesday 4 October**

**SESSION 7**

Hynes Conv. Ctr. Room 108 ..... Wed. 8:00 to 10:15 am

**Superconducting THz Devices and Systems**

*Chairs:* **Hiroshi Ito**, Nippon Telegraph and Telephone Corp. (Japan);  
**Mehdi Anwar**, Univ. of Connecticut

8:00 am: **Microwave generation by Josephson vortex motion in stacked high-Tc intrinsic junctions** (*Invited Paper*), H. Lee, M. Bae, Pohang Univ. of Science and Technology (South Korea) ..... [6373-28]

8:30 am: **Ultrafast kinetic inductance samplers** (*Invited Paper*), C. J. Stevens, Univ. of Oxford (United Kingdom) ..... [6373-29]

9:00 am: **A 1.5-THz hot electron bolometer receiver for ground-based terahertz astronomy in northern Chile** (*Invited Paper*), E. Tong, Harvard-Smithsonian Ctr. for Astrophysics; J. H. Kawamura, Jet Propulsion Lab.; D. P. Marrone, R. Blundell, S. N. Paine, Harvard-Smithsonian Ctr. for Astrophysics ..... [6373-30]

9:30 am: **THz signal generation/propagation in an integrated traveling-wave superconductive/photoconductive heterodyne photodetector** (*Invited Paper*), A. H. Majedi, Univ. of Waterloo (Canada) ..... [6373-31]

10:00 am: **THz radiation from intrinsic Josephson junctions of Bi-2212 single crystals**, K. Kadowaki, K. Kawamata, M. Kohri, Y. Kubo, T. Yamamoto, I. Kakeya, Univ. of Tsukuba (Japan) ..... [6373-32]

Coffee Break ..... 10:15 to 10:35 am

**SESSION 8**

Hynes Conv. Ctr. Room 108 ..... Wed. 10:35 am to 12:25 pm

**THz Sources II: Advanced Concepts**

*Chairs:* **Gottfried H. Döhler**, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); **Weili Zhang**, Oklahoma State Univ.

10:35 am: **Terahertz comb radio frequency generation in nonlinear optical devices** (*Invited Paper*), E. J. Donkor, Univ. of Connecticut ..... [6373-33]

11:05 am: **Terahertz quantum cascade lasers** (*Invited Paper*), E. H. Linfield, A. G. Davies, Univ. of Leeds (United Kingdom) ..... [6373-34]

11:35 am: **Development of double negative metamaterials in the THz regime** (*Invited Paper*), A. Akyurtlu, N. Wongkasem, K. A. Marx, Univ. of Massachusetts/Lowell ..... [6373-35]

12:05 pm: **Mask repair using layout based pattern copy for the 65-nm node and beyond**, V. A. Boegli, NaWoTec GmbH (Germany) ..... [6373-36]

# Conference 6374A • Hynes Conv. Ctr. Room 106

Sunday-Tuesday 1-3 October 2006 • Part of Proceedings of SPIE Vol. 6374: Optomechatronic Actuators, Manipulation, and Systems Control

## Optomechatronic Actuators and Manipulation II

Conference Chair: **Yukitoshi Otani**, Tokyo Univ. of Agriculture and Technology (Japan)

Cochairs: **Kee S. Moon**, San Diego State Univ.; **Rainer Tutsch**, Technische Univ. Braunschweig (Germany); **Toru Yoshizawa**, Opton Co., Ltd. (Japan) and Tokyo Univ. A&T (Japan); **Young-June Cho**, Korea Institute of Industrial Technology (South Korea)

Program Committee: **Masaaki Adachi**, Kanazawa Univ. (Japan); **Kalloy Bhattacharya**, Univ. of Calcutta (India); **Katsushi Furutani**, Toyota Technological Institute (Japan); **Nobuyuki Hashimoto**, Citizen Watch Co., Ltd. (Japan); **Dae Hwa Jeong**, LG Electronics Inc. (South Korea); **Pavel Krecmer**, Dublin City Univ. (Ireland); **Timothy P. Kurzweg**, Drexel Univ.; **Sung-Q Lee**, Electronics and Telecommunications Research Institute (South Korea); **Sergey S. Sarkisov**, SSS Optical Technologies, LLC; **Michael I. Shribak**, Marine Biological Lab.

### Sunday 1 October

#### SESSION 1

Hynes Conv. Ctr. Room 106 ..... Sun. 8:30 to 10:00 am

##### Optical Actuator

Chairs: **Ichirou Ishimaru**, Kagawa Univ. (Japan);  
**Sergey S. Sarkisov**, SSS Optical Technologies, LLC

8:30 am: **Laser motor (Invited Paper)**, H. Okamura, International Christian Univ. (Japan) ..... [6374A-01]

9:00 am: **Light driven polymer actuators for propulsion and light control**, L. L. Huey, Alabama A&M Univ.; S. S. Sarkisov, SSS Optical Technologies, LLC; M. J. Curley, Alabama A&M Univ.; G. Adamovsky, NASA Glenn Research Ctr.; J. Wang, Alabama A&M Univ. .... [6374A-02]

9:20 am: **Positioning control of nafion-Au ionic polymer metal composite: the effect of the driving ion on the deformation patterns of IPMC**, A. Itoh, T. Amari, T. Tanaka, Tokyo Denki Univ. (Japan) ..... [6374A-03]

9:40 am: **Optical driving of actuator using poly-vinylidene difluoride cantilever**, Y. Mizutani, S. Nishimura, Y. Otani, N. Umeda, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6374A-04]

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

#### SESSION 2

Hynes Conv. Ctr. Room 106 ..... Sun. 10:30 am to 12:00 pm

##### Optomechatronic Measurement

Chairs: **Masaaki Adachi**, Kanazawa Univ. (Japan);  
**Nobuyuki Hashimoto**, Citizen Watch Co., Ltd. (Japan)

10:30 am: **Orientation-independent differential interference contrast microscopy (Invited Paper)**, M. I. Shribak, S. Inoue, Marine Biological Lab. .... [6374A-05]

11:00 am: **Analysis of mechanical characteristics by birefringence microscope**, M. Ebisawa, Y. Otani, N. Umeda, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6374A-06]

11:20 am: **Simultaneous measurement of nanometric longitudinal displacement and micrometric lateral displacement by using one line CCD camera**, M. Adachi, Y. Nishide, Kanazawa Univ. (Japan) ..... [6374A-08]

11:40 am: **High-sensitive MEMS acoustic sensor using PMN-PT single-crystal diaphragm**, S. Lee, H. J. Kim, K. Park, Electronics and Telecommunications Research Institute (South Korea) ..... [6374A-09]

Lunch Break ..... 12:00 to 1:20 pm

#### SESSION 3

Hynes Conv. Ctr. Room 106 ..... Sun. 1:20 to 3:10 pm

##### Optomechatronic Actuation Devices

Chair: **Kee S. Moon**, San Diego State Univ.

1:20 pm: **PMN-PT piezoelectric near field optical probe for data storage (Invited Paper)**, Y. K. Hong, Michigan Technological Univ.; S. Q. Lee, E. K. Kim, K. Park, Electronics and Telecommunications Research Institute (South Korea); K. S. Moon, San Diego State Univ. .... [6374A-10]

1:50 pm: **Real-time high-displacement amplified bimorph scanning mirror**, P. E. Patterson, The George Washington Univ. and The United States Military Academy; J. M. Zara, The George Washington Univ. .... [6374A-11]

2:10 pm: **Optimization of electrostatic side-drive micromotor torque using new rotor-pole-shaping technique**, M. A. Basha, S. Safavi-Naeini, Univ. of Waterloo (Canada) ..... [6374A-13]

2:30 pm: **Liquid crystal optics for laser beam modulation**, N. Hashimoto, M. Kurihara, Citizen Watch Co., Ltd. (Japan) ..... [6374A-14]

2:50 pm: **Reconfigurable microfluidic chip based on a light-sensitive hydrogel**, K. Al-Arife, G. K. Knopf, The Univ. of Western Ontario (Canada) ..... [6374A-15]

Coffee Break ..... 3:10 to 3:40 pm

#### SESSION 4

Hynes Conv. Ctr. Room 106 ..... Sun. 3:40 to 5:30 pm

##### Optical Actuator and Micro/Nano Manipulation

Chairs: **Young-June Cho**, Korea Institute of Industrial Technology (South Korea); **George K. Knopf**, The Univ. of Western Ontario (Canada)

3:40 pm: **Liquid crystal laser manipulation system for controlling microscopic particles (Invited Paper)**, M. Kawamura, M. Ye, S. Sato, Akita Univ. (Japan) ..... [6374A-16]

4:10 pm: **Imaging technology of 3D distribution for sugar chain on single living cell membrane**, K. Yamamoto, I. Ishimaru, Y. Fujii, T. Yasokawa, K. Ishizaki, M. Yoshida, S. Kuriyama, T. Masaki, S. Nakai, K. Takegawa, N. Tanaka, Kagawa Univ. (Japan) ..... [6374A-17]

4:30 pm: **Laser irradiation induced resonant vibrations in solids**, B. V. Richert, H. Okamura, International Christian Univ. (Japan) .... [6374A-18]

4:50 pm: **Light-driven micromanipulator and its application for 3D fabrications**, Y. Otani, Y. Hirai, Y. Mizutani, N. Umeda, T. Yoshizawa, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6374A-19]

5:10 pm: **Optimal actuation of a MEMS cantilever by a laser beam**, A. K. Ghosh, S. Pal, Indian Institute of Technology (India) ..... [6374A-20]

### Monday 2 October

#### Optomechatronics Technical Group Meeting

Hynes Conv. Ctr. Room 106 ..... Mon. 5:30 to 7:00 pm

See p. 7 in Special Events for details.

## Tuesday 3 October

### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A.

Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday.

Poster authors, see p. 76 for setup instructions.

- ✓ **Development of PC-controlled laser manipulation system with image processing functions**, Y. Tanaka, National Institute of Advanced Industrial Science and Technology (Japan); A. Murakami, The Univ. of Tokushima (Japan); K. Hirano, H. Nagata, M. Ishikawa, National Institute of Advanced Industrial Science and Technology (Japan) ..... [6374A-34]
- ✓ **Low-cost deformable mirror for laser focussing**, W. Greger, T. Hoesel, T. Fellner, A. Schoth, C. Mueller, J. Wilde, H. Reinecke, Albert-Ludwigs-Univ. Freiburg (Germany) ..... [6374A-35]
- ✓ **The simple and practical variable optical attenuator using a piezoelectric sheet containing an optical fiber**, S. Kim, S. Kang, W. Kim, H. Kang, H. Jeong, Y. Cho, Korea Institute of Industrial Technology (South Korea) ..... [6374A-36]
- ✓ **A novel capacitive type miniature microphone with a flexure hinge diaphragm**, H. Kim, Electronics and Telecommunications Research Institute (South Korea) ..... [6374A-37]
- ✓ **Two-dimensional magnetic force actuator using temperature sensitive ferrite driven by light beam**, Y. Mizutani, Y. Otani, N. Umeda, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6374A-38]
- ✓ **Liquid pressure varifocus lens by fibrous actuator**, R. Kuwano, Y. Mizutani, Tokyo Univ. of Agriculture and Technology (Japan); T. Tokunaga, Chiba Institute of Technology (Japan); Y. Otani, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6374A-39]
- ✓ **Polymer-based 1x2 power splitter for a plastic optical fiber**, H. Jeong, Y. Cho, S. T. Kim, Korea Institute of Industrial Technology (South Korea) ..... [6374A-41]

### Optomechatronic Technologies Banquet

See Ticket for Location ..... Tues. 7:30 to 10:00 pm

Enjoy networking with your peers at this gala event.

Tickets for the banquet are not included in the registration fee but may be purchased onsite at the SPIE Registration Desk until 5:00 pm on Sunday 1 October. Banquet tickets are \$65 each. All authors and attendees interested in optomechatronic technologies are welcome.

### Don't Miss the Exhibition!

Tuesday · 10:00 am to 5:00 pm  
Wednesday · 10:00 am to 4:00 pm  
See p. 10 for details.

# Conference 6374B • Hynes Conv. Ctr. Room 106

Monday 2 October 2006 • Part of Proceedings of SPIE Vol. 6374: Optomechatronic Actuators, Manipulation, and Systems Control

## Optomechatronic Systems Control II

Conference Chair: **Farrokh Janabi-Sharifi**, Ryerson Univ. (Canada)

Cochairs: **Toshio Fukuda**, Nagoya Univ. (Japan); **Wei Gao**, Tohoku Univ. (Japan); **Hyungsuk Cho**, Korea Advanced Institute of Science and Technology (South Korea); **Roberto Horowitz**, Univ. of California/Berkeley; **Ali Rostami**, Univ. of Tabriz (Iran); **Satoru Takahashi**, Kagawa Univ. (Japan)

Program Committee: **Peter K. Allen**, Columbia Univ.; **George Barbastathis**, Massachusetts Institute of Technology; **Peter I. Corke**, Commonwealth Scientific & Industrial Research Organisation (Australia); **Seth A. Hutchinson**, Univ. of Illinois at Urbana-Champaign; **Chih-Kung Lee**, National Taiwan Univ. (Taiwan); **Cheng-Hsien Liu**, National Tsing Hua Univ. (Taiwan); **Bradley J. Nelson**, ETH Zürich (Switzerland); **Yves-Alain Peter**, École Polytechnique de Montréal (Canada); **Masatake Shiraishi**, Ibaraki Univ. (Japan); **Bruno Siciliano**, Univ. degli Studi di Napoli Federico II (Italy)

### Monday 2 October

#### SESSION 5

Hynes Conv. Ctr. Room 106 ..... Mon. 8:30 to 10:10 am

##### Vision-Based Tracking and Control

Chair: **Hyungsuck Cho**, Korea Advanced Institute of Science and Technology (South Korea)

- 8:30 am: **A robust vision-based technique for human arm kinematics identification**, O. Talakuob, F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-21]
- 8:50 am: **A fuzzy adaptive PD controller based microassembly system**, J. Wang, X. Tao, H. Cho, Korea Advanced Institute of Science and Technology (South Korea) ..... [6374B-22]
- 9:10 am: **A method of calculating the scanning start angle and the scanning angle of aviation camera**, G. Zhou, L. Zhai, Changchun Institute of Optics, Fine Mechanics and Physics (China) ..... [6374B-23]
- 9:30 am: **Mark position measurement by visual feedback with laser**, D. Miyamoto, S. Nara, S. Takahashi, Kagawa Univ. (Japan) ..... [6374B-24]
- 9:50 am: **Vision guided pin insertion machine inspired by human motion**, K. Kim, C. Song, C. Kim, NT Research Inc. (South Korea); J. Shim, Korea Polytechnic Univ. (South Korea) ..... [6374B-25]
- Coffee Break ..... 10:10 to 10:40 am

#### SESSION 6

Hynes Conv. Ctr. Room 106 ..... Mon. 10:40 am to 12:20 pm

##### System Identification and Modeling I

Chairs: **Ali Rostami**, Univ. of Tabriz (Iran); **Guchuan Zhu**, École Polytechnique de Montréal (Canada)

- 10:40 am: **Catheter kinematics and control to enhance cardiac ablation**, Y. Ganji, Univ. of Waterloo (Canada); F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-26]
- 11:00 am: **An investigation of phenomenal parasitics and robust control of parallel-plate electrostatic micro-actuators**, G. Zhu, École Polytechnique de Montréal (Canada) ..... [6374B-27]
- 11:20 am: **Hybridization of neural networks and genetic algorithms for identification of complex Bragg gratings**, A. Rostami, A. Yazdanpanah-Goharrizi, Univ. of Tabriz (Iran); F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-28]
- 11:40 am: **Identification of complex Bragg gratings based on optical transfer function fitting using genetic algorithm: optimization**, A. Rostami, A. Yazdanpanah-Goharrizi, Univ. of Tabriz (Iran); F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-29]
- 12:00 pm: **Physical parameters identification of nonuniform fiber Bragg gratings using interpolation method**, A. Rostami, A. Yazdanpanah-Goharrizi, Univ. of Tabriz (Iran); F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-30]
- Lunch/Exhibition Break ..... 12:20 to 1:50 pm

#### SESSION 7

Hynes Conv. Ctr. Room 106 ..... Mon. 1:50 to 2:50 pm

##### System Identification and Modeling II

Chairs: **Ali Rostami**, Univ. of Tabriz (Iran); **Guchuan Zhu**, École Polytechnique de Montréal (Canada)

- 1:50 pm: **Circuit modeling of multiple quantum well laser optimized by carrier tunneling**, A. Rostami, H. Rasooli, Univ. of Tabriz (Iran); F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-31]
- 2:10 pm: **Micro-optical electromechanical system (MOEMS) for high-precision displacement sensor design using ring resonator array**, A. Rostami, A. Ghanbari, Univ. of Tabriz (Iran); F. Janabi-Sharifi, Ryerson Univ. (Canada) ..... [6374B-32]
- 2:30 pm: **Tunable dispersion management using thermo optical effect in ring resonator**, G. Rostami, Univ. of Tabriz (Iran) and Iran Telecommunication Research Ctr. (Iran); A. Rostami, Univ. of Tabriz (Iran); H. Akhavan, Iran Telecommunication Research Ctr. (Iran) ..... [6374B-33]

#### Optomechatronics Technical Group Meeting

Hynes Conv. Ctr. Room 106 ..... Mon. 5:30 to 7:00 pm

See p. 7 in Special Events for details.

### Tuesday 3 October

#### Optomechatronic Technologies Banquet

See Ticket for Location ..... Tues. 7:30 to 10:00 pm

Enjoy networking with your peers at this gala event.

Tickets for the banquet are not included in the registration fee but may be purchased onsite at the SPIE Registration Desk until 5:00 pm on Sunday 1 October. Banquet tickets are \$65 each. All authors and attendees interested in optomechatronic technologies are welcome.

# Conference 6375A • Hynes Conv. Ctr. Room 106

Tuesday 3 October 2006 • Part of Proceedings of SPIE Vol. 6375: Optomechatronic Sensors, Instrumentation, and Computer-Vision Systems

## Optomechatronic Sensors and Instrumentation II

Conference Chair: **Yasuhiro Takaya**, Osaka Univ. (Japan)

Cochairs: **Akira Ishii**, Ritsumeikan Univ. (Japan); **Takayuki Tanaka**, Hokkaido Univ. (Japan); **TaeHo Ha**, Korea Institute of Machinery and Materials (South Korea); **Jonathan Kofman**, Univ. of Waterloo (Canada); **Kyihwan Park**, Gwangju Institute of Science and Technology (South Korea)

Program Committee: **Young-June Cho**, Korea Institute of Industrial Technology (South Korea); **Sangsoo Choi**, LG Electronics Inc. (South Korea); **Terutake Hayashi**, Osaka Univ. (Japan); **Hideki Ina**, Canon Inc. (Japan); **George K. Knopf**, The Univ. of Western Ontario (Canada); **Hiroki Shimizu**, Tohoku Univ. (Japan); **Satoru Takahashi**, The Univ. of Tokyo (Japan)

### Monday 2 October

#### Optomechatronics Technical Group Meeting Hynes Conv. Ctr. Room 106 ..... Mon. 5:30 to 7:00 pm

See p. xx in Special Events for details.

### Tuesday 3 October

#### SESSION 1

Hynes Conv. Ctr. Room 106 ..... Tues. 8:20 to 9:20 am

##### Mechanical Properties and Imaging

Chair: **Akira Ishii**, Ritsumeikan Univ. (Japan)

8:20 am: **Hardness measurements of metals with the complex refractive index**, J. G. Suárez-Romero, J. J. Ramirez-Rangel, J. Resendiz-Barron, Z. Valdes-Barron, Instituto Tecnológico de Querétaro (Mexico); E. Tepichin-Rodríguez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); J. C. Solorio-Leyva, Instituto Tecnológico de La Piedad (Mexico); J. Gomez-Ramirez, Instituto Tecnológico de Querétaro (Mexico) ..... [6375A-01]

8:40 am: **Characterization of gradient residual stress for curvature improvement of MEMS-based infrared detector structures**, S. Huang, X. Zhang, Boston Univ. .... [6375A-02]

9:00 am: **An active imaging system using micromachined membrane deformable mirror**, D. Hong, H. Cho, Korea Advanced Institute of Science and Technology (South Korea) ..... [6375A-03]

#### SESSION 2

Hynes Conv. Ctr. Room 106 ..... Tues. 9:20 to 10:00 am

##### Design of Phase Control Devices

Chair: **Satoru Takahashi**, The Univ. of Tokyo (Japan)

9:20 am: **Design of liquid crystal Fresnel lens by uneven electric field, I**, Fujieda, M. Tada, F. Rahadian, Ritsumeikan Univ. (Japan) ..... [6375A-04]

9:40 am: **Phase retardation symmetric design**, B. Haji-Saeed, S. K. Sengupta, Univ. of Massachusetts/Lowell; J. Khoury, C. P. Morath, C. L. Woods, Air Force Research Lab.; J. Kierstead, Solid State Scientific Corp. .... [6375A-05]

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

#### SESSION 3

Hynes Conv. Ctr. Room 106 ..... Tues. 10:30 to 11:50 am

##### Geometry Measurement and Inspection

Chair: **Yasuhiro Takaya**, Osaka Univ. (Japan)

10:30 am: **Simultaneous measurement of film surface topography and thickness variation using white-light interferometry (Invited Paper)**, K. Kitagawa, Toray Engineering Co. (Japan) ..... [6375A-07]

### Course of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

10:50 am: **Development of super-resolution optical inspection system for semiconductor defects using standing wave illumination shift**, S. Usuki, H. Nishioka, S. Takahashi, K. Takamasu, The Univ. of Tokyo (Japan) ... [6375A-08]

11:10 am: **Evaluation of laser trapping probe properties for coordinate measurement**, M. Michihata, Y. Takaya, T. Miyoshi, T. Hayashi, Osaka Univ. (Japan) ..... [6375A-09]

11:30 am: **Measuring shapes of three-dimensional objects by rotary focused-plane sectioning**, A. Ishii, T. Yamagata, Ritsumeikan Univ. (Japan) ..... [6375A-10]

Lunch/Exhibition Break ..... 11:50 am to 1:00 pm

#### SESSION 4

Hynes Conv. Ctr. Room 106 ..... Tues. 1:00 to 2:00 pm

##### Fringe-Projection 3D Surface Measurement

#### Joint Session with Conference 6375B

Chair: **Hyungsuck Cho**, Korea Advanced Institute of Science and Technology (South Korea)

1:00 pm: **Triangular phase-shifting algorithms for surface measurement**, P. Jia, Univ. of Ottawa (Canada); J. Kofman, Univ. of Waterloo (Canada); C. E. English, Neptec Design Group Ltd. (Canada) ..... [6375B-11]

1:20 pm: **Repeated phase-offset measurement for error compensation in two-step triangular phase-shifting profilometry**, P. Jia, Univ. of Ottawa (Canada); J. Kofman, Univ. of Waterloo (Canada); C. E. English, Neptec Design Group Ltd. (Canada) ..... [6375B-12]

1:40 pm: **An active vision sensor system employing adaptive digital fringe pattern generated by DMD pattern projector**, H. Lee, H. Cho, Korea Advanced Institute of Science and Technology (South Korea) ..... [6375B-13]

#### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

✓ **Precision laser beam movements assisted by sensors**, C. I. Isarie, F. Zerles, I. V. Isarie, State Univ. of Sibiu (Romania); N. Olaru, On-Thera (Germany); A. Fulea, Stoma-Med Co. (Romania) ..... [6375A-25]

✓ **Expansion of measuring range of stereovision system based on Mono-MoCap**, H. Takahashi, Hokkaido Univ. (Japan) ..... [6375A-26]

#### Optomechatronic Technologies Banquet

See Ticket for Location ..... Tues. 7:30 to 10:00 pm

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# Conference 6375B • Hynes Conv. Ctr. Room 106

Tuesday 3 October 2006 • Part of Proceedings of SPIE Vol. 6375: Optomechatronic Sensors, Instrumentation, and Computer-Vision Systems

## Optomechatronic Computer-Vision Systems

Conference Chair: **Jonathan Kofman**, Univ. of Waterloo (Canada)

Cochairs: **Hiroyasu Koshimizu**, Chukyo Univ. (Japan); **Yeong-Ho Ha**, Kyungpook National Univ. (South Korea); **Claudio A. Perez**, Univ. de Chile (Chile); **Kazuhiko Sumi**, Kyoto Univ. (Japan); **Shun'ichi Kaneko**, Hokkaido Univ. (Japan)

Program Committee: **John Billingsley**, Univ. of Southern Queensland (Australia); **Didier Coquin**, Univ. de Savoie (France); **Seiji Hata**, Kagawa Univ. (Japan); **Dieter Just**, EUMETSAT (Germany); **Yukio Sato**, Keio Univ. (Japan); **Jun'ichi Yamaguchi**, Kagawa Univ. (Japan)

### Monday 2 October

#### Optomechatronics Technical Group Meeting Hynes Conv. Ctr. Room 106 ..... Mon. 5:30 to 7:00 pm

See p. xx in Special Events for details.

### Tuesday 3 October

#### SESSION 4

Hynes Conv. Ctr. Room 106 ..... Tues. 1:00 to 2:00 pm

#### Fringe-Projection 3D Surface Measurement

##### Joint Session with Conference 6375A

Chair: **Hyungsuck Cho**, Korea Advanced Institute of Science and Technology (South Korea)

1:00 pm: **Triangular phase-shifting algorithms for surface measurement**, P. Jia, Univ. of Ottawa (Canada); J. Kofman, Univ. of Waterloo (Canada); C. E. English, Neptec Design Group Ltd. (Canada) ..... [6375B-11]

1:20 pm: **Repeated phase-offset measurement for error compensation in two-step triangular phase-shifting profilometry**, P. Jia, Univ. of Ottawa (Canada); J. Kofman, Univ. of Waterloo (Canada); C. E. English, Neptec Design Group Ltd. (Canada) ..... [6375B-12]

1:40 pm: **An active vision sensor system employing adaptive digital fringe pattern generated by DMD pattern projector**, H. Lee, H. Cho, Korea Advanced Institute of Science and Technology (South Korea) ..... [6375B-13]

#### SESSION 5

Hynes Conv. Ctr. Room 106 ..... Tues. 2:00 to 3:20 pm

#### Pattern Recognition, Segmentation, and Object Modeling

Chair: **Shun'ichi Kaneko**, Hokkaido Univ. (Japan)

2:00 pm: **Virtual assemblage of fragmented artefacts**, P. C. Igwe, G. K. Knopf, The Univ. of Western Ontario (Canada) ..... [6375B-14]

2:20 pm: **Template generation by component maximization for real-time face detection**, C. A. Perez, J. I. Vallejos, Univ. de Chile (Chile) ..... [6375B-15]

2:40 pm: **Local retouching of images by histogram-based similarity evaluation**, L. Fu, S. Kaneko, T. Tanaka, Hokkaido Univ. (Japan) ..... [6375B-16]

3:00 pm: **Using orientation code matching for robustly sensing real velocity of agrimotors**, K. Nakahara, H. Takauji, S. Kaneko, T. Tanaka, Hokkaido Univ. (Japan); M. Shimizu, Y. Miyashita, Toyo Precision Parts Manufacturing Co., Ltd. (Japan) ..... [6375B-17]

Coffee Break ..... 3:20 to 3:50 pm

#### SESSION 6

Hynes Conv. Ctr. Room 106 ..... Tues. 3:50 to 4:30 pm

#### Novel Optomechatronic Applications

Chair: **George K. Knopf**, The Univ. of Western Ontario (Canada)

3:50 pm: **Spherical imaging array based on bioelectronic photoreceptors**, W. W. Wang, G. K. Knopf, A. S. Bassi, The Univ. of Western Ontario (Canada) ..... [6375B-18]

4:10 pm: **Non-contact vibration analysis using innovative laser-based methodology**, D. Shetty, T. A. Eppes, S. Notiega, J. Kondo, Univ. of Hartford ..... [6375B-19]

#### SESSION 7

Hynes Conv. Ctr. Room 106 ..... Tues. 4:30 to 5:50 pm

#### Vision-Based Tracking

Chair: **Claudio A. Perez**, Univ. de Chile (Chile)

4:30 pm: **Camera pan-tilt ego-motion tracking from point-based environment models**, J. Boehm, Univ. Stuttgart (Germany) ..... [6375B-20]

4:50 pm: **Object tracking by block division based on radial reach filter**, N. Wajima, S. Takahashi, Kagawa Univ. (Japan); M. Itoh, Hitachi, Ltd. (Japan); Y. Satoh, National Institute of Advanced Industrial Science and Technology (Japan); S. Kaneko, Hokkaido Univ. (Japan) ..... [6375B-21]

5:10 pm: **A vision-based billiard ball entertainment system**, C. Shih, Tunghai Univ. (Taiwan) ..... [6375B-22]

5:30 pm: **An edge tracking approach for tape substrate (TS) pattern inspection based on skeleton information**, Y. J. Roh, C. W. Kim, H. H. Lee, D. H. Jeong, LG Electronics Inc. (South Korea) ..... [6375B-23]

#### ✓ Posters-Tuesday

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✓ **Development of macro defects inspection system for TFT-LCD color filter glass**, H. I. Son, C. J. Jeon, Y. I. Kim, SAMSUNG Electronics Co., Ltd. (South Korea) ..... [6375B-27]

#### Optomechatronic Technologies Banquet

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#### Course of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm

# Optomechatronic Micro/Nano Devices and Components II

Conference Chair: **Yoshitada Katagiri**, Nippon Telegraph and Telephone Corp. (Japan)

Cochairs: **Eiji Higurashi**, The Univ. of Tokyo (Japan); **Pamela R. Patterson**, HRL Labs., LLC; **Katsuo Kurabayashi**, Univ. of Michigan; **Andres Fernandez**, Glimmerglass Networks, Inc.; **Heui-seok Kang**, Korea Institute of Industrial Technology (South Korea); **André P. Persoons**, Katholieke Univ. Leuven (Belgium)

Program Committee: **Kazuo Aida**, Shizuoka Univ. (Japan); **Akiko Gomyo**, NEC Corp. (Japan); **Terunao Hirota**, The Univ. of Tokyo (Japan); **Mikio Horie**, Tokyo Institute of Technology (Japan); **Maho Hosogi**, Kagawa Univ. (Japan); **Kazuo Hotate**, The Univ. of Tokyo (Japan); **Totaro Imasaka**, Kyushu Univ. (Japan); **Ichirou Ishimaru**, Kagawa Univ. (Japan); **Sang-Gook Kim**, Massachusetts Institute of Technology; **Jun Kondoh**, Shizuoka Univ. (Japan); **Horacio Lamela**, Univ. Carlos III de Madrid (Spain); **Seokhee Lee**, Pusan National Univ. (South Korea); **Takashi Matsuoka**, Tohoku Univ. (Japan); **Mitsuru Naganuma**, Teikyo Univ. (Japan); **Seiichiro Nakabayashi**, Saitama Univ. (Japan); **Masashi Nakao**, NTT Photonics Labs. (Japan); **Bradley J. Nelson**, ETH Zürich (Switzerland); **Toshifumi Ohkubo**, Toyo Univ. (Japan); **Kazuhiko Oka**, Hokkaido Univ. (Japan); **Fumikazu Oohira**, Kagawa Univ. (Japan); **Yves-Alain Peter**, École Polytechnique de Montréal (Canada); **Jae Hong Shim**, Korea Polytechnic Univ. (South Korea); **Metin Sitti**, Carnegie Mellon Univ.; **Tomasz S. Tkaczyk**, College of Optical Sciences/The Univ. of Arizona; **Yi-Chung Tung**, Univ. of Michigan; **Hakan Urey**, Koç Univ. (Turkey); **Katsuyuki Utaka**, Waseda Univ. (Japan); **Manabu Yamamoto**, Tokyo Univ. of Science (Japan); **Toru Yoshizawa**, Optron Co., Ltd. (Japan) and Tokyo Univ. A&T (Japan); **June Yu**, Lawrence Livermore National Lab.

## Monday 2 October

**Optomechatronics Technical Group Meeting**  
Hynes Conv. Ctr. Room 106 ..... Mon. 5:30 to 7:00 pm  
*See p. 7 in Special Events for details.*

## Tuesday 3 October

### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Reference pattern-based 2D measurement with nanoresolution**, Z. Wang, S. Su, Cardiff Univ. (United Kingdom); Y. Verevkin, Institute of Applied Physics (Russia); S. Fatikow, Univ. of Oldenburg (Germany) [6376-12]
- ✓ **Time shared bidirectional repeatered system for scalable sensor network with time synchronization**, K. Aida, Shizuoka Univ. (Japan); Y. Katagiri, Nippon Telegraph and Telephone Corp. (Japan) ..... [6376-25]
- ✓ **Fabrication of a novel integrated light guiding plate for backlight system by MEMS technique**, Z. Chen, Tatung Univ. (Taiwan); C. Chien, Tatung Univ. (Taiwan) ..... [6376-26]

**Optomechatronic Technologies Banquet**  
See Ticket for Location ..... Tues. 7:30 to 10:00 pm  
Enjoy networking with your peers at this gala event.  
Tickets for the banquet are not included in the registration fee but may be purchased onsite at the SPIE Registration Desk until 5:00 pm on Sunday 1 October. Banquet tickets are \$65 each. All authors and attendees interested in optomechatronic technologies are welcome.

## Wednesday 4 October

### SESSION 1

Hynes Conv. Ctr. Room 106 ..... Wed. 8:00 to 9:10 am

#### Nano/Micro Fabrication

Chairs: **Yoshitada Katagiri**, Nippon Telegraph and Telephone Corp. (Japan); **Katsuo Kurabayashi**, Univ. of Michigan

- 8:00 am: **Three-dimensional nanostructure fabrication** (*Invited Paper*), S. Matsui, Univ. of Hyogo (Japan) ..... [6376-01]
- 8:25 am: **Low-temperature bonding of a LiNbO3 waveguide chip to a Si substrate in ambient air for hybrid-integrated optical devices**, R. Takigawa, E. Higurashi, S. Tadatomo, The Univ. of Tokyo (Japan); S. Shinada, T. Kawanishi, National Institute of Information and Communications Technology (Japan) ..... [6376-02]
- 8:45 am: **Tunable micro-electromechanical grating in silicon** (*Invited Paper*), Y. Peter, F. B. Koné, N. Godbout, École Polytechnique de Montréal (Canada) ..... [6376-03]

### SESSION 2

Hynes Conv. Ctr. Room 106 ..... Wed. 9:10 to 10:25 am

#### Nano/Bio Technologies

Chair: **Eiji Higurashi**, The Univ. of Tokyo (Japan)

- 9:10 am: **Constitutive chemical biology** (*Invited Paper*), S. Nakabayashi, Saitama Univ. (Jordan) ..... [6376-04]
- 9:35 am: **Chemical and biological detectors using ultrahigh-Q microresonators** (*Invited Paper*), A. M. Armani, K. J. Vahala, California Institute of Technology ..... [6376-05]
- 10:00 am: **Micro-optomechanical devices for medical endoscope applications** (*Invited Paper*), H. Toshiyoshi, M. Nakada, H. Fujita, The Univ. of Tokyo (Japan); K. Isamoto, C. Chong, Santec Corp. (Japan) ..... [6376-06]
- Coffee Break ..... 10:25 to 10:55 am

### SESSION 3

Hynes Conv. Ctr. Room 106 ..... Wed. 10:55 to 11:20 am

#### Micro/Nano Plenary

Chair: **Pamela R. Patterson**, HRL Labs., LLC

**Keynote**  
10:55 am: **Exceptional photonic properties from molecular design and controlled self-assembly** (*Invited Paper*), A. K. Y. Jen, Univ. of Washington ..... [6376-07]



**SESSION 4**

Hynes Conv. Ctr. Room 106 ..... Wed. 11:20 am to 12:25 pm

**Visual/Optical Based Assembly and Package I**

*Chair: Eniko T. Enikov, The Univ. of Arizona*

- 11:20 am: **An active vision system for microassembly** (*Invited Paper*), X. Tao, H. Cho, Korea Advanced Institute of Science and Technology (South Korea) ..... [6376-08]
- 11:45 am: **Assembly of micro-optical systems with mechanical positioning**, A. Stockham, J. G. Smith, J. A. Hammer, MEMS Optical, Inc. .... [6376-09]
- 12:05 pm: **Intelligent force control of a microchip packaging system**, J. H. Shim, Korea Polytechnic Univ. (South Korea) ..... [6376-10]
- Lunch Break ..... 12:25 to 1:25 pm

**SESSION 5**

Hynes Conv. Ctr. Room 106 ..... Wed. 1:25 to 2:10 pm

**Visual/Optical Based Assembly and Package II**

*Chair: Eniko T. Enikov, The Univ. of Arizona*

- 1:25 pm: **Vision feedback in an automatic nanohandling station inside an SEM** (*Invited Paper*), T. Sievers, M. Jähnisch, C. Schrader, S. Fatikow, Univ. of Oldenburg (Germany) ..... [6376-11]
- 1:50 pm: **Microassembly of 3D micromirrors as building elements for optical MEMS switching**, N. Dechev, Univ. of Victoria (Canada); M. A. Basha, S. K. Chaudhuri, S. Safavi-Naeini, Univ. of Waterloo (Canada) ..... [6376-13]

**SESSION 6**

Hynes Conv. Ctr. Room 106 ..... Wed. 2:10 to 3:15 pm

**Light Control by MEMS**

*Chair: Zhi-peng Chen, Tatung Univ. (Taiwan)*

- 2:10 pm: **Segmented MEMS deformable mirror for wavefront correction** (*Invited Paper*), M. A. Helmbrecht, Iris AO, Inc. .... [6376-14]
- 2:35 pm: **Fabrication of concentric light guiding plate with SiO<sub>2</sub> reflective film**, Z. Chen, C. Chien, Tatung Univ. (Taiwan) ..... [6376-15]
- 2:55 pm: **Two-photon photopolymeric micro-nano fabrication for polymer device application**, S. Yokoyama, T. Nakahama, H. Miki, S. Mashiko, National Institute of Information and Communications Technology (Japan) ... [6376-16]
- Coffee Break ..... 3:15 to 3:45 pm

**SESSION 7**

Hynes Conv. Ctr. Room 106 ..... Wed. 3:45 to 4:55 pm

**Application in Communication Systems I: Systems**

*Chair: Pamela R. Patterson, HRL Labs., LLC*

- 3:45 pm: **Monolithic wavelength-selective switches and cross connects with integrated MEMS mirror array** (*Invited Paper*), C. Chi, Univ. of California/Berkeley and Univ. of California/Los Angeles; M. C. Wu, Univ. of California/Berkeley ..... [6376-17]
- 4:10 pm: **Generation-free platform architecture with a reconfigurable and scalable optical interconnection system** (*Invited Paper*), S. Yanagimachi, T. Yoshikawa, S. Araki, A. Iwata, NEC Corp. (Japan) ..... [6376-18]
- 4:35 pm: **Reconfigurable optical add-drop multiplexer (R-OADM) based on silicon photonic crystal slab waveguides**, T. Chu, H. Yamada, A. Gomyo, J. Ushida, NEC Corp. (Japan); S. Ishida, Y. Arakawa, The Univ. of Tokyo (Japan) ..... [6376-20]

**SESSION 8**

Hynes Conv. Ctr. Room 106 ..... Wed. 4:55 to 5:55 pm

**Application in Communication Systems II: Devices**

*Chair: Pamela R. Patterson, HRL Labs., LLC*

- 4:55 pm: **Optical add-drop multiplexer with hexagonal-hole lattice PC slab waveguides**, A. Gomyo, J. Ushida, M. Shirane, H. Yamada, T. Chu, NEC Corp. (Japan); S. Ishida, Y. Arakawa, The Univ. of Tokyo (Japan) ..... [6376-21]
- 5:15 pm: **Preparation and properties of novel silicone-based flexible optical waveguide**, K. Hara, Asahi Denka Co., Ltd. .... [6376-22]
- 5:35 pm: **Plasmonic waveguides and micro/nano couplers for nanophotonics devices**, J. Takahara, Osaka Univ. (Japan) ..... [6376-23]

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# Conference 6377 • Hynes Conv. Ctr. Room 110

Sunday-Monday 1-2 October 2006  
Proceedings of SPIE Vol. 6377

*"Sensing technologies and applications have been incorporated into a number of industrial, environmental, medical, and scientific disciplines. I can't think of a better meeting on the East Coast than Optics East for helping researchers, product developers, managers, and executives get a handle on new sensing developments and their potential impact."*

**Robert A. Lieberman**, Intelligent Optical Systems, Inc.  
Sensors and Industry Applications Symposium Chair

## Advanced Environmental, Chemical, and Biological Sensing Technologies IV

*Conference Chairs:* **Tuan Vo-Dinh**, Duke Univ.; **Robert A. Lieberman**, Intelligent Optical Systems, Inc.; **Günter Gauglitz**, Eberhard Karls Univ. Tübingen (Germany)

*Program Committee:* **Francesco Baldini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Stephanus Buettgenbach**, Technische Univ. Braunschweig (Germany); **Luigi Campanella**, Univ. degli Studi di Roma/La Sapienza (Italy); **Fabien J. Josse**, Marquette Univ.; **Lothar U. Kempen**, Intelligent Optical Systems, Inc.; **Robert Lascola**, Savannah River National Lab.; **Marco Leona**, The Metropolitan Museum of Art; **Anna G. Mignani**, Istituto di Fisica Applicata Nello Carrara (Italy); **Klaus Schäfer**, Forschungszentrum Karlsruhe (Germany); **Khalid J. Siddiqui**, SUNY Fredonia; **Jagdish P. Singh**, Mississippi State Univ.; **David L. Stokes**, EOIR Technologies; **Eiichi Tamiya**, Japan Advanced Institute of Science and Technology (Japan); **Irena Twardowska**, Polska Akademia Nauk (Poland); **Hubert van den Bergh**, École Polytechnique Fédérale de Lausanne (Switzerland)

### Sunday 1 October

#### SESSION 1

Hynes Conv. Ctr. Room 110 ..... Sun. 1:40 to 3:00 pm

##### Advanced Laser-Based Sensing Techniques

*Chair:* **Tuan Vo-Dinh**, Duke Univ.

1:40 pm: **Use of LIBS technology in biological media**, A. Kumar, P. C. Sharma, Tuskegee Univ. .... [6377-01]

2:00 pm: **Optical superposition in fiber double loop ringdown**, C. Wang, A. E. Mbi, Mississippi State Univ. .... [6377-03]

2:20 pm: **Surface-enhanced Raman for environmental sensing**, T. Vo-Dinh, Duke Univ. .... [6377-04]

2:40 pm: **Kinetic investigations of proton transfer and complex formation reactions by laser-based ion mobility spectrometry**, H. Loehmannsroeben, T. Beitz, Univ. Potsdam (Germany); R. Laudien, Optimare GmbH (Germany) ..... [6377-05]

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

#### SESSION 2

Hynes Conv. Ctr. Room 110 ..... Sun. 3:30 to 5:30 pm

##### Nano Biosensor Systems

*Chairs:* **Jagdish P. Singh**, Mississippi State Univ.; **Tuan Vo-Dinh**, Duke Univ.

3:30 pm: **Diagnostics of single-base mismatch DNA hybridization on gold nanoparticles using hyper-Rayleigh scattering technique (Invited Paper)**, P. C. Ray, Jackson State Univ. .... [6377-06]

4:00 pm: **Development of nano-bio optical fiber sensor using laser-induced fluorescence (Invited Paper)**, J. P. Singh, C. K. Kim, R. R. Kalluru, F. Yueh, S. T. Willard, A. N. Musselwhite, Mississippi State Univ.; P. C. Ray, Jackson State Univ. .... [6377-07]

4:30 pm: **Optical nanobiosensor for environmental health studies**, T. Vo-Dinh, Duke Univ. .... [6377-08]

4:50 pm: **A fluorescent bio-aerosol point detector incorporating excitation, emission, and lifetime data**, P. C. Trepagnier, SPARTA, Inc; P. D. Henshaw, SPARTA, Inc.; R. F. Dillon, Lumen Labs., Inc.; D. McCampbell, Midwest Research Institute ..... [6377-09]

5:10 pm: **Study of bacteria using Raman spectroscopy**, V. S. Tiwari, F. Yueh, J. P. Singh, M. Cunningham, Jr., L. Pulakat, N. Gavini, Mississippi State Univ.; P. C. Ray, Jackson State Univ. .... [6377-10]

### Monday 2 October

#### SESSION 3

Hynes Conv. Ctr. Room 110 ..... Mon. 8:40 to 10:00 am

##### Advanced Sensors I

*Chair:* **Robert A. Lieberman**, Intelligent Optical Systems, Inc.

8:40 am: **Fiberoptic diisocyanate personal monitoring device**, S. A. Lis, LightLine Technologies, Inc. .... [6377-11]

9:00 am: **NiCl<sub>2</sub>/SiO<sub>2</sub> sol-gel material for ammonia sensing**, A. Tsigara, N. Madamopoulos, G. Manasis, L. Athanasekos, A. Meristoudi, G. Mousdis, National Hellenic Research Foundation (Greece); N. A. Vainos, National Hellenic Research Foundation (Greece) and Univ. of Patras (Greece) ..... [6377-12]

9:20 am: **Fiber optic sensor coatings with enhanced sensitivity and longevity**, S. R. Cordero, R. A. Lieberman, H. Mukamal, Intelligent Optical Systems, Inc. .... [6377-13]

9:40 am: **Fabrication of silica-silver core-shell microspheres with designed surface charge for SERS-based sensing**, Y. Han, S. Tan, S. A. Sukhishvili, H. H. Du, Stevens Institute of Technology ..... [6377-14]

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

#### SESSION 4

Hynes Conv. Ctr. Room 110 ..... Mon. 10:20 to 11:50 am

##### Advanced Sensors II

*Chairs:* **Stuart R. Farquharson**, Real-Time Analyzers, Inc.; **Robert A. Lieberman**, Intelligent Optical Systems, Inc.

10:30 am: **Analysis of jet fuel properties on the tarmac by Raman spectroscopy**, W. W. Smith, S. R. Farquharson, Real-Time Analyzers, Inc. .... [6377-15]

10:50 am: **Class identification of biomolecules based on multicolor native fluorescence spectroscopy**, M. Bassler, P. Kiesel, O. Schmidt, N. M. Johnson, Palo Alto Research Ctr. Inc. .... [6377-16]

11:10 am: **Development of dual-LED fiber optic surface plasmon sensor for liquid refractive index detection**, H. Shibata, H. Suzuki, Y. Matsui, J. Kondoh, Shizuoka Univ. (Japan) ..... [6377-18]

11:30 am: **Gallium nitride (GaN) photodetector for the exhausts monitoring in combustion engines**, M. M. M. Mello, A. de Risi, A. Passaseo, M. Lomascolo, M. De Vittorio, Univ. degli Studi di Lecce (Italy) ..... [6377-19]

Lunch/Exhibition Break ..... 11:50 am to 1:30 pm

**SESSION 5**

**Hynes Conv. Ctr. Room 110 . . . . . Mon. 1:30 to 3:10 pm**

**Advanced Field Techniques**

*Chair: Irena Twardowska, Polska Akademia Nauk (Poland)*

- 1:30 pm: **LED-based tetracycline analyzer for field analysis**, G. Chen, U.S. Dept of Agriculture . . . . . [6377-20]
- 1:50 pm: **Optimization of the anthropogenic vadose zone monitoring at the sulfidic mining waste dumps or engineering constructions**, I. Twardowska, S. Stefaniak, K. Janta-Koszuta, J. Kyziol, Polska Akademia Nauk (Poland) . . . . . [6377-21]
- 2:10 pm: **Determination of concentration of ratio of nitrogen and oxygen in a liquid mixture**, A. Moitra, R. R. Kalluru, F. Yueh, J. P. Singh, Mississippi State Univ. . . . . [6377-22]
- 2:30 pm: **Assessment of chemical status of ground waters based on aggregated data from a monitoring network exemplified in a river drainage basin**, E. Kmiecik, M. Stach-Kalarus, J. Szczepanska, Univ. of Science and Technology (Poland); I. Twardowska, S. Stefaniak, Polska Akademia Nauk (Poland) . . . . . [6377-23]
- 2:50 pm: **Continuous in situ bacteria detection in fluid lines**, I. F. Saxena, Intelligent Optical Systems, Inc.; J. W. Costerton, Univ. of Southern California . . . . . [6377-24]
- Coffee Break . . . . . 3:10 to 3:40 pm

**SESSION 6**

**Hynes Conv. Ctr. Room 110 . . . . . Mon. 3:40 to 6:00 pm**

**Sensing and Analysis Techniques**

*Chair: Khalid J. Siddiqui, SUNY Fredonia*

- 3:40 pm: **Hyperspectral imaging based techniques in fluff characterization**, G. Bonifazi, S. Serranti, Univ. degli Studi di Roma/La Sapienza (Italy) . [6377-25]
- 4:00 pm: **Chemometrics and recognition technologies for spectral classification**, K. J. Siddiqui, SUNY Fredonia . . . . . [6377-26]
- 4:20 pm: **Thermodynamics of information loss in spectroscopic measurements**, K. D. Mohan, M. A. Khan, A. N. Dharamsi, Old Dominion Univ. . . . . [6377-27]
- 4:40 pm: **SERS spectroscopy inside light-guiding capillary tubing**, D. Pristincki, S. Tan, H. H. Du, Stevens Institute of Technology . . . . . [6377-28]
- 5:00 pm: **Quantitative imaging characterization of aluminum pit corrosion in oak ridge research reactor pool**, P. Jang, R. Arunkumar, Z. Long, M. Mott, W. Okhuysen, Y. Su, D. L. Monts, Mississippi State Univ.; P. G. Kirk, Oak Ridge National Lab.; J. Ettien, Bechtel Jacobs Company LLC . . . . . [6377-29]
- 5:20 pm: **Fluorescence lifetime sensing of temperature**, P. R. Kommidi, B. R. Reddy, Alabama A&M Univ. . . . . [6377-32]
- 5:40 pm: **A conductivity measuring method driving by frequency self-adaptive current**, W. Chen, Xiamen Univ. (China) . . . . . [6377-31]

**Tuesday 3 October**

**✓ Posters-Tuesday**

*A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.*

- ✓ **Studies of stability of petroleum emulsions by confocal microscopy**, J. Hung Low, Instituto Venezolano de Investigaciones Cientificas (Venezuela); J. A. Castillo, Univ. Central de Venezuela (Venezuela) . . . . . [6377-17]
- ✓ **An intensity modulation based high-speed and high-resolution long-period fiber grating sensor interrogating system**, C. Chiang, C. Shin, National Taiwan Univ. (Taiwan); S. Liaw, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [6377-30]

**Courses of Related Interest**

*Register for courses and get full course descriptions at the SPIE Registration desk.*

- 
- SC309 Fluorescent Markers: Usage and Optical System Optimization (Levi) Wednesday, 8:30 am to 12:30 pm

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  - SC461 Bio-Optical Detection Systems (Levi) Wednesday, 1:30 to 5:30 pm

---

  - SC800 Instruments for Light Spectroscopy (Saptari) Monday, 1:30 to 5:30 pm

---

  - SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm

---

  - SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

---

  - SC802 Practical Near Infrared and Raman Spectroscopy Applications (McDermott, Botonjic) Monday, 8:30 am to 12:30 pm

# Chemical and Biological Sensors for Industrial and Environmental Monitoring II

*Conference Chairs:* **Steven D. Christesen**, U.S. Army Edgewood Chemical Biological Ctr.; **Arthur J. Sedlacek III**, Brookhaven National Lab.; **James B. Gillespie**, OptiMetrics, Inc.; **Kenneth J. Ewing**, Northrop Grumman Corp.

*Program Committee:* **Pamela M. Chu**, National Institute of Standards and Technology; **Thomas H. Chyba**, ITT Industries, Inc.; **Roger J. Combs**, Research & Technology Consultants; **Chris Dyer**, Defence Science and Technology Lab. (United Kingdom); **Stuart R. Farquharson**, Real-Time Analyzers, Inc.; **William F. Hug**, Photon Systems; **James O. Jensen**, U.S. Army Armament Research, Development and Engineering Ctr.; **Timothy J. Johnson**, Pacific Northwest National Lab.; **Robert A. Lieberman**, Intelligent Optical Systems, Inc.; **Christopher J. Manning**, Manning Applied Technologies, Inc.; **Steven W. Sharpe**, Pacific Northwest National Lab.; **Laura R. Skubal**, Argonne National Lab.; **Gary C. Tepper**, Virginia Commonwealth Univ.; **Jean-Marc Thériault**, Defence Research and Development Canada (Canada); **Lucy Zheng**, Institute for Defense Analyses

## Tuesday 3 October

### SESSION 1

**Hynes Conv. Ctr. Room 110** ..... Tues. 8:00 am to 12:00 pm  
**Chemical and Biological Sensor Diagnostics, Standards, and Calibration**

*Chair:* **Patrick J. Treado**, ChemImage Corp.

- 8:00 am: **Leveling the playing field: why ROC curves?** (*Invited Paper*), K. O. Schafer, ChemImage Corp. .... [6378-01]
- 8:30 am: **Test methodology development for biological agent detection systems**, A. C. Samuels, J. L. Santarpia, J. R. Bottiger, U.S. Army Edgewood Chemical Biological Ctr.; S. A. Hunter, U.S. Army; E. W. Stuebing, U.S. Army Edgewood Chemical Biological Ctr. .... [6378-02]
- 8:50 am: **Optically based bioaerosol detection**, J. D. Eversole, Naval Research Lab. .... [6378-03]
- 9:10 am: **Qualifying biomaterials for signature library construction**, K. S. Kalasinsky, A. Shea, Armed Forces Institute of Pathology ..... [6378-04]
- 9:30 am: **Spectrometer correction and validation techniques for the development of Raman spectral databases for homeland security applications**, S. J. Choquette, B. Benner, A. Kearsley, National Institute of Standards and Technology ..... [6378-05]
- 9:50 am: **Assessing threat sensor and signature performance**, P. J. Treado, M. P. Nelson, J. H. Neiss, ChemImage Corp.; W. Beckenbaugh, Sceptor Industries, Inc. .... [6378-06]
- Coffee Break ..... 10:10 to 10:40 am
- 10:40 am: **Application of the adaptive subspace detector to Raman spectra for biological threat detection**, T. A. Russell, S. Borchardt, R. Anderson, Applied Signal Technology, Inc.; P. J. Treado, J. H. Neiss, ChemImage Corp. .... [6378-07]
- 11:00 am: **Evaluation of a high-throughput liquid crystal tunable filter for Raman chemical imaging of threat materials**, X. Wang, Kent State Univ.; T. C. Voigt, ChemImage Corp.; P. J. Bos, Kent State Univ.; M. P. Nelson, P. J. Treado, ChemImage Corp. .... [6378-08]
- 11:20 am: **Performance characterization of material identification systems**, C. D. Brown, L. Zhu, J. D. Santillan, Ahura Corp. .... [6378-09]
- 11:40 am: **Relative infrared (IR) and terahertz (THz) signatures of common explosives**, S. W. Sharpe, T. J. Johnson, D. M. Sheen, D. A. Atkinson, Pacific Northwest National Lab. .... [6378-10]
- Lunch/Exhibition Break ..... 12:00 to 1:00 pm

### SESSION 2

**Hynes Conv. Ctr. Room 110** ..... Tues. 1:00 to 4:20 pm  
**Laser-Based Sensor Technology for Ultra-Trace Gas Analysis**

*Chair:* **Pamela M. Chu**,  
 National Institute of Standards and Technology

- 1:00 pm: **Tunable diode laser and difference frequency generation absorption spectrometers for highly sensitive airborne measurements of trace atmospheric constituents** (*Invited Paper*), A. Fried, P. K. A. Weibring, D. A. Richter, J. G. Walega, National Ctr. for Atmospheric Research . . . [6378-11]

- 1:30 pm: **Methane-in-air standards measured using a 1.65-micron cavity ring-down spectrometer**, P. M. Chu, J. T. Hodges, G. C. Rhoderick, National Institute of Standards and Technology; D. Lisak, Univ. Mikolaja Kopernika (Poland); J. C. Travis, National Institute of Standards and Technology [6378-12]
- 1:50 pm: **Detecting ammonia and methane with antimonide lasers**, D. C. Hovde, D. S. Bomse, Southwest Sciences, Inc. .... [6378-13]
- 2:10 pm: **Trace gas optical detection using a differential multiple-pass astigmatic Herriott-style cell**, D. S. Bomse, M. A. Zondlo, J. A. Silver, Southwest Sciences, Inc. .... [6378-14]
- 2:30 pm: **High-precision CO<sub>2</sub> sensor for meteorological balloons**, J. A. Silver, M. A. Zondlo, Southwest Sciences, Inc. .... [6378-15]
- 2:50 pm: **High-sensitivity cryogen-free ammonia monitor using a pulsed quantum cascade laser**, D. D. Nelson, J. H. Shorter, J. B. McManus, S. C. Herndon, M. S. Zahniser, Aerodyne Research, Inc. .... [6378-16]
- Coffee Break ..... 3:10 to 3:40 pm
- 3:40 pm: **An adaptive robust computational method for removing unwanted etalon fringes from diode laser absorption spectra**, D. S. Bomse, Southwest Sciences, Inc. .... [6378-17]
- 4:00 pm: **Gas-cell measurements for evaluating LWIR passive sensor performance**, A. S. Cummings, Tetra Tech; R. J. Combs, Research and Technology Consultants; T. Curry, M. J. Thomas, U.S. Environmental Protection Agency; R. T. Kroutil, Los Alamos National Lab. .... [6378-18]

### SESSION 3

**Hynes Conv. Ctr. Room 110** ..... Tues. 4:20 to 5:40 pm  
**Optical Methods for Bioagent Detection**

*Chair:* **Timothy J. Johnson**, Pacific Northwest National Lab.

- 4:20 pm: **FTIR spectroscopy for bacterial spore identification and classification**, N. B. Valentine, T. J. Johnson, J. Forrester, Pacific Northwest National Lab. .... [6378-19]
- 4:40 pm: **The evolution of fluorescent portable digital lidar: from laboratory to low-rate production and beyond**, C. R. Prasad, Science & Engineering Services, Inc. .... [6378-20]
- 5:00 pm: **Detection of invisible bacillus spores on surfaces using a portable SERS-based analyzer**, S. R. Farquharson, F. E. Inscore, Real-Time Analyzers, Inc. .... [6378-21]
- 5:20 pm: **Water and surface contamination monitoring using deep UV laser induced native fluorescence and Raman spectroscopy**, W. F. Hug, Photon Systems, Inc.; R. Bhartia, A. Tsapin, A. L. Lane, Jet Propulsion Lab. . . [6378-22]

### ✓ Posters-Tuesday

*A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.*

- ✓ **Optical bar code recognition of methyl salicylate-surface imprinted InGaP EviTags for environmental monitoring using fluorescence resonance energy transfer on thin films**, C. B. Smith, J. E. Anderson, U.S. Army Corps of Engineers; B. Tatini, D. Pestov, R. Kesik, G. C. Tepper, Virginia Commonwealth Univ. .... [6378-44]
- ✓ **Fabrication of a monolithically integrated multiple wavelength Fabry-Perot filter array using transparent etch stop layers for accurate wavelength determination**, D. Convey, N. V. Le, S. M. Smith, P. Holm, J. H. Baker, Motorola, Inc. .... [6378-45]

- ✓ **Photodynamics of Ag and Au thin metal film surface-enhanced Raman spectroscopy substrates**, M. L. Jacobson, S. D. Christesen, U.S. Army Edgewood Chemical Biological Ctr. .... [6378-46]
- ✓ **Novel pathlength saturation effects in modulation spectroscopic techniques**, M. A. Khan, K. D. Mohan, A. N. Dharamsi, Old Dominion Univ. .... [6378-47]
- ✓ **Development of a variable pressure infrared spectrometer for field measurement of gaseous pollutants in indoor and outdoor environments**, B. Hanoune, B. Lemoine, Univ. des Sciences et Technologies de Lille (France) .... [6378-48]
- ✓ **Chemical sensor of planar waveguides by means of sol-gel silica Citania films**, W. Sun, M. Ye, X. Wang, F. Jiang, Harbin Engineering Univ. (China) .... [6378-49]
- ✓ **Trace acetylene sensing by means of quartz-enhanced photoacoustic spectroscopy**, A. A. Kosterev, T. S. Mosely, F. K. Tittel, Rice Univ.; J. D. Tate, L. D. Le, The Dow Chemical Co. .... [6378-50]
- ✓ **Measurement of water quality using optical methods**, I. O. Niskanen, H. Huttunen, P. Koponen, Univ. of Oulu (Finland) .... [6378-51]
- ✓ **Detection of nerve gas agent by microplasma emission spectroscopy**, W. Cao, Q. Kia, Y. Duan, Los Alamos National Lab. .... [6378-52]

## Wednesday 4 October

### SESSION 4

Hynes Conv. Ctr. Room 110 ..... Wed. 8:20 to 11:30 am

#### Portable Optical Technologies for CB Detection

- Chair: Christopher J. Manning*, Manning Applied Technologies, Inc.
- 8:20 am: **Miniature FT-IR spectrometer for passive and active sensing**, C. J. Manning, M. Gross, Manning Applied Technologies, Inc.; A. Samuels, U.S. Army Edgewood Chemical Biological Ctr. .... [6378-23]
- 8:40 am: **A fiber optic sensor for nerve agent**, S. R. Cordero, R. A. Lieberman, Intelligent Optical Systems, Inc. .... [6378-24]
- 9:00 am: **Design and calibration of low-cost fiber optic sensors for refractive index measurement of turbid liquids**, P. Gupta Bhaya, A. K. Ghosh, V. Saxena, J. John, Indian Institute of Technology Kanpur (India) .... [6378-25]
- 9:20 am: **Analysis of oxytetracycline in surface water using a portable analyzer**, G. Chen, U.S. Dept of Agriculture; F. Qin, Shanghai Institute of Drug Control (China) .... [6378-26]
- 9:40 am: **Continuous water monitoring of chemical agents and their hydrolysis products by SERS**, S. Farquharson, F. E. Inscore, Real-Time Analyzers, Inc. .... [6378-27]
- Coffee Break ..... 10:00 to 10:30 am
- 10:30 am: **Differential fluorescence from molecularly imprinted polymers containing europium ions as a transducer element**, D. Pestov, Virginia Commonwealth Univ.; J. E. Anderson, U.S. Army Corps of Engineers; G. C. Tepper, Virginia Commonwealth Univ. and Sentor Technologies Inc. .... [6378-28]
- 10:50 am: **Portable natural gas leak detector**, M. E. Paige, J. A. Silver, D. S. Bomse, Southwest Sciences, Inc.; D. Petroski, Southern Cross Corp. .... [6378-29]
- 11:10 am: **Water assessment using beam diameter measurement**, E. Jonathan, Harare Institute of Technology (Zimbabwe) .... [6378-30]

### SESSION 5

Hynes Conv. Ctr. Room 110 ..... Wed. 11:30 am to 12:10 pm

#### Methods, Techniques, and Experimentation for Standoff Detection I

- Chairs: James O. Jensen*, U.S. Army Armament Research, Development and Engineering Ctr.; *Jean-Marc Thériault*, Defence Research and Development Canada (Canada)
- 11:30 am: **Bioaerosols laser-induced fluorescence provides robust signature for standoff detection**, S. Buteau, J. Simard, J. E. McFee, J. Ho, P. Lahaie, G. Roy, P. Mathieu, B. Déry, Defence Research and Development Canada (Canada) .... [6378-31]
- 11:50 am: **Real-time determination and suppression of bioaerosol constituents**, P. D. Henshaw, P. C. Trepagnier, SPARTA, Inc. .... [6378-32]
- Lunch Break ..... 12:10 to 1:20 pm

### SESSION 6

Hynes Conv. Ctr. Room 110 ..... Wed. 1:20 to 3:10 pm

#### Methods, Techniques, and Experimentation for Standoff Detection II

- Chairs: James O. Jensen*, U.S. Army Armament Research, Development and Engineering Ctr.; *Jean-Marc Thériault*, Defence Research and Development Canada (Canada)
- 1:20 pm: **Remote detection of gases and liquids by imaging Fourier transform spectrometry using a focal plane array detector**, R. Harig, J. Gerhard, R. Braun, Technische Univ. Hamburg-Harburg (Germany); C. D. Dyer, A. Jones, Defence Science and Technology Lab. (United Kingdom) ... [6378-33]
- 1:40 pm: **Design of CATSI EDM: a passive standoff chemical warfare agent detector**, Y. Montembeault, A. Villemare, F. Marcotte, V. Farley, L. Belhumeur, Telops, Inc. (Canada); J. Thériault, E. Puckrin, H. Lavoie, C. Turcotte, Defence Research and Development Canada (Canada) .... [6378-34]
- 2:00 pm: **Vibrational overtone stretching transitions in sarin**, M. W. P. Petryk, Defence Research and Development Canada (Canada) .... [6378-35]
- 2:20 pm: **Detection of explosive materials by differential reflection spectroscopy**, A. M. Fuller, R. E. Hummel, C. Schoellhorn, P. H. Holloway, Univ. of Florida ..... [6378-36]
- 2:40 pm: **Remote detection of chemicals with passive millimeter waves (Invited Paper)**, N. Gopalsami, S. Bakhtiar, T. Elmer, A. C. Raptis, Argonne National Lab. .... [6378-37]
- Coffee Break ..... 3:10 to 3:40 pm

### SESSION 7

Hynes Conv. Ctr. Room 110 ..... Wed. 3:40 to 5:40 pm

#### Multi and Hyperspectral Image Processing for Standoff Detection

- Chairs: Hsuan Ren*, National Central Univ. (Taiwan); *Qian Du*, Mississippi State Univ.
- 3:40 pm: **Variable-size variable-band selection for spectral feature characterization in hyperspectral data**, S. Wang, C. Chang, Univ. of Maryland/Baltimore County ..... [6378-38]
- 4:00 pm: **Exploration of methods for estimation of number of endmembers in hyperspectral imagery**, C. Wu, C. Chang, Univ. of Maryland/Baltimore County ..... [6378-39]
- 4:20 pm: **Modified Fisher's linear discriminant analysis for hyperspectral image compression and classification**, Q. Du, Mississippi State Univ. .... [6378-40]
- 4:40 pm: **Signature reduction methods for target detection in multispectral remote sensing imagery**, H. Ren, National Central Univ. (Taiwan); J. P. Fang, Y. Chang, National Taipei Univ. of Technology (Taiwan) .... [6378-41]
- 5:00 pm: **Relative radiometric calibration for multispectral and hyperspectral remote sensing imagery**, H. Ren, National Central Univ. (Taiwan) ..... [6378-42]
- 5:20 pm: **A simulated annealing band selection approach for hyperspectral imagery**, J. P. Fang, Y. Chang, National Taipei Univ. of Technology (Taiwan); H. Ren, National Central Univ. (Taiwan); W. Liang, National Taipei Univ. of Technology (Taiwan); J. Fang, National TaiChung Univ. (Taiwan) .... [6378-43]

### Courses of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

- 
- SC309 Fluorescent Markers: Usage and Optical System Optimization (Levi) Wednesday, 8:30 am to 12:30 pm
- 
- SC461 Bio-Optical Detection Systems (Levi) Wednesday, 1:30 to 5:30 pm
- 
- SC800 Instruments for Light Spectroscopy (Saptari) Monday, 1:30 to 5:30 pm
- 
- SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm
- 
- SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm
- 
- SC802 Practical Near Infrared and Raman Spectroscopy Applications (McDermott, Botonjic) Monday, 8:30 am to 12:30 pm

# Conference 6379A • Hynes Conv. Ctr. Room 205

Tuesday 3 October 2006 • Part of Proceedings of SPIE Vol. 6379: Photonic Applications for Aerospace, Transportation, and Harsh Environments

## Sensors for Harsh Environments III

Conference Chair: **Anbo Wang**, Virginia Polytechnic Institute and State Univ.

Program Committee: **Sheikh A. Akbar**, The Ohio State Univ.; **Chi Chiu Chan**, Nanyang Technological Univ. (Singapore); **Wei Jin**, The Hong Kong Polytechnic Univ. (Hong Kong China); **Nan M. Jokerst**, Duke Univ.; **Gordon S. Kino**, Stanford Univ.; **Yanbiao Liao**, Tsinghua Univ. (China); **S.-C. Liu**, National Science Foundation; **Gary R. Pickrell**, Virginia Polytechnic Institute and State Univ.; **Robert S. Rogowski**, NASA Langley Research Ctr.; **Hai Xiao**, New Mexico Institute of Mining and Technology

### Tuesday 3 October

#### SESSION 1

Hynes Conv. Ctr. Room 205 . . . . . Tues. 8:30 to 10:00 am

#### Sensors for Harsh Environments

Chair: **Anbo Wang**, Virginia Polytechnic Institute and State Univ.

8:30 am: **Nonlinearity enhanced fiber ring laser** (*Invited Paper*), P. Shum, X. Y. Dong, M. L. Tang, Nanyang Technological Univ. (Singapore); Y. Gong, Institute for Infocomm Research (Singapore); S. Fu, H. Dong, Nanyang Technological Univ. (Singapore); X. Yang, Institute for Infocomm Research (Singapore) . . . . . [6379A-01]

9:00 am: **Photopolymer microtips for efficient light coupling between single-mode fibers and small-core photonic crystal fibers**, L. Xiao, W. Jin, M. S. Demokan, The Hong Kong Polytechnic Univ. (Hong Kong China) . [6379A-02]

9:20 am: **Four point photo-conductance (FPPC) monitoring array for speckle and fringe motion sensing**, J. Bessette, A. Gogo, P. Heinz, E. M. Garmire, Dartmouth College . . . . . [6379A-04]

9:40 am: **Bragg wavelength detection in fiber Bragg grating sensor by combining nonlinear least squares with Kalman smoothing**, Y. Tang, Y. Chu, Y. Chu, Nanyang Technological Univ. (Singapore) . . . . . [6379A-05]

#### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Trace-gas detection based on temperature-tuning periodically poled MgO: LiNbO<sub>3</sub> optical parametric oscillator**, J. Kong, C. Chan, D. Tang, N. Ni, B. Zhao, Nanyang Technological Univ. (Singapore) . . . . . [6379A-03]
- ✓ **Tunable photonic band gaps in a photonic crystal fiber**, J. Sun, C. Chan, X. Y. Dong, P. Shum, Nanyang Technological Univ. (Singapore) . . [6379A-19]
- ✓ **Application of digital signal processing technique on mid-infrared gas detection by using optical parametric oscillator**, N. Ni, C. Chan, J. Kong, D. Tang, Nanyang Technological Univ. (Singapore) . . . . . [6379A-20]
- ✓ **Guided-wave optical pressure sensor with semi-closed space under the diaphragm: step response in relation to the area of a small hole of a semi-closed space**, K. Sato, M. Ohkawa, S. Sekine, T. Sato, Niigata Univ. (Japan) . . . . . [6379A-21]

#### Course of Related Interest

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SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

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# Conference 6379B • Hynes Conv. Ctr. Room 205

Tuesday 3 October 2006 • Part of Proceedings of SPIE Vol. 6379: Photonic Applications for Aerospace, Transportation, and Harsh Environments

## Photonics in Automotive and Transportation

Conference Chairs: **Christopher S. Baldwin**, Aither Engineering, Inc.; **Alex A. Kazemi**, The Boeing Co.

### Tuesday 3 October

#### SESSION 2

Hynes Conv. Ctr. Room 205 ..... Tues. 10:50 am to 12:10 pm

##### Photonics in Automotive and Transportation I

Chair: **Alex A. Kazemi**, The Boeing Co.

- 10:50 am: **Ormosil coating-based oxygen sensor for aircraft ullage**, K. Goswami, U. Sampathkumaran, M. Alam, D. Tseng, A. K. Majumdar, InnoSense LLC; A. A. Kazemi, The Boeing Co. .... [6379B-06]
- 11:10 am: **Optical device of non-contact temperature measurement and hot box detecting**, S. D. Milic, Institut Nikola Tesla (Serbia and Montenegro) ..... [6379B-07]
- 11:30 am: **A novel optical fiber with applications in sensing and communications**, R. Albandakji, A. Safaai-Jazi, R. H. Stolen, Virginia Polytechnic Institute and State Univ. .... [6379B-08]
- 11:50 am: **Detection of carbon dioxide emissions from a land transport vehicle using a mid-infrared optical fiber sensor**, J. F. Mulrooney, J. Clifford, C. Fitzpatrick, P. Chambers, E. Lewis, Univ. of Limerick (Ireland) ... [6379B-09]
- Lunch/Exhibition Break ..... 12:10 to 1:30 pm

#### SESSION 3

Hynes Conv. Ctr. Room 205 ..... Tues. 1:30 to 3:10 pm

##### Photonics in Automotive and Transportation II

Chair: **Alex A. Kazemi**, The Boeing Co.

- 1:30 pm: **Fiber optic hydrogen sensor leak detection system for launch vehicle applications**, A. A. Kazemi, The Boeing Co.; K. Goswami, InnoSense LLC; E. A. Mendoza, Redondo Optics; L. U. Kempen, R. A. Lieberman, Intelligent Optical Systems, Inc. .... [6379B-10]
- 1:50 pm: **Differential strain sensitivity of higher order cladding modes in weakly tilted fiber Bragg gratings**, C. Chen, L. Xiong, Carleton Univ. (Canada); C. Caucheteur, P. Mégret, Faculté Polytechnique de Mons (Belgium); J. Albert, Carleton Univ. (Canada) ..... [6379B-11]
- 2:10 pm: **Versatile fiber Bragg grating arrays for strain mapping and ultrasound Lamb wave detection**, G. J. Thursby, Univ. of Strathclyde (United Kingdom); D. C. Betz, DaimlerChrysler AG (Germany); B. Culshaw, Univ. of Strathclyde (United Kingdom); W. J. Staszewski, The Univ. of Sheffield (United Kingdom) ..... [6379B-12]
- 2:30 pm: **Absolute low-cost diffractive angular encoder for steer by wire in automotive**, M. Ndao, B. Kress, P. P. Meyrueis, Univ. Louis Pasteur (France); L. Tupinier, O. Marroux, Delphi Mechatronic Systems, Inc. (France) ... [6379B-13]
- 2:50 pm: **Photonic components and networks for automotive applications**, F. H. W. Ho, E. Wong, V. Hung, Hong Kong Applied Science and Technology Research Institute Co. Ltd. (Hong Kong China); T. Wipiejewski, FireComms Ltd. (Ireland) ..... [6379B-14]
- Coffee Break ..... 3:10 to 3:40 pm

#### SESSION 4

Hynes Conv. Ctr. Room 205 ..... Tues. 3:40 to 5:20 pm

##### Photonics in Automotive and Transportation III

Chair: **Christopher S. Baldwin**, Aither Engineering, Inc.

- 3:40 pm: **Particulate detection in turbine exhaust using laser-induced breakdown spectroscopy**, C. S. Baldwin, Aither Engineering, Inc. ... [6379B-15]
- 4:00 pm: **Gas detection using an integrating sphere as a multipass absorption cell**, E. P. Hawe, E. Lewis, C. Fitzpatrick, P. Chambers, Univ. of Limerick (Ireland) ..... [6379B-16]
- 4:20 pm: **Onboard monitoring of exhaust emissions using a UV optical fiber based sensor**, G. L. Dooly, E. Lewis, C. Fitzpatrick, Univ. of Limerick (Ireland) ..... [6379B-17]
- 4:40 pm: **Stabilization of the output signal of thermopile sensors in the thermal environment of automotive applications**, A. Charlebois, PerkinElmer Optoelectronics (Canada) ..... [6379B-18]
- 5:00 pm: **Rotation sensing with a low-cost simple FOG**, A. Morshed, Ain Shams Univ. (Egypt) ..... [6379B-23]

### Courses of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

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SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm

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SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

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SC747 Semiconductor Optoelectronic Device Fundamentals (Linden) Wednesday, 8:30 am to 5:30 pm

# Smart Medical and Biomedical Sensor Technology IV

Conference Chairs: **Brian M. Cullum**, Univ. of Maryland/Baltimore County; **J. Chance Carter**, Lawrence Livermore National Lab.

Program Committee: **Troy A. Alexander**, Army Research Lab.; **Karl S. Booksh**, Arizona State Univ.; **Bill W. Colston, Jr.**, Lawrence Livermore National Lab.; **Alexander E. Dudelzak**, Canadian Space Agency (Canada); **Syed Ismail**, NASA Langley Research Ctr.; **Zeev Rosenzweig**, Univ. of New Orleans; **Olusola O. Soyemi**, Univ. of Massachusetts Medical School

## Tuesday 3 October

### SESSION 1

Hynes Conv. Ctr. Room 109 ..... Tues. 8:20 to 10:00 am

#### Cellular Monitoring I

Chairs: **Alexander E. Dudelzak**, Canadian Space Agency (Canada);  
**Brian M. Cullum**, Univ. of Maryland/Baltimore County

8:20 am: **Monitoring intracellular signaling networks: DARPA's goals (Invited Paper, Presentation Only)**, D. K. Shenoy, DARPA ..... [6380-01]

8:40 am: **Advances in zinc ion sensing for studying zinc release events from pancreatic cells**, Z. Rosenzweig, G. Crivat, Univ. of New Orleans ... [6380-02]

9:00 am: **Nanoparticle arrays for efficient detection of whole cells**, T. A. Alexander, Army Research Lab. .... [6380-03]

9:20 am: **SERS probes for imaging individual biochemical species on the nanoscale**, M. E. Hankus, B. M. Cullum, Univ. of Maryland/Baltimore County ..... [6380-04]

9:40 am: **Intrinsic Fabry-Perot interferometer with a micrometric tip for biomedical applications**, X. Wang, J. Xu, Z. Wang, K. L. Cooper, A. Wang, Virginia Polytechnic Institute and State Univ. .... [6380-05]

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

### SESSION 2

Hynes Conv. Ctr. Room 109 ..... Tues. 10:30 am to 12:10 pm

#### Cellular Monitoring II

Chairs: **Syed Ismail**, NASA Langley Research Ctr.;  
**Brian M. Cullum**, Univ. of Maryland/Baltimore County

10:30 am: **Polarization imaging sensor for cell and tissue imaging and diagnostics**, H. Zhao, Q. Chen, Y. K. Zou, Boston Applied Technologies Inc.; J. Xuan, The Catholic Univ. of America ..... [6380-06]

10:50 am: **In silico cell electrophysiology for measuring transcellular calcium currents**, D. M. Porterfield, A. ul Haque, M. Rokkam, A. R. De Carlo, S. Wereley, Purdue Univ.; H. W. Wells, Bionetics Corp.; W. T. McLamb, Dynamac Corp.; S. J. Roux, The Univ. of Texas at Austin; P. P. Irazoqui, Purdue Univ. . [6380-07]

11:10 am: **A fiber optic surface plasmon resonance (SPR) sensor applied to quantifying survival of motor neuron (SMN) protein in cell lysate**, K. S. Booksh, M. Barnhart, M. R. Malone, B. Bert, R. Nieman, Arizona State Univ. .... [6380-08]

11:30 am: **Raman molecular imaging of tissue and cell samples using tunable multiconjugate filter**, J. S. Maier, S. D. Stewart, J. Panza, A. Drauch, ChemImage Corp. .... [6380-09]

11:50 am: **In vitro study of the spectrally selective UV-irradiation bacterial inhibition**, A. E. Dudelzak, Darel Enterprises, Inc. (Canada); A. S. Koujlev, All-Optical Solutions (Canada); M. A. Miller, Jewish General Hospital (Canada) ..... [6380-10]

Lunch/Exhibition Break ..... 12:10 to 1:40 pm

### SESSION 3

Hynes Conv. Ctr. Room 109 ..... Tues. 1:40 to 3:00 pm

#### Enabling Studies for Biological Sensor Development

Chairs: **Karl S. Booksh**, Arizona State Univ.;  
**Troy A. Alexander**, Army Research Lab.

1:40 pm: **Evaluation of aptamers as molecular recognition elements for pathogens using capillary electrophoretic analysis**, S. McMasters, D. N. Stratis-Cullum, Army Research Lab. .... [6380-11]

2:00 pm: **Diazirine photochemistry as a means of functionalizing microcantilever biosensors**, J. V. LaTour, F. A. Bourguet, T. V. Ratto, B. R. Hart, Lawrence Livermore National Lab. .... [6380-12]

2:20 pm: **Novel gold SERS substrates with multilayer enhancements**, H. Li, C. E. Baum, B. M. Cullum, Univ. of Maryland/Baltimore County ..... [6380-13]

2:40 pm: **The investigation of liquid analysis method based on fiber microdrop sensor**, W. Sun, X. Li, C. Zhang, X. Wang, Harbin Engineering Univ. (China) ..... [6380-15]

Coffee Break ..... 3:00 to 3:20 pm

### SESSION 4

Hynes Conv. Ctr. Room 109 ..... Tues. 3:20 to 6:00 pm

#### Compact Biological and Biomedical Diagnostic Platforms

Chairs: **Troy A. Alexander**, Army Research Lab.; **J. Chance Carter**, Lawrence Livermore National Lab.

3:20 pm: **Liquid core optical ring resonator label-free biosensor array for lab-on-a-chip development**, I. M. White, H. Zhu, J. D. Suter, H. Oveys, X. Fan, Univ. of Missouri/Columbia ..... [6380-16]

3:40 pm: **On-chip microfluidic PCR using monodisperse microdroplets**, N. R. Beer, B. J. Hindson, J. C. Carter, K. A. Rose, Lawrence Livermore National Lab.; I. M. Kennedy, Univ. of California/Davis; J. P. Fitch, Battelle Memorial Institute; B. W. Colston, Jr., Lawrence Livermore National Lab. .... [6380-17]

4:00 pm: **Compact optofluidic platform for detection of biomolecules**, O. Schmidt, M. Bassler, P. Kiesel, N. M. Johnson, Palo Alto Research Ctr. Inc. .... [6380-18]

4:20 pm: **Development of a MEMS 2D separations device**, K. P. Bloschok, Georgetown Univ.; T. W. Schneider, ITT Industries; A. Hussam, George Mason Univ.; E. R. Van Keuren, Georgetown Univ. .... [6380-19]

4:40 pm: **Surface mass sensitivity of a differential phase contrast BioCD at 0.2 pg/mm**, D. D. Nolte, Purdue Univ. .... [6380-20]

5:00 pm: **Critical factors for nanoscale injection molding**, S. Yoon, Univ. of Massachusetts/Lowell ..... [6380-21]

5:20 pm: **UV LED excited time-gated luminescence flow cytometry: concepts and experimental evaluation**, D. Jin, R. E. Connally, J. A. Piper, Macquarie Univ. (Australia) ..... [6380-22]

5:40 pm: **Fluorescence immunoassay diagnostic improvement with a compact diode pumped solid state laser at 315 nm**, M. Niederkrüger, C. Salb IV, G. Marowsky, Laser-Lab. Göttingen e.V. (Germany); M. Beck, N. Hildebrandt, H. Löhmannsröben, Univ. Potsdam (Germany) ..... [6380-23]



✓ **Posters-Tuesday**

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- ✓ **Development of structured light illumination based endoscope**, C. Wong, N. Chen, C. J. R. Sheppard, National Univ. of Singapore (Singapore) ..... [6380-36]
- ✓ **Bio-compatible optical interfaces**, F. Causa, Univ. of Bath (United Kingdom); J. Robbins, King's College London (United Kingdom); A. V. Sapelkin, Queen Mary Univ. of London (United Kingdom); S. Surguy, King's College London (United Kingdom); B. Unal, Queen Mary Univ. of London (United Kingdom); W. N. Wang, D. Masanotti, J. T. Taylor, Univ. of Bath (United Kingdom) ..... [6380-37]
- ✓ **Detection of inflammatory cytokines using a fiber optic microsphere immunoassay array**, T. M. Blicharz, D. R. Walt, Tufts Univ. .... [6380-38]
- ✓ **Molecularly imprinted polymerization-based surface plasmon resonance sensing for glucose detection in human urine**, K. S. Booksh, S. Banerji, W. Peng, Y. Kim, Arizona State Univ. .... [6380-39]

**Wednesday 4 October**

**SESSION 5**

**Hynes Conv. Ctr. Room 109 ..... Wed. 8:20 to 10:00 am**  
**Towards In-Vivo Diagnostics**

*Chairs:* **Olusola O. Soyemi**, Univ. of Massachusetts Medical School;  
**Bill W. Colston, Jr.**, Lawrence Livermore National Lab.

- 8:20 am: **Simultaneous acquisition of the real and imaginary components in Fourier domain optical coherence tomography using harmonic detection**, K. A. Peterson, A. Vakhtin, D. J. Kane, Southwest Sciences, Inc. .... [6380-24]
- 8:40 am: **Near-infrared applications for tissue identification**, E. Botonjic, Axsun Technologies Inc. .... [6380-25]
- 9:00 am: **Determination of protein biomarkers in serum by surface plasmon resonance spectroscopy**, K. S. Booksh, M. R. Malone, J. Masson, T. M. Battaglia, M. Barnhart, Arizona State Univ. .... [6380-30]
- 9:20 am: **Back-scattering angular domain imaging of objects within highly scattering media**, F. Vasefi, P. K. Y. Chan, B. Kaminska, G. H. Chapman, Simon Fraser Univ. (Canada) ..... [6380-27]
- 9:40 am: **Development of molecular signatures for identifying known and unknown viruses**, A. Hiddessen, S. N. Gardner, M. K. Borucki, T. R. Slezak, P. L. Williams, P. Naraghi-arani, G. L. Vanier, L. D. Suer, B. J. Hindson, B. W. Colston, Jr., Lawrence Livermore National Lab. .... [6380-28]
- Coffee Break ..... 10:00 to 10:30 am

**Courses of Related Interest**

Register for courses and get full course descriptions at the SPIE Registration desk.

SC309 Fluorescent Markers: Usage and Optical System Optimization (Levi) Wednesday, 8:30 am to 12:30 pm
SC461 Bio-Optical Detection Systems (Levi) Wednesday, 1:30 to 5:30 pm
SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm
SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm
SC747 Semiconductor Optoelectronic Device Fundamentals (Linden) Wednesday, 8:30 am to 5:30 pm

**SESSION 6**

**Hynes Conv. Ctr. Room 109 ..... Wed. 10:30 am to 12:30 pm**

**Clinical Diagnostic Technologies**

*Chairs:* **J. Chance Carter**, Lawrence Livermore National Lab.;  
**Olusola O. Soyemi**, Univ. of Massachusetts Medical School

- 10:30 am: **Noninvasive approaches to measuring respiratory patterns using a PITFP-based phase-lifetime self-referencing oxygen optrode**, D. M. Porterfield, J. L. Rickus, Purdue Univ.; R. Kopelman, Univ. of Michigan ..... [6380-29]
- 10:50 am: **Feasibility of monitoring patient motion with opposed stereo infrared cameras during supine medical imaging**, R. D. Beach, Univ. of Massachusetts Medical School; G. Terlecki, Northern Digital Inc. (Canada); M. A. King, J. E. McNamara, Univ. of Massachusetts Medical School [6380-31]
- 11:10 am: **Noninvasive sensors in critical care medicine: near-infrared spectroscopy for the detection of altered microvascular blood flow in severe sepsis and septic shock**, J. M. Walz, B. R. Soller, O. O. Soyemi, Y. Yang, M. R. Landry, S. O. Heard, Univ. of Massachusetts Medical School ..... [6380-32]
- 11:30 am: **Astronaut health monitoring**, F. E. Inscore, C. S. Shende, P. Maksymiuk, S. Farquharson, Real-Time Analyzers, Inc. .... [6380-33]
- 11:50 am: **Aculaser therapy: a comprehensive approach for the treatment of cerebral palsy**, S. Anwar, Anwar Shah's First C.P. and Paralysis Clinic and Research Ctr. (Pakistan) ..... [6380-34]
- 12:10 pm: **Hollow fiber optic probe for in vivo Raman measurement**, T. Katagiri, Y. Hattori, The Institute of Physical and Chemical Research (Japan); Y. Komachi, Machida Endoscope Co., Ltd. (Japan); Y. Matsuura, Tohoku Univ. (Japan); H. Tashiro, H. Sato, The Institute of Physical and Chemical Research (Japan) ..... [6380-35]

**Special Session Smart Medical Home**

*Wednesday 4 October • 2:00 to 4:00 pm*  
*Hynes Convention Center, Room 100*

*Chair:* **Israel Gannot**, Tel-Aviv Univ. (Israel) and George Washington Univ.

This special session will deal with different aspects of the smart medical home idea. The panelists come from different disciplines: medicine, biomedical sciences, architecture, and engineering, and they will present the projects that they are heading in their universities. After the presentations there will be a panel discussion with active participation from the audience on the presented issues, as well as psychological and philosophical aspects of the smart medical home concept.

See p. 5 for more information.

# Optics for Natural Resources, Agriculture, and Foods

Conference Chairs: **Yud-Ren Chen**, USDA Agricultural Research Service; **George E. Meyer**, Univ. of Nebraska/Lincoln; **Shu-I Tu**, USDA Agricultural Research Service

Program Committee: **Arun K. Bhunia**, Purdue Univ.; **Kuanglin Chao**, USDA Agricultural Research Service; **Suming Chen**, National Taiwan Univ. (Taiwan); **Stephen R. Delwiche**, USDA Agricultural Research Service; **Moon S. Kim**, USDA Agricultural Research Service; **Kurt C. Lawrence**, USDA Agricultural Research Service; **Renfu Lu**, USDA Agricultural Research Service; **Elizabeth M. Middleton**, NASA Goddard Space Flight Ctr.; **Fred A. Payne**, Univ. of Kentucky; **Yang Tao**, Univ. of Maryland/College Park; **Gang Yao**, Univ. of Missouri/Columbia; **Yibin Ying**, Zhejiang Univ. (China)

## Monday 2 October

### Robotics and Machine Perception Technical Group Meeting

Hynes Conv. Ctr. Room 109 ..... Mon. 5:30 to 7:00 pm

See p. 7 in Special Events for details.

## Tuesday 3 October

### SESSION 1

Hynes Conv. Ctr. Room 111 ..... Tues. 1:40 to 3:00 pm

#### Natural Resources

Chairs: **Elizabeth M. Middleton**, NASA Goddard Space Flight Ctr.;  
**Moon S. Kim**, USDA Agricultural Research Service

1:40 pm: **Hyperspectral imaging based techniques applied to polluted clay characterization**, G. Bonifazi, S. Serranti, Univ. degli Studi di Roma/La Sapienza (Italy) ..... [6381-02]

2:00 pm: **Using ASTER image for soybean plant residue coverage estimation**, H. Yao, D. Lewis, R. Kincaid, Institute for Technology Development ..... [6381-03]

2:20 pm: **Development of multifunctional remote sensing system for greenhouse production**, S. Chen, H. Lu, National Taiwan Univ. (Taiwan); K. Hsieh, Y. Huang, National Chung-Shing Univ. (Taiwan); C. Chen, I. Yang, G. Yeh, C. Chang, National Taiwan Univ. (Taiwan) ..... [6381-04]

2:40 pm: **Application of plant impedance for diagnosing plant disease**, H. Xu, Y. Ying, X. Jiang, S. Zhu, Zhejiang Univ. (China) ..... [6381-05]

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

### SESSION 2

Hynes Conv. Ctr. Room 111 ..... Tues. 3:30 to 4:30 pm

#### Pathogen Detection

Chair: **Arun K. Bhunia**, Purdue Univ.

3:30 pm: **Noninvasive forward-scattering system for rapid detection, characterization, and identification of Listeria colonies: image-processing and data analysis**, B. P. Rajwa, B. Bayraktar, P. P. Banada, K. Huff, E. Bae, J. P. Robinson, E. D. Hirlleman, Jr., A. K. Bhunia, Purdue Univ. .... [6381-07]

3:50 pm: **Fiber optic biosensor employing Alexa-Fluor conjugated antibody for detection of escherichia coli O157:H7 and Shiga-like toxins**, S. Tu, USDA Agricultural Research Service; T. Geng, Purdue Univ.; J. Uknalis, USDA Agricultural Research Service; A. K. Bhunia, Purdue Univ. .... [6381-08]

4:10 pm: **Optical light scatter images of Listeria growing at different time periods and on different substrates: a proposed biophysical model**, E. Bae, P. P. Banada, A. K. Bhunia, E. D. Hirlleman, Jr., Purdue Univ. .... [6381-09]

### SESSION 3

Hynes Conv. Ctr. Room 111 ..... Tues. 4:30 to 5:50 pm

#### Grains

Chair: **Stephen R. Delwiche**, USDA Agricultural Research Service

4:30 pm: **Prediction of ethanol in bottled Chinese rice wine by NIR spectroscopy**, Y. Ying, H. Yu, Zhejiang Univ. (China) ..... [6381-10]

4:50 pm: **Age determination of bottled Chinese rice wine by VIS-NIR spectroscopy**, H. Yu, Y. Ying, Zhejiang Univ. (China) ..... [6381-11]

5:10 pm: **Improvements in optical sorting of mold-damaged wheat**, S. R. Delwiche, USDA Agricultural Research Service ..... [6381-12]

5:30 pm: **Hyperspectral bright greenish-yellow fluorescence (BGYF) imaging of aflatoxin contaminated corn kernels**, H. Yao, Z. Hruska, K. DiCrispino, Institute for Technology Development; R. L. Brown, T. E. Cleveland, USDA Agricultural Research Service ..... [6381-13]

#### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

✓ **Heating effects on optical scattering properties in beef muscles**, J. Xia, Univ. of Missouri/Columbia; A. Weaver, D. Gerrard, Purdue Univ.; G. Yao, Univ. of Missouri/Columbia ..... [6381-36]

✓ **A fast ellipse detection algorithm for multiple rice seeds images**, F. Cheng, Y. Ying, Zhejiang Univ. (China) ..... [6381-37]

✓ **Early detection of plant disease using infrared thermal imaging**, H. Xu, Y. Ying, S. Zhu, H. Jiang, Zhejiang Univ. (China) ..... [6381-38]

✓ **Geometrical calibration of a combined x-ray and laser system**, F. Jin, H. Jing, L. Qin, T. Yang, Univ. of Maryland/College Park ..... [6381-39]

✓ **A near-infrared diffuse reflection type measuring system for chlorophyll content of tomato leaves**, H. Jiang, Y. Ying, Zhejiang Univ. (China) ..... [6381-40]

✓ **Laser scatter feature of surface defect on apples**, X. Rao, Y. Ying, Zhejiang Univ. (China) ..... [6381-42]

✓ **Egg weight detection on dynamic machine vision system**, Y. Cen, Y. Ying, X. Rao, Zhejiang Univ. (China) ..... [6381-44]

✓ **Rapid analysis of sugar content of intact orange fruit using ultraviolet and visible transmittance techniques**, Y. Liu, Jiangxi Agriculture Univ. (China); Y. Ying, Zhejiang Univ. (China) ..... [6381-45]

✓ **Imaging processing technique to measure plant infection severity**, S. Zhu, Y. Ying, H. Xu, H. Jiang, Zhejiang Univ. (China) ..... [6381-46]

✓ **Effect of biological variability on the robustness of FT-NIR models for soluble solids content of oranges**, Y. Liu, Jiangxi Agriculture Univ. (China) ..... [6381-47]

✓ **Design and validation of the real-time determination software for soluble solids content estimation of juicy peach by visible/near infrared spectroscopy**, M. Jiang, Y. Ying, H. Lu, Zhejiang Univ. (China) ... [6381-48]

✓ **Influence of humidity on spectral performance for near-infrared detection of fruit**, Y. Zhou, Y. Ying, Zhejiang Univ. (China) ..... [6381-49]

✓ **Fragrant pear sexuality recognition with machine vision**, B. Ma, Y. Ying, Zhejiang Univ. (China) ..... [6381-50]

✓ **MEMS-based spectrometers and how they work**, M. Ramani, Polychromix, Inc. .... [6381-51]

✓ **Computational analysis of Pelton bucket tip erosion using image processing**, B. P. Shrestha, S. K. Suman, M. Adhikari, P. Manandhar, Kathmandu Univ. (Nepal) ..... [6381-52]

**Wednesday 4 October**

**SESSION 4**

Hynes Conv. Ctr. Room 111 ..... Wed. 8:00 to 10:00 am

**Optical Techniques**

*Chair: Yibin Ying, Zhejiang Univ. (China)*

8:00 am: **Optical scattering coefficients are correlated with muscle structure properties**, G. Yao, J. Xia, Univ. of Missouri/Columbia; A. Weaver, D. Gerrard, Purdue Univ. .... [6381-14]

8:20 am: **Characterizing fiber formation in meat analogs using an anisotropic photon migration model**, J. C. Ranasinghesagara, F. Hsieh, G. Yao, Univ. of Missouri/Columbia ..... [6381-15]

8:40 am: **Screening of oxytetracycline in trout muscle**, G. Chen, USDA Agricultural Research Service; F. Qin, Shanghai Institute of Drug Control (China); E. Smith, Drexel Univ.; L. Liu, USDA Agricultural Research Service .. [6381-16]

9:00 am: **Bone fragment detection in chicken breast filets using diffuse scattering pattern of back-illuminated structured light**, S. Yoon, K. C. Lawrence, B. Park, D. P. Smith, W. R. Windham, USDA Agricultural Research Service ..... [6381-17]

9:20 am: **The statistical and fractal properties of surface reflectivity of raw chicken tissue with application to public health safety**, R. Subramaniam, R. Sullivan, P. S. Schneider, A. Flamholz, E. Cheung, G. Tremberger, Jr., P. K. Wong, D. Lieberman, T. D. Cheung, A. Yee, Queensborough Community College/CUNY ..... [6381-18]

9:40 am: **An examination of ham color fading using optical fiber methods**, C. D. Sheridan, M. E. O'Farrell, E. Lewis, C. Flanagan, Univ. of Limerick (Ireland); J. Kerry, N. Jackman, Echo Food Solutions International Ltd. (Ireland) [6381-19]

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

**SESSION 5**

Hynes Conv. Ctr. Room 111 ..... Wed. 10:30 am to 12:10 pm

**Fruits and Vegetables: Spectroscopy**

*Chair: Yang Tao, Univ. of Maryland/College Park*

10:30 am: **Effect of wavelet denoising techniques on the determination of navel orange sugar content with near-infrared spectra**, L. Xie, Y. Ying, Zhejiang Univ. (China) ..... [6381-20]

10:50 am: **Temperature influence for Fourier transform near-infrared transmittance measurement of citrus fruit soluble solids contents**, H. Lu, Y. Ying, Zhejiang Univ. (China) ..... [6381-21]

11:10 am: **Measurement of internal quality of watermelon by Vis/NIR diffuse transmittance technique**, H. Tian, Zhejiang Univ. (China) ..... [6381-22]

11:30 am: **Integrating fluorescence and reflectance measurements to improve apple maturity assessment**, H. K. Noh, R. Lu, USDA Agricultural Research Service ..... [6381-23]

11:50 am: **NIR assessment of soluble solids and firmness for pears of different cultivars**, X. Fu, Y. Ying, Zhejiang Univ. (China) ..... [6381-24]

Lunch Break ..... 12:10 to 1:40 pm

**SESSION 6**

Hynes Conv. Ctr. Room 111 ..... Wed. 1:40 to 3:00 pm

**Fruits and Vegetables: Imaging**

*Chair: Suming Chen, National Taiwan Univ. (Taiwan)*

1:40 pm: **Fruit edge detection based gradient vector flow**, J. Gui, Y. Ying, Zhejiang Univ. (China) ..... [6381-25]

2:00 pm: **Hyperspectral reflectance and fluorescence line-scan system for on-line detection of fecal contamination on apples**, M. S. Kim, B. Cho, Y. Chen, C. Yang, A. M. Lefcourt, K. Chao, USDA Agricultural Research Service ..... [6381-26]

2:20 pm: **Development of video technology to analyze dynamics of inertia-based apple orientation**, A. M. Lefcourt, USDA Agricultural Research Service; P. Narayanan, U. Tasch, R. Rostamian, Univ. of Maryland/Baltimore County; M. S. Kim, Y. Chen, USDA Agricultural Research Service ..... [6381-27]

2:40 pm: **Application of multispectral reflectance for early detection of tomato disease**, H. Xu, Y. Ying, S. Zhu, H. Jiang, Zhejiang Univ. (China) ..... [6381-28]

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

**SESSION 7**

Hynes Conv. Ctr. Room 111 ..... Wed. 3:30 to 4:30 pm

**Meats, Poultry, and Eggs**

*Chair: Kuanglin Chao, USDA Agricultural Research Service*

3:30 pm: **Hyperspectral waveband selection method: chicken tumor detection applications**, S. Nakariyakul, D. P. Casasent, Carnegie Mellon Univ. .... [6381-29]

3:50 pm: **Egg fertility detection with hyperspectral imaging**, K. C. Lawrence, D. P. Smith, G. W. Heitschmidt, W. R. Windham, B. Park, USDA Agricultural Research Service ..... [6381-30]

4:10 pm: **Detection of fecal/ingesta contaminants at slaughter plants from a number of characteristic visible and near-infrared bands**, Y. Liu, Univ. of Maryland/College Park; K. Chao, Y. Chen, X. Nou, M. S. Kim, USDA Agricultural Research Service; C. Yang, Univ. of Kentucky; D. Chan, USDA Agricultural Research Service ..... [6381-31]

**SESSION 8**

Hynes Conv. Ctr. Room 111 ..... Wed. 4:30 to 5:50 pm

**Meats and Poultry: Online Systems**

*Chair: Kurt C. Lawrence, USDA Agricultural Research Service*

4:30 pm: **Poultry carcass inspection by a fast line-scan imaging system: results from in-plant testing**, K. Chao, Y. Chen, C. Yang, M. S. Kim, D. E. Chan, USDA Agricultural Research Service ..... [6381-32]

4:50 pm: **Real-time multispectral imaging system for online application using UML**, B. Park, K. C. Lawrence, M. Kise, W. R. Windham, USDA Agricultural Research Service; C. N. Thai, The Univ. of Georgia ..... [6381-33]

5:10 pm: **Stereovision-based multispectral imaging system for contaminant detection on poultry carcasses**, M. Kise, B. Park, K. C. Lawrence, W. R. Windham, USDA Agricultural Research Service ..... [6381-34]

5:30 pm: **Development of online line-scan imaging system for chicken inspection and differentiation**, C. Yang, K. Chao, Y. Chen, M. S. Kim, D. E. Chan, USDA Agricultural Research Service ..... [6381-35]

**Courses of Related Interest**

*Register for courses and get full course descriptions at the SPIE Registration desk.*

SC309 Fluorescent Markers: Usage and Optical System Optimization (Levi) Wednesday, 8:30 am to 12:30 pm

SC461 Bio-Optical Detection Systems (Levi) Wednesday, 1:30 to 5:30 pm

SC800 Instruments for Light Spectroscopy (Saptari) Monday, 1:30 to 5:30 pm

SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm

SC673 Optical Fiber Sensing Technology: Principles, Components & Applications (Méndez) Monday, 1:30 to 5:30 pm

SC802 Practical Near Infrared and Raman Spectroscopy Applications (McDermott, Botonjic) Monday, 8:30 am to 12:30 pm

**Special Session Smart Medical Home**

*Wednesday 4 October • 2:00 to 4:00 pm  
Hynes Convention Center, Room 100*

*Chair: Israel Gannot, Tel-Aviv Univ. (Israel) and George Washington Univ.*

This special session will deal with different aspects of the smart medical home idea. The panelists come from different disciplines: medicine, biomedical sciences, architecture, and engineering, and they will present the projects that they are heading in their universities. After the presentations there will be a panel discussion with active participation from the audience on the presented issues, as well as psychological and philosophical aspects of the smart medical home concept.

*See p. 5 for more information.*

# Conference 6382 • Hynes Conv. Ctr. Room 107

Sunday-Tuesday 1-3 October 2006 • Proceedings of SPIE Vol. 6382

## Two- and Three-Dimensional Methods for Inspection and Metrology IV

Conference Chair: **Peisen S. Huang**, Stony Brook Univ.

Program Committee: **Kevin G. Harding**, GE Global Research; **Qingying Hu**, GE Global Research; **Heinz Hügli**, Univ. de Neuchâtel (Switzerland); **Charles Joenathan**, Rose-Hulman Institute of Technology; **John W. Miller**, Univ. of Michigan; **Shizhuo Yin**, The Pennsylvania State Univ.; **Toru Yoshizawa**, Opton Co., Ltd. (Japan) and Tokyo Univ. A&T (Japan); **Chengping Zhang**, KLA-Tencor Corp.

### Sunday 1 October

#### SESSION 1

Hynes Conv. Ctr. Room 107 ..... Sun. 8:30 to 10:20 am

#### Interferometry and Microscopy

Chair: **Kevin G. Harding**, GE Global Research

- 8:30 am: **Recent trends in white-light interferometry** (*Invited Paper*), K. Kitagawa, Toray Engineering Co., Ltd. (Japan) ..... [6382-01]
- 9:00 am: **Toward on-line non-contact roughness profile measurements with a sensor based on conoscopic holography: current developments**, I. Alvarez, J. Marina, J. M. Enguita, C. Fraga, R. Garcia, G. Ojea, Univ. de Oviedo (Spain) ..... [6382-02]
- 9:20 am: **Chromatic confocal and two-photon imaging**, K. Shi, S. Nam, P. Li, S. Yin, Z. Liu, The Pennsylvania State Univ. .... [6382-03]
- 9:40 am: **White-light geometric phase interference microscopy for mapping complex microspheres**, M. Roy, The Univ. of Sydney (Australia); C. J. R. Sheppard, National Univ. of Singapore (Singapore); P. Hariharan, The Univ. of Sydney (Australia) ..... [6382-04]
- 10:00 am: **White light displacement sensor by spectro-polarization modulator**, Y. Otani, D. Orlov, T. Wakayama, N. Umeda, T. Yoshizawa, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6382-05]
- Coffee Break ..... 10:20 to 10:50 am

#### SESSION 2

Hynes Conv. Ctr. Room 107 ..... Sun. 10:50 to 11:50 am

#### 2D Inspection Methods

Chair: **Heinz Hügli**, Univ. de Neuchâtel (Switzerland)

- 10:50 am: **Machine vision method for online surface inspection of easy open can ends**, P. Marino, V. Pastoriza, M. Santamaría, Univ. de Vigo (Spain) ..... [6382-07]
- 11:10 am: **Optical crack following on tunnel surfaces**, G. Paar, M. d. P. Caballo-Perucha, Joanneum Research (Austria); H. Kontrus, DIBIT Messtechnik GmbH (Austria); O. Sidla, Joanneum Research (Austria) ..... [6382-08]
- 11:30 am: **Optical inspection of holes in jet engine blades**, D. Shetty, T. A. Eppes, Univ. of Hartford ..... [6382-09]
- Lunch Break ..... 11:50 am to 1:00 pm

#### SESSION 3

Hynes Conv. Ctr. Room 107 ..... Sun. 1:00 to 3:10 pm

#### 3D Methods and Techniques I

Chair: **Peisen S. Huang**, Stony Brook Univ.

- 1:00 pm: **3D vision methods and selected experiences in micro and macro applications** (*Invited Paper*), H. Hügli, Univ. de Neuchâtel (Switzerland) ..... [6382-10]
- 1:30 pm: **Passive range measurement through wavefront coding**, S. A. Lis, LightLine Technologies, Inc. .... [6382-11]
- 1:50 pm: **Regularization of the deflectometry problem using shading data**, J. Balzer, S. Werling, Univ. Karlsruhe (Germany) ..... [6382-12]
- 2:10 pm: **Edge profile measurement and its enhancement using stereovision**, Q. Hu, K. G. Harding, D. Hamilton, GE Global Research [6382-13]
- 2:30 pm: **Inner profile measurement of pipes and holes using a ring beam device**, T. Yoshizawa, Saitama Medical Univ. (Japan); M. Yamamoto, Softron Corp. (Japan); T. Wakayama, Saitama Univ. .... [6382-14]
- 2:50 pm: **Depth-from-defocus: blur equalization technique**, T. Xian, M. Subbarao, Stony Brook Univ. .... [6382-15]
- Coffee Break ..... 3:10 to 3:40 pm

#### SESSION 4

Hynes Conv. Ctr. Room 107 ..... Sun. 3:40 to 5:40 pm

#### 3D Methods and Techniques II

Chair: **Toru Yoshizawa**, Opton Co., Ltd. (Japan)

- 3:40 pm: **Accuracy problems in phase shift based 3D machine vision inspection systems**, I. Dunin-Barkowski, J. Kim, Synapse Imaging Co., Ltd. (South Korea) ..... [6382-16]
- 4:00 pm: **Metric projector camera calibration for measurement applications**, J. W. Horbach, T. Dang, Univ. Karlsruhe (Germany) ... [6382-17]
- 4:20 pm: **On improving the accuracy of structured light systems**, "P. S. Huang, X. Han, Stony Brook Univ. .... [6382-18]
- 4:40 pm: **Automated geometry measurement of wheel rims based on optical 3D metrology**, C. Teutsch, D. Berndt, N. Schmidt, E. Trostmann, Fraunhofer-Institut für Fabrikbetrieb und -automatisierung (Germany) [6382-19]
- 5:00 pm: **Embedded 3D vision system for automated micro-assembly**, J. Mure-Dubois, H. Hügli, Univ. de Neuchâtel (Switzerland) ..... [6382-20]
- 5:20 pm: **Multiresolution 3D measurement using a hybrid fringe projection and moire approach**, K. G. Harding, Q. Hu, GE Global Research ... [6382-21]

### Monday 2 October

#### Robotics and Machine Perception Technical Group Meeting

Hynes Conv. Ctr. Room 109 ..... Mon. 5:30 to 7:00 pm

See p. 7 in Special Events for details.

### Tuesday 3 October

#### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **An improved achromatic half-wave plate phase shifter for white-light interferometry**, S. H. Simson, M. P. Kothiyal, R. S. Sirohi, Indian Institute of Technology Madras (India) ..... [6382-24]
- ✓ **A flexible photogrammetric stereo vision system for capturing the 3D shape of extruded profiles**, C. Teutsch, D. Berndt, S. Sperling, Fraunhofer-Institut für Fabrikbetrieb und -automatisierung (Germany); A. Sobotta, Ingenieurbüro für Numerische Optimierungsmethoden (Germany) . [6382-25]
- ✓ **Dynamic out-of-plane profilometry for nanoscale full-field characterization of MEMS with automatic detection of vibratory modes and MHz measurement bandwidth**, L. Chen, Y. Huang, National Taipei Univ. of Technology (Taiwan); C. C. Chang, Industrial Technology Research Institute (Taiwan) ..... [6382-26]
- ✓ **Stereovision-based vegetable row recognition algorithm for agricultural vehicles**, F. Zhang, Y. Ying, Zhejiang Univ. (China) ..... [6382-27]
- ✓ **Optical on-line product inspection system and its application**, W. Sun, Y. Yang, H. Jiang, X. Wang, Harbin Engineering Univ. (China) ..... [6382-28]
- ✓ **Optimal image enhancement for phase shift analysis sensors**, G. Abramovich, K. Harding, GE Global Research; R. Isaacs, General Electric Co.; Z. Sun, K. Kenny, GE Global Research; L. Tao, GE (China) Research & Development Ctr. Co. Ltd. (China); J. Ross, GE Aircraft Engines; M. Radebach, GE Global Research; G. Song, J. Zheng, M. Jia, GE (China) Research & Development Ctr. Co. Ltd. (China); G. W. Brooksby, GE Global Research ..... [6382-29]

# Wavelet Applications in Industrial Processing IV

Conference Chairs: **Frédéric Truchetet**, Univ. de Bourgogne (France); **Olivier Laligant**, Univ. de Bourgogne (France)

Program Committee: **Patrice Abry**, École Normale Supérieure de Lyon (France); **Radu V. Balan**, Siemens Corporate Research; **Atila M. Baskurt**, Univ. Claude Bernard Lyon 1 (France); **Amel Benazza-Benyahia**, Ecole Supérieure des Communications de Tunis (Tunisia); **Albert Bijaoui**, Observatoire de la Côte d'Azur (France); **Seiji Hata**, Kagawa Univ. (Japan); **Henk J. A. M. Heijmans**, Ctr. for Mathematics and Computer Science (Netherlands); **William S. Hortos**, Associates in Communication Engineering Research and Technology; **Jacques Lewalle**, Syracuse Univ.; **Wilfried R. Philips**, Univ. Gent (Belgium); **Alexandra Pizurica**, Univ. Gent (Belgium); **Guoping Qiu**, The Univ. of Nottingham (United Kingdom); **Hamed Sari-Sarraf**, Texas Tech Univ.; **Peter Schelkens**, Vrije Univ. Brussel (Belgium); **Paul Scheunders**, Univ. Antwerpen (Belgium); **Kenneth W. Tobin, Jr.**, Oak Ridge National Lab.; **Günther K. G. Wernicke**, Humboldt-Univ. zu Berlin (Germany); **Gerald Zauner**, Fachhochschule Wels (Austria)

## Monday 2 October

### SESSION 1

Hynes Conv. Ctr. Room 107 ..... Mon. 8:40 to 10:00 am

#### Image and Signal Analysis

Chair: **Gerald Zauner**, Fachhochschule Wels (Austria)

8:40 am: **Quaternionic wavelet transform: application to color images** (Invited Paper), P. Denis, Univ. de Poitiers (France); P. Carré, Univ. of Poitiers (France) ..... [6383-01]

9:20 am: **Power production monitoring based on a sensor instrumentation system**, F. Poza, P. Mariño, S. Otero, V. Pastoriza, Univ. de Vigo (Spain) [6383-03]

9:40 am: **Application of wavelet transform to analysis of instantaneous speed signals of diesel engines**, M. G. Mehrabi, Univ. of Detroit Mercy ..... [6383-04]

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

### SESSION 2

Hynes Conv. Ctr. Room 107 ..... Mon. 10:30 to 11:50 am

#### Coding

Chair: **Amel Benazza-Benyahia**, Ecole Supérieure des Communications de Tunis (Tunisia)

10:30 am: **Ensuring multimedia content adaptability by means of data hiding techniques**, M. P. Mitrea, S. A. Duta, T. B. Zaharia, F. J. Preteux, Institut National des Télécommunications (France) ..... [6383-05]

10:50 am: **High-quality scalable video coding based on integer-to-integer wavelet transform**, Z. Yang, Q. Qin, Wuhan Univ. (China) ..... [6383-06]

11:10 am: **Joint source and channel coding of embedded wavelet-based coded images using LDPC codes**, M. R. L. Stoufs, A. Munteanu, J. P. H. Cornelis, P. Schelkens, Vrije Univ. Brussel (Belgium) ..... [6383-07]

11:30 am: **Unequal error protection of the reference grid for robust transmission of MeshGrid-represented objects over error-prone channels**, C. D. Cernea, A. Munteanu, M. R. L. Stoufs, A. Alecu, J. P. H. Cornelis, P. Schelkens, Vrije Univ. Brussel (Belgium) ..... [6383-08]

Lunch/Exhibition Break ..... 11:50 am to 1:00 pm

### SESSION 3

Hynes Conv. Ctr. Room 107 ..... Mon. 1:00 to 3:20 pm

#### Inspection and Pattern Recognition

Chair: **Frédéric Truchetet**, Univ. de Bourgogne (France)

1:00 pm: **M-band filter banks and dual-tree wavelets for engine combustion and geophysical image analysis** (Invited Paper), L. C. Duval, Institut Français du Pétrole (France); C. Chauv, J. Pesquet, Univ. de Marne-la-Vallée (France) ..... [6383-09]

1:40 pm: **Appearance-based robot localization using wavelets-PCA**, H. H. Tamimi, Palestine Polytechnic Univ. (Palestinian Territory (Occupied)) . [6383-10]

2:00 pm: **Multiresolution approach to identification of recurring signal patterns**, I. Zeid, S. V. Kamarthi, S. Lakshmanan, Northeastern Univ. [6383-11]

2:20 pm: **Application of wavelet analysis in active infrared thermography for nondestructive testing of carbon composites**, G. Zauner, G. Mayr, G. Hendorfer, Fachhochschule Wels (Austria) ..... [6383-12]

2:40 pm: **Wavelet-based feature extraction method for inspection using cross-sensor image data**, M. Ouendeno, S. P. Kozaitis, Florida Institute of Technology ..... [6383-13]

3:00 pm: **Osteoporosis visualization by densities projection based on kernel convolution method**, W. Ayadi, Ecole Supérieure des Communications de Tunis (Tunisia); S. Sevestre-Ghalila, Univ. René Descartes (France); A. Benazza-Benyahia, Ecole Supérieure des Communications de Tunis (Tunisia) . [6383-14]

Coffee Break ..... 3:20 to 3:50 pm

### SESSION 4

Hynes Conv. Ctr. Room 107 ..... Mon. 3:50 to 5:10 pm

#### Denosing

Chair: **Philippe Carre**, Univ. de Poitiers (France)

3:50 pm: **Denosing of imagery for inspection tasks using higher-order statistics**, S. P. Kozaitis, Florida Institute of Technology ..... [6383-15]

4:10 pm: **Wavelet-based joint video de-interlacing and denosing**, V. Zlokolica, A. Pizurica, W. R. Philips, Univ. Gent (Belgium) ..... [6383-16]

4:30 pm: **Spatially adaptive image denosing based on joint image statistics in the curvelet domain**, L. Tessens, A. Pizurica, Univ. Gent (Belgium); A. Alecu, A. Munteanu, Vrije Univ. Brussel (Belgium); W. R. Philips, Univ. Gent (Belgium) ..... [6383-17]

4:50 pm: **Sound analysis for underwater animals (Haddock sounds) with wavelet denosing techniques**, G. Kokturk, Dokuz Eylul Univ. (Turkey) ..... [6383-18]

### SESSION 5

Hynes Conv. Ctr. Room 107 ..... Mon. 5:10 to 6:10 pm

#### Statistical Approaches

Chair: **Laurent C. Duval**, Institut Français du Pétrole (France)

5:10 pm: **Combined statistical-fractal wavelets signatures for texture recognition**, F. Mourougaya, Univ. de Poitiers (France) ..... [6383-19]

5:30 pm: **Visual browsing in image collections using wavelets**, J. Landre, F. Truchetet, Univ. de Bourgogne (France) ..... [6383-20]

5:50 pm: **Informed audio watermarking in the wavelet domain**, M. P. Mitrea, S. A. Duta, F. Preteux, Institut National des Télécommunications (France) ..... [6383-21]

### Robotics and Machine Perception Technical Group Meeting

Hynes Conv. Ctr. Room 109 ..... Mon. 5:30 to 7:00 pm

See p. 7 in Special Events for details.

## Tuesday 3 October

### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A.

Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday.

Poster authors, see p. 76 for setup instructions.

- ✓ **A comparison of wavelet multiresolution analysis and scale-space edge detection for lithography metrology**, Y. Midoh, J. Imada, K. Nakamae, Osaka Univ. (Japan); H. Fujioka, Fukui Univ. of Technology (Japan) [6383-24]
- ✓ **Lighting inhomogeneities removal by wavelet analysis**, O. Laligant, F. Mériaudeau, F. Truchetet, Univ. de Bourgogne (France) . . . . . [6383-28]
- ✓ **Impact of source-independent modeling on unequal error protection for JPEG2000 images**, E. Salemi, C. Desset, A. Dejonghe, IMEC (Belgium); P. Schelkens, J. P. H. Cornelis, Vrije Univ. Brussel (Belgium) . . . . . [6383-29]
- ✓ **Complex network representation of textures: new perspectives for texture characterization and classification**, T. Chalumeau, F. Meriaudeau, Univ. de Bourgogne (France); L. Fontoura Da Costa, Univ. de São Paulo (Brazil); O. Laligant, Univ. de Bourgogne (France) . . . . . [6383-30]
- ✓ **Modelling and predicting flow regimes using wavelet representations**, D. A. Goodwin, R. G. Aykroyd, S. Barber, Univ. of Leeds (United Kingdom) . . . . . [6383-31]
- ✓ **Strategies for improving the interpretability of Bayesian networks using Markovian time models and genetic algorithms**, A. L. Santana, C. R. Francês, Univ. Federal do Para (Brazil); C. A. Rocha, Univ. da Amazonia (Brazil); S. Carvalho, N. Vijaykumar, Instituto Nacional de Pesquisas Espaciais (Brazil); J. C. W. A. Costa, Univ. Federal do Para (Brazil) . . . . . [6383-32]
- ✓ **Support decision system for load forecast and dependencies modeling in power systems**, C. A. Rocha, Univ. da Amazonia (Brazil); A. L. Santana, C. R. Francês, L. P. Rego, Univ. Federal do Para (Brazil); A. A. Tupiassú, V. Gato, REDE Celpa (Brazil); U. H. Bezerra, J. C. W. A. Costa, Univ. da Amazonia (Brazil) . . . . . [6383-33]
- ✓ **Data mining and energy efficiency: future trends**, S. A. Chaudhari, West Virginia Univ. . . . . [6383-34]
- ✓ **Shape-based mechanisms for content-based retrieval of Aurora images**, C. Cao, T. S. Newman, G. A. Germany, The Univ. of Alabama in Huntsville . . . . . [6383-35]

### Course of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

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SC189 Image Recognition Using Statistical Filtering Techniques, Wavelets and Neural Networks (Javidi) Monday, 8:30 am to 5:30 pm

# Intelligent Robots and Computer Vision XXIV: Algorithms, Techniques, and Active Vision

Conference Chairs: **David P. Casasent**, Carnegie Mellon Univ.; **Ernest L. Hall**, Univ. of Cincinnati; **Juha Röning**, Univ. of Oulu (Finland)

Program Committee: **Gerald R. Lane**, Applied Research Associates, Inc.; **Norbert Lauinger**, Corrsys Datron Sensorsysteme G (Germany); **Dah-Jye Lee**, Brigham Young Univ.; **Charles A. McPherson**, C. S. Draper Lab.; **Yoshihiko Nomura**, Mie Univ. (Japan); **Wolfgang Pözlleitner**, Sensotech GmbH (Austria); **Daniel Raviv**, Florida Atlantic Univ.; **Neelima Shrikhande**, Central Michigan Univ.; **Oliver Sidla**, JOANNEUM RESEARCH GmbH (Austria); **Bernard L. Theisen**, U.S. Army; **Friedrich M. Wahl**, Technische Univ. Braunschweig (Germany); **Ross T. Whitaker**, The Univ. of Utah; **Dili Zhang**, Agfa Monotype Corp.

## Monday 2 October

## SESSION 3

**Robotics and Machine Perception  
Technical Group Meeting**  
Hynes Conv. Ctr. Room 109 ..... Mon. 5:30 to 7:00 pm  
*See p. 7 in Special Events for details.*

Hynes Conv. Ctr. Room 107 ..... Tues. 1:20 to 3:10 pm  
**Visualization, Modeling, and Human Interaction in  
Intelligent Robots**

*Chairs: Norbert Lauinger*, CORRSYS-DATRON GmbH (Germany);  
*Juha Röning*, Oulun Yliopisto (Finland)

1:20 pm: **Embodying a cognitive model in a mobile robot** (*Invited Paper*),  
D. P. Benjamin, Pace Univ.; D. Lonsdale, Brigham Young Univ.; D. Lyons,  
Fordham Univ. .... [6384-07]

1:50 pm: **Visualization of pallets**, R. V. Bostelman, T. Hong, T. Chang, National  
Institute of Standards and Technology .... [6384-08]

2:10 pm: **Indoor environment modeling for interactive robot security  
application**, S. Jo, Q. M. Shahab, Y. Kwon, Korea Institute of Science and  
Technology (South Korea) .... [6384-09]

2:30 pm: **Biomimetic sensory abstraction using hierarchical quilted self-  
organizing maps**, J. W. Miller, P. H. Lommel, Charles Stark Draper Lab.,  
Inc. .... [6384-10]

2:50 pm: **A comparison of single and multiple image stereo for real-time  
robot guidance**, E. L. Hall, D. W. Rosselot, Univ. of Cincinnati ..... [6384-11]

Coffee Break ..... 3:10 to 3:40 pm

### Posters of Related Interest

✓ **Analysis on the jumping of a spherical rolling robot**, L. Wang, Beihang  
Univ. (China); H. Sun, Q. Jia, Beijing Univ. of Posts and Telecommunications  
(China) .... [6384-13]

✓ **Virtual performer: single camera 3D measuring system for interaction in  
virtual space**, K. Sakamoto, S. Taneji, Shimane Univ. .... [6384-14]

✓ **A method of 3D measuring for finger pointing using a single camera**,  
H. Nakayama, K. Sakamoto, Shimane Univ. (Japan) .... [6384-15]

✓ **Functions of images**, J. Lehtonen, A. Andriyashin, J. P. S. Parkkinen,  
Joensuu Yliopisto (Finland); T. Leisti, G. S. Nyman, Univ. of Helsinki  
(Finland) .... [6384-16]

## SESSION 4

Hynes Conv. Ctr. Room 107 ..... Tues. 3:40 to 5:00 pm  
**Pattern Recognition and Applications in Intelligent Robots**

*Chairs: Oliver Sidla*, Joanneum Research (Austria);  
*Yoshihiko Nomura*, Mie Univ. (Japan)

3:40 pm: **Feature optimization and creation of a real-time pattern matching  
system**, E. Wildling, O. Sidla, JOANNEUM RESEARCH GmbH (Austria) [6384-17]

4:00 pm: **Vehicle detection methods for surveillance applications**, O. Sidla,  
E. Wildling, Y. Lypetsky, JOANNEUM RESEARCH GmbH (Austria) .. [6384-18]

4:20 pm: **High-quality and small-capacity e-learning video featuring  
lecturer-superimposing PC screen images**, Y. Nomura, Mie Univ.  
(Japan) .... [6384-19]

4:40 pm: **A parallel unmixing algorithm for hyperspectral images**, S. A.  
Robila, L. Maciack, Montclair State Univ. .... [6384-20]

### Poster of Related Interest

✓ **A new algorithm for fruit shape classification based on level set**, J. Gui,  
Y. Ying, Zhejiang Univ. (China) .... [6384-21]

## Tuesday 3 October

### SESSION 1

Hynes Conv. Ctr. Room 107 ..... Tues. 8:30 to 10:00 am  
**Intelligent Robots: Invited Papers I**

*Chair: David P. Casasent*, Carnegie Mellon Univ.

8:30 am: **Automated synthesis of distortion-invariant filters: AutoMinace**  
(*Invited Paper*), R. Patnaik, D. P. Casasent, Carnegie Mellon Univ. ... [6384-01]

9:00 am: **Emerging directions in human-robotic space exploration  
technologies** (*Invited Paper*), P. S. Schenker, Jet Propulsion Lab. ... [6384-02]

9:30 am: **A telepresence robot system realized by embedded object  
concept** (*Invited Paper*), J. Röning, T. J. Vallius, Oulun Yliopisto  
(Finland) .... [6384-03]

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

### SESSION 2

Hynes Conv. Ctr. Room 107 ..... Tues. 10:30 am to 12:00 pm  
**Intelligent Robots: Invited Papers II**

*Chair: David P. Casasent*, Carnegie Mellon Univ.

10:30 am: **Pedestrian detection in crowded scenes with the histogram of  
gradients principle** (*Invited Paper*), O. Sidla, M. Rosner, Y. Lypetsky,  
JOANNEUM RESEARCH GmbH (Austria) .... [6384-04]

11:00 am: **Remote imagery for unmanned ground vehicles: the future of  
path planning for ground robotics** (*Invited Paper*), B. L. Theisen, P. A.  
Frederick, U.S. Army Tank-automotive and Armaments Command; D. Ward,  
Lockheed Martin Missiles And Fire Control .... [6384-05]

11:30 am: **New experimental diffractive-optical data on E.Land's Retinex  
mechanism in human color vision** (*Invited Paper*), N. Lauinger, CORRSYS-  
DATRON GmbH (Germany) .... [6384-06]

Lunch/Exhibition Break ..... 12:00 to 1:20 pm

✓ **Posters-Tuesday**

Chair: **Surendra M. Gupta**, Northeastern Univ.

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Analysis on the jumping of a spherical rolling robot**, L. Wang, Beihang Univ. (China); H. Sun, Q. Jia, Beijing Univ. of Posts and Telecommunications (China) ..... [6384-13]
- ✓ **Virtual performer: single camera 3D measuring system for interaction in virtual space**, K. Sakamoto, S. Taneji, Shimane Univ. (Japan) ..... [6384-14]
- ✓ **A method of 3D measuring for finger pointing using a single camera**, H. Nakayama, K. Sakamoto, Shimane Univ. (Japan) ..... [6384-15]
- ✓ **Functions of images**, J. Lehtonen, A. Andriyashin, J. P. S. Parkkinen, Joensuu Yliopisto (Finland); T. Leisti, G. S. Nyman, Univ. of Helsinki (Finland) ..... [6384-16]
- ✓ **A new algorithm for fruit shape classification based on level set**, J. Gui, Y. Ying, Zhejiang Univ. (China) ..... [6384-21]
- ✓ **A CMAC neural net-based vehicle-controlling algorithm**, F. Zhang, Y. Ying, Zhejiang Univ. (China); Q. Zhang, Univ. of Illinois at Urbana-Champaign ..... [6384-27]
- ✓ **The measure and control system for agricultural robot**, T. Sun, Y. Ying, F. Zhang, Zhejiang Univ. (China) ..... [6384-28]

**Wednesday 4 October**

**SESSION 5**

Hynes Conv. Ctr. Room 107 ..... Wed. 9:00 to 10:00 am

**Autonomous Robots I**

Chair: **Ernest L. Hall**, Univ. of Cincinnati

- 9:00 am: **An embedded vision system for an unmanned four-rotor helicopter**, D. Lee, B. Godard, S. Fowers, B. Nelson, J. K. Archibald, Brigham Young Univ. .... [6384-24]
- 9:20 am: **Framework for autonomy**, R. Hildebrant, Charles Stark Draper Lab., Inc. .... [6384-25]
- 9:40 am: **Moving target detection through omnidirectional vision fixed on AGV**, S. Yang, Tianjin Univ. (China) and Tianjin Univ. of Technology (China); Z. Cao, C. Ren, Tianjin Univ. of Technology (China); P. He, Tianjin Univ. (China) ..... [6384-26]
- Coffee Break ..... 10:00 to 10:30 am

**SESSION 6**

Hynes Conv. Ctr. Room 107 ..... Wed. 10:30 am to 12:00 pm

**Autonomous Robots II**

Chairs: **Dah-Jye Lee**, Brigham Young Univ.; **Charles A. McPherson**, C. S. Draper Lab., Inc.

- 10:30 am: **Real-time intelligent robot control using an adaptive critic with a task control center and dynamic database (Invited Paper)**, E. L. Hall, X. S. Liao, M. Ghaffari, Univ. of Cincinnati ..... [6384-29]
- 11:00 am: **Obstacle avoidance using predictive vision based on a dynamic 3D world model**, D. P. Benjamin, T. Achtemichuk, Pace Univ.; D. Lyons, Fordham Univ. .... [6384-30]
- 11:20 am: **A design approach for small vision based autonomous vehicles**, B. Edwards, W. Fife, J. K. Archibald, D. Wilde, D. Lee, Brigham Young Univ. .... [6384-31]
- 11:40 am: **High-speed tracking active cameras for obtaining clear object images**, H. Oike, H. Wu, T. Kato, T. Wada, Wakayama Univ. (Japan) . [6384-32]

*Posters of Related Interest*

- ✓ **A CMAC neural net-based vehicle-controlling algorithm**, F. Zhang, Y. Ying, Zhejiang Univ. (China); Q. Zhang, Univ. of Illinois at Urbana-Champaign ..... [6384-27]
- ✓ **The measure and control system for agricultural robot**, T. Sun, Y. Ying, F. Zhang, Zhejiang Univ. (China) ..... [6384-28]
- Lunch Break ..... 12:00 to 1:20 pm

**SESSION 7**

Hynes Conv. Ctr. Room 107 ..... Wed. 1:20 to 3:20 pm

**International Ground Vehicle Competition (IGVC)**

Chair: **Bernard L. Theisen**, U.S. Army Tank-automotive and Armaments Command

- 1:20 pm: **The 14TH Annual Intelligent Ground Vehicle Competition: intelligent teams creating intelligent ground robots**, B. L. Theisen, U.S. Army Tank-automotive and Armaments Command; G. R. Lane, Applied Research Associates, Inc. .... [6384-33]
- 1:40 pm: **Autonomous robot navigation using vision and sensor based algorithm**, S. Bhandari, M. I. Restrepo, A. Mathis, D. Pietrocola, K. Mohiuddin, S. H. Lin, D. J. Ahlgren, Trinity College ..... [6384-34]
- 2:00 pm: **A simple inexpensive and effective implementation of a vision-guided autonomous robo**, B. Tippetts, K. Lillywhite, S. Fowers, A. W. Dennis, C. R. Greco, D. Lee, J. K. Archibald, Brigham Young Univ. .... [6384-35]
- 2:20 pm: **Sensor integration and navigation for autonomous mobile robots**, R. N. Riggins, Bluefield State College; B. V. Mutter, Cart, Inc.; J. Huntley, J. Farmer, S. Baker, J. Keesler, Bluefield State College ..... [6384-36]
- 2:40 pm: **Obstacle recognition using region-based color segmentation techniques for mobile robot navigation**, R. McKeon, M. Krishnan, M. Paulik, Univ. of Detroit Mercy ..... [6384-37]
- 3:00 pm: **Lane identification and path planning for autonomous mobile robots**, R. McKeon, M. Paulik, M. Krishnan, Univ. of Detroit Mercy . . . [6384-38]

**Courses of Related Interest**

Register for courses and get full course descriptions at the SPIE Registration desk.

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SC194 Multispectral and Hyperspectral Image Sensors (Lomheim) Monday, 8:30 am to 12:30 pm

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SC189 Image Recognition Using Statistical Filtering Techniques, Wavelets and Neural Networks (Javid) Monday, 8:30 am to 5:30 pm



# Conference 6385 • Hynes Conv. Ctr. Room 108

Sunday and Tuesday 1 and 3 October 2006 • Proceedings of SPIE Vol. 6385

## Environmentally Conscious Manufacturing VI

Conference Chair: **Surendra M. Gupta**, Northeastern Univ.

Program Committee: **Belarmino Adenso-Díaz**, Univ. de Oviedo (Spain); **Hans-Dietrich Haasis**, Institut Franco-Allemand de Recherches de Saint-Lo (Germany); **Karl Inderfurth**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Kwang J. Kim**, Univ. of Nevada/Reno; **N. Elif Kongar**, Univ. of Bridgeport; **Aybek Korugan**, Bogaziçi Univ. (Turkey); **Alfred J. D. Lambert**, Technische Univ. Eindhoven (Netherlands); **Kenichi Nakashima**, Osaka Institute of Technology (Japan); **Kishore K. Pochampally**, Southern New Hampshire Univ.; **Kurt A. Rosentrater**, U.S. Dept. of Agriculture; **Joseph Sarkis**, Clark Univ.; **Mohsen Shahinpoor**, The Univ. of New Mexico; **Thomas Spengler**, Technische Univ. Braunschweig (Germany); **Pitipong Veerakamolmal**, IBM Corp.

### Sunday 1 October

#### SESSION 1

Hynes Conv. Ctr. Room 108 ..... Sun. 1:00 to 2:00 pm

##### Disassembly

Chair: **Surendra M. Gupta**, Northeastern Univ.

- 1:00 pm: **Computational complexity of a reverse manufacturing line**, S. M. McGovern, John A. Volpe National Transportation Systems Ctr.; S. M. Gupta, Northeastern Univ. .... [6385-01]
- 1:15 pm: **Balancing inventory generated from a disassembly line: mathematical approach**, B. O. Johar, S. M. Gupta, Northeastern Univ. [6385-02]
- 1:30 pm: **Dynamic Kanban system for disassembly line applied to an industrial voice recognition client unit**, E. A. Kizilkaya, S. M. Gupta, Northeastern Univ. .... [6385-03]
- 1:45 pm: **Evolutionary computation with linear physical programming for solving a disassembly-to-order system**, P. Imtavanich, S. M. Gupta, Northeastern Univ. .... [6385-04]

#### SESSION 2

Hynes Conv. Ctr. Room 108 ..... Sun. 2:00 to 3:30 pm

##### Modeling Environmental Problems

Chair: **Joseph Sarkis**, Clark Univ.

- 2:00 pm: **Using interpretive structural modeling to investigate adoption of ECM programs**, J. Sarkis, Clark Univ. .... [6385-05]
- 2:15 pm: **An end-of-life decision methodology and tool to support recycling practices in the footwear industry**, T. Staikos, S. Rahimifard, Loughborough Univ. (United Kingdom) .... [6385-06]
- 2:30 pm: **Modeling the economics of blending organic processing waste streams**, K. A. Rosentrater, U.S. Dept. of Agriculture .... [6385-07]
- 2:45 pm: **Modeling organic product and residue stream flows on a constituent basis**, K. A. Rosentrater, U.S. Dept. of Agriculture .... [6385-08]
- 3:00 pm: **A data envelopment analysis approach for material flow analysis**, N. E. Kongar, D. B. Mueller, Yale Univ. .... [6385-09]
- 3:15 pm: **A multi-criteria framework to maximize profits for product recovery facilities**, S. Vadde, S. V. Kamarthi, S. M. Gupta, Northeastern Univ. .... [6385-10]
- Coffee Break ..... 3:30 to 4:00 pm

#### SESSION 3

Hynes Conv. Ctr. Room 108 ..... Sun. 4:00 to 5:00 pm

##### Reverse and Closed Loop Supply Chains

Chair: **Kishore K. Pochampally**, Southern New Hampshire Univ.

- 4:00 pm: **A six sigma tolerancing approach for the design of an efficient closed-loop supply chain network**, S. Nukala, S. M. Gupta, Northeastern Univ. .... [6385-11]
- 4:15 pm: **Supplier selection in a closed-loop supply chain network: an ANP-goal programming-based methodology**, S. Nukala, S. M. Gupta, Northeastern Univ. .... [6385-12]
- 4:30 pm: **Total quality management (TQM) in a reverse supply chain**, K. K. Pochampally, Southern New Hampshire Univ.; S. Nukala, S. M. Gupta, Northeastern Univ. .... [6385-13]
- 4:45 pm: **Developing the reverse logistics network for product returns**, N. Zaarour, E. Melachrinoudis, Northeastern Univ.; H. Min, Univ. of Louisville .... [6385-14]

#### SESSION 4

Hynes Conv. Ctr. Room 108 ..... Sun. 5:00 to 6:00 pm

##### Sustainability and Industrial Ecology

Chair: **Kurt A. Rosentrater**, U.S. Dept. of Agriculture

- 5:00 pm: **Initiating a waste management and resource recovery network: a college, NGO, and corporate partnership**, I. Dunmade, Mount Royal College (Canada) .... [6385-15]
- 5:15 pm: **Designing for multi-lifecycles to promote industrial ecology philosophy**, I. Dunmade, Mount Royal College (Canada) .... [6385-16]
- 5:30 pm: **Motivations and profits of the reverse logistics activities**, B. Gonzalez-Torre, A. Díaz-Fernandez, M. Alvarez-Abella, P. Gonzalez-Torre, Univ. de Oviedo (Spain) .... [6385-17]
- 5:45 pm: **Strategic sustainability justification for reverse logistics**, J. Sarkis, Clark Univ. .... [6385-18]

### Tuesday 3 October

#### Environmental Issues (Poster Session)

##### ✓ Posters-Tuesday

Chair: **Surendra M. Gupta**, Northeastern Univ.

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Strategic and tactical planning of a closed-loop supply chain network under uncertainty**, S. Nukala, S. M. Gupta, Northeastern Univ. ... [6385-19]
- ✓ **Effective marketing of a closed-loop supply chain network: a fuzzy QFD approach**, S. Nukala, S. M. Gupta, Northeastern Univ. .... [6385-20]
- ✓ **Controlling disassembly line with multi-Kanban system**, G. Udomsawat, S. M. Gupta, Northeastern Univ. .... [6385-21]
- ✓ **Solving a disassembly-to-order system by using genetic algorithm and weighted fuzzy goal programming**, P. Imtavanich, S. M. Gupta, Northeastern Univ. .... [6385-22]
- ✓ **Near optimum disassembly sequencing**, A. J. D. Lambert, Technische Univ. Eindhoven (Netherlands); S. M. Gupta, Northeastern Univ. ... [6385-23]
- ✓ **Optimal inventory control with consideration for LCA**, K. Nakashima, Osaka Institute of Technology (Japan); S. M. Gupta, Northeastern Univ. .... [6385-24]

# Conference 6386A • Hynes Conv. Ctr. Room 111

Sunday 1 October 2006

Part of Proceedings of SPIE Vol. 6386: Optical Methods in the Life Sciences

*"With the advent of new and revolutionary imaging, sensing and diagnostic technologies and applications, the life sciences are entering new and uncharted territories. The integration of mature optical tools is creating new capabilities in biological detection, while state-of-art tools bring new opportunities. Optics East is shaping up to be a great venue to discuss current and future developments in the life sciences."*

**J. Paul Robinson**, SVM Professor of Cytomics, Professor of Immunopharmacology & Biomedical Engineering  
Director, Purdue University Cytometry Laboratories, Life Sciences Symposium Chair

## Optical Methods in Drug Discovery and Development II

Conference Chair: **Mostafa Analoui**, Pfizer Inc.

Cochair: **J. Paul Robinson**, Purdue Univ.

Program Committee: **Fred S. Azar**, Siemens Corporate Research; **Bohumil Bednar**, Merck and Co., Inc.; **Amir H. Gandjbakhche**, National Institutes of Health; **Michael Hehenberger**, IBM Healthcare and Life Sciences; **Elizabeth M. C. Hillman**, Massachusetts General Hospital; **Floris P. Jansen**, GE Global Research; **Michael J. Levene**, Yale Univ.; **Craig S. Levin**, Stanford Univ. School of Medicine; **Michael J. Natan**, Nanoplex Technologies, Inc.; **Martin Rausch**, Novartis Pharma S.A. (France); **Markus Rudin**, ETH Zürich (Switzerland); **Colin J. R. Sheppard**, National Univ. of Singapore (Singapore); **D. Lansing Taylor**, Cellomics, Inc.; **Steven A. Toms**, The Cleveland Clinic Foundation; **Vincent Vilker**, National Institute of Standards and Technology; **Tuan Vo-Dinh**, Duke Univ.; **Warren S. Warren, Sr.**, Duke Univ.; **Christopher Watts**, U.S. Food and Drug Administration; **Li Yan**, Johnson & Johnson; **Yantian Zhang**, National Institutes of Health

### Sunday 1 October

#### Chair Introduction

Hynes Conv. Ctr. Room 111 ..... Sun. 1:00 to 1:20 pm  
**Mostafa Analoui**, Pfizer Inc.; **J. Paul Robinson**, Purdue Univ.

#### SESSION 1

Hynes Conv. Ctr. Room 111 ..... Sun. 1:20 to 4:10 pm  
**Devices and Measurement**

Chairs: **Mostafa Analoui**, Pfizer Inc.; **J. Paul Robinson**, Purdue Univ.

- 1:20 pm: **Biological applications of hyperspectral fluorescence imaging**, D. D. Tuschel, A. Bangalore, ChemImage Corp. .... [6386A-01]  
1:40 pm: **New ultrafast laser system based on the chromium: Forsterite for multiphoton in vivo imaging**, S. E. Egorov, C. C. Barnes, A. J. Carson, Del Mar Photonics, Inc. .... [6386A-02]  
2:00 pm: **Quantum dots imaging for observing mung bean seeding**, S. Fu, T. Chia, L. C. Kwek, C. S. Lim, Nanyang Technological Univ. (Singapore) .... [6386A-03]  
2:20 pm: **Rapid analysis of drugs during clinical trials using saliva and disposable lab-on-a-chips**, C. S. Shende, F. E. Inscore, P. Maksymiuk, S. Farquharson, Real-Time Analyzers, Inc. .... [6386A-04]  
2:40 pm: **Laser application in assessing selected African herbal medicines**, E. Jonathan, Harare Institute of Technology (Zimbabwe) .... [6386A-05]  
Coffee Break ..... 3:00 to 3:30 pm  
3:30 pm: **FRET imaging by picosecond TCSPC laser scanning microscopy**, A. Bergmann, W. Becker, Becker & Hickl GmbH (Germany) .... [6386A-06]  
3:50 pm: **Investigation of the excited states dynamics in the Chl d-containing cyanobacterium *Acaryochloris marina* by time- and wavelength correlated single-photon counting**, F. Schmitt, C. Theiss, H. J. Eichler, H. Eckert, Technische Univ. Berlin (Germany) .... [6386A-07]

#### Courses of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

SC309 Fluorescent Markers: Usage and Optical System Optimization (Levi)  
8:30 am to 12:30 pm

SC461 Bio-Optical Detection Systems (Levi), 1:30 to 5:30 pm

SC800 Instruments for Light Spectroscopy (Saptari), 1:30 to 5:30 pm

SC194 Multispectral and Hyperspectral Image Sensors (Lomheim), 8:30 am to 12:30 pm

SC802 Practical Near Infrared and Raman Spectroscopy Applications (McDermott, Botonjic), 8:30 am to 12:30 pm

#### SESSION 2

Hynes Conv. Ctr. Room 111 ..... Sun. 4:10 to 5:50 pm  
**Quantitative Analysis**

Chairs: **Mostafa Analoui**, Pfizer Inc.; **J. Paul Robinson**, Purdue Univ.

- 4:10 pm: **Cell transformation assays for drug carcinogenicity studies: a new structure-texture classifier of foci**, C. Urani, G. F. Crosta, L. Fumarola, Univ. degli Studi di Milano-Bicocca (Italy) .... [6386A-08]  
4:30 pm: **Assessing drug-induced regeneration of demyelinated nerve fibers: an outbreak from quantitative morphology**, L. Fumarola, C. Urani, G. F. Crosta, Univ. degli Studi di Milano-Bicocca (Italy) .... [6386A-09]  
4:50 pm: **Colony recognition and scoring in hematotoxicity assays by an image stack classifier**, G. F. Crosta, L. Fumarola, Univ. degli Studi di Milano-Bicocca (Italy); I. Malerba, L. Gribaldo, Joint Research Ctr. (Italy) ... [6386A-10]  
5:10 pm: **Optical speckle angular correlation and fractal property of a composite of cancer/normal cell layers with application for laboratory monitoring of drug efficacy**, R. Sullivan, R. Subramaniam, P. S. Schneider, A. Flamholz, E. Cheung, S. Rotenberg, P. K. Wong, D. Lieberman, T. D. Cheung, R. Perez, Queensborough Community College/CUNY ..... [6386A-11]  
5:30 pm: **For our eyes only: challenges in realizing the promise of quantitative microscopy imaging**, A. D. Kalvin, IBM Thomas J. Watson Research Ctr. .... [6386A-12]

#### Special Session Smart Medical Home

Wednesday 4 October • 2:00 to 4:00 pm  
Hynes Convention Center, Room 100

Chair: **Israel Gannot**, Tel-Aviv Univ. (Israel) and George Washington Univ.

This special session will deal with different aspects of the smart medical home idea. The panelists come from different disciplines: medicine, biomedical sciences, architecture, and engineering, and they will present the projects that they are heading in their universities. After the presentations there will be a panel discussion with active participation from the audience on the presented issues, as well as psychological and philosophical aspects of the smart medical home concept.

See p. 5 for more information.

# Conference 6386B • Hynes Conv. Ctr. Room 111

Monday-Tuesday 2-3 October 2006 • Part of Proceedings of SPIE Vol. 6386: Optical Methods in the Life Sciences

## Infrared, Mid-IR, and THz Technologies for Health and the Environment

Conference Chairs: **Alexey A. Belyanin**, Texas A&M Univ.; **Rebekah A. Drezek**, Rice Univ.; **Claire F. Gmachl**, Princeton Univ.

Program Committee: **Mark G. Allen**, Physical Sciences Inc.; **Hui Chun Liu**, National Research Council Canada (Canada); **Tanya L. Myers**, Pacific Northwest National Lab.; **Josh Pfefer**, U.S. Food and Drug Administration; **Gottfried Strasser**, Technische Univ. Wien (Austria); **Urs Utzinger**, The Univ. of Arizona

### Monday 2 October

#### SESSION 3

Hynes Conv. Ctr. Room 111 ..... Mon. 8:20 to 10:00 am

##### Novel Mid-IR Sources and Photonics

Chair: **Alexey A. Belyanin**, Texas A&M Univ.

8:20 am: **Shockley-Reed-Hall and Auger recombination in 0.5-0.6 eV GaSb-based photonic devices** (*Invited Paper*), D. V. Donetsky, Stony Brook Univ. .... [6386B-13]

8:50 am: **Mid-infrared electroluminescence from InAs quantum dots**, D. Wasserman, C. F. Gmachl, S. A. Lyon, Princeton Univ.; E. A. Shaner, Sandia National Labs. .... [6386B-14]

9:10 am: **Silicon-on-lithium niobate waveguides for the mid-infrared**, M. Solmaz, C. K. Madsen, Texas A&M Univ. .... [6386B-15]

9:30 am: **Recent progress by mid-IR antimonide type-II "W" interband cascade lasers and LWIR detectors** (*Invited Paper*), C. L. Canedy, I. Vurgaftman, W. W. Bewley, C. Kim, M. Kim, J. R. Lindle, J. R. Meyer, E. H. Aifer, J. G. Tischler, J. H. Warner, E. M. Jackson, Naval Research Lab. .... [6386B-16]

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

#### SESSION 4

Hynes Conv. Ctr. Room 111 ..... Mon. 10:30 am to 12:30 pm

##### Quantum Cascade Lasers

Chair: **Dan Wasserman**, Princeton Univ.

10:30 am: **Probing the electronic and optical properties of quantum cascade lasers under operating conditions** (*Invited Paper*), J. W. Cockburn, D. Revin, L. R. Wilson, M. Soulby, A. B. Krysa, The Univ. of Sheffield (United Kingdom); M. F. Pereira, Jr., Sheffield Hallam Univ. (United Kingdom); J. S. Roberts, R. J. Airey, The Univ. of Sheffield (United Kingdom) .. [6386B-17]

11:00 am: **Spectral tuning and mode competition of quantum cascade lasers studied by time-resolved Fourier transform spectroscopy**, F. Fuchs, C. Mann, Q. Yang, W. Bronner, B. Raynor, K. Köhler, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) .... [6386B-18]

11:20 am: **Modeling of room-temperature high-performance quantum cascade lasers**, S. S. Howard, Z. Liu, D. Wasserman, A. J. Hoffman, C. F. Gmachl, Princeton Univ.; D. L. Sivco, Lucent Technologies/Bell Labs.; L. Cheng, F. Choa, Univ. of Maryland/Baltimore County; X. Wang, T. Tanbun-Ek, AdTech Optics .... [6386B-19]

11:40 am: **In-plane integration of quantum cascade lasers with resonant intersubband nonlinearities**, A. A. Belyanin, F. Xie, D. Smith, Texas A&M Univ. .... [6386B-20]

12:00 pm: **Intersubband nonlinearities in GaAs-based quantum cascade lasers** (*Invited Paper*), S. Schartner, M. Austerer, C. J. Pflügl, T. Roch, A. M. Andrews, W. Schrenk, G. Strasser, Technische Univ. Wien (Austria) . [6386B-21]

Lunch/Exhibition Break ..... 12:30 to 2:00 pm

#### SESSION 5

Hynes Conv. Ctr. Room 111 ..... Mon. 2:00 to 3:40 pm

##### Mid-IR Sensing I

Chair: **Konstantin L. Vodopyanov**, Stanford Univ.

2:00 pm: **A new frontier: mid-infrared chemical sensors based on single-mode waveguides** (*Invited Paper*), B. Mizakoff, Georgia Institute of Technology ..... [6386B-22]

2:30 pm: **Breath test for o.s.s. detection in humans compared to free radical analysis in blood**, G. Giubileo, ENEA (Italy); S. Mandolesi, International Foundation of Angiology (Italy); A. Puiu, National Institute for Lasers, Plasma and Radiation Physics (Romania) ..... [6386B-23]

2:50 pm: **Breath acetone detection**, S. M. Massick, A. Vakhtin, Southwest Sciences, Inc. .... [6386B-24]

3:10 pm: **Of wristwatches, organ-pipes, and insects: quartz-enhanced photoacoustic spectroscopy** (*Invited Paper*), A. A. Kosterev, Rice Univ. .... [6386B-25]

Coffee Break ..... 3:40 to 4:00 pm

#### SESSION 6

Hynes Conv. Ctr. Room 111 ..... Mon. 4:00 to 5:40 pm

##### Mid-IR Sensing II

Chair: **Boris Mizaikoff**, Georgia Institute of Technology

4:00 pm: **A mid-IR ICL-based sensor for field measurements of ambient CH<sub>4</sub>** (*Invited Paper*), D. M. Sonnenfroh, M. L. Silva, M. G. Allen, Physical Sciences Inc. .... [6386B-26]

4:30 pm: **Quartz-enhanced photoacoustic spectroscopy based formaldehyde sensor using a mid-IR interband cascade laser**, Y. A. Bakhrin, A. A. Kosterev, T. Ajtai, Rice Univ.; R. Q. Yang, Jet Propulsion Lab.; F. K. Tittel, Rice Univ. .... [6386B-27]

4:50 pm: **Gas phase photoacoustic spectroscopy in the mid-wave infrared using quartz tuning**, M. D. Wojcik, Pacific Northwest National Lab. [6386B-28]

5:10 pm: **Tunable THz source based on frequency conversion in quasi-phase-matched GaAs** (*Invited Paper*), K. L. Vodopyanov, J. Schaar, M. M. Fejer, X. Yu, J. S. Harris, Stanford Univ.; Y. Lee, Oregon State Univ.; V. G. Kozlov, Microtech Instruments, Inc.; G. Imeshev, M. E. Fermann, IMRA America, Inc.; D. F. Bliss, C. Lynch, Air Force Research Lab. .... [6386B-29]

### Courses of Related Interest

Register for courses and get full course descriptions at the SPIE Registration desk.

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SC309 Fluorescent Markers: Usage and Optical System Optimization (Levi)  
8:30 am to 12:30 pm

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SC461 Bio-Optical Detection Systems (Levi), 1:30 to 5:30 pm

---

SC800 Instruments for Light Spectroscopy (Saptari), 1:30 to 5:30 pm

---

SC194 Multispectral and Hyperspectral Image Sensors (Lomheim), 8:30 am to 12:30 pm

---

SC802 Practical Near Infrared and Raman Spectroscopy Applications (McDermott, Botonjic), 8:30 am to 12:30 pm

**Tuesday 3 October**

**SESSION 7**

**Hynes Conv. Ctr. Room 111 . . . . . Tues. 8:30 to 10:10 am**

**Visible and Near-IR Devices and Applications**

*Chair: Rebekah A. Drezek, Rice Univ.*

8:30 am: **Linear and non-linear optical microscopy and spectroscopy of human papilloma virus transfected cells** (*Invited Paper*), I. Georgakondi, J. M. Levitt, A. Baldwin, C. Mujat, C. A. Greiner, L. A. Stucenski, Tufts Univ.; K. Münger, Harvard Medical School . . . . . [6386B-30]

9:00 am: **Interstitial Doppler OCT monitoring of microvascular shutdown during photodynamic therapy in a Dunning prostate model: fluence rate dependences**, B. A. Standish, H. Li, A. Mariampillai, N. R. Munce, S. Chiu, Univ. of Toronto (Canada); I. A. Vitkin, Univ. of Toronto (Canada) and Ontario Cancer Institute (Canada) and Radiation Oncology (Canada); V. X. D. Yang, Univ. of Toronto (Canada) and Ryerson Univ. (Canada) and Sunnybrook Health Science Ctr. (Canada) . . . . . [6386B-31]

9:20 am: **Diffusion approximation model of photon migration in the human lung**, Z. Sikorski, M. Furmanczyk, CFD Research Corp. . . . . [6386B-32]

9:40 am: **Time-domain in vivo near-infrared brain imaging in adult humans** (*Invited Paper*), H. Wabnitz, Physikalisch-Technische Bundesanstalt (Germany); M. Moeller, Physikalisch-Technische Bundesanstalt (Germany) and Hochschule für Technik und Wirtschaft des Saarlandes (Germany); A. Liebert, Physik-Tech Bundesanstalt (Germany) and Institute of Biocybernetics and Biomedical Engineering (Poland); C. Drenckhahn, J. P. Dreier, H. Obrig, J. Steinbrink, Charité-Univ. Medizin Berlin (Germany); R. Macdonald, Physikalisch-Technische Bundesanstalt (Germany) . . . . . [6386B-33]

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

**SESSION 8**

**Hynes Conv. Ctr. Room 111 . . . . . Tues. 10:40 am to 12:20 pm**

**THz Devices and Applications**

*Chair: Claire F. Gmachl, Princeton Univ.*

10:40 am: **Solid state microelectronic terahertz receivers and transceivers** (*Invited Paper*), M. Lee, M. C. Wanke, E. A. Shaner, J. L. Reno, Sandia National Labs.; S. J. Allen, Univ. of California/Santa Barbara . . . . . [6386B-34]

11:10 am: **Vertically emitting quantum cascade lasers based on photonic crystal resonators**, L. Sirigu, R. Terazzi, M. I. Amanti, M. Giovannini, Univ. de Neuchâtel (Switzerland); L. A. Dunbar, R. Houdré, École Polytechnique Fédérale de Lausanne (Switzerland); J. Faist, Univ. de Neuchâtel (Switzerland) [6386B-35]

11:30 am: **Terahertz pulsed imaging and spectroscopy of breast tumors**, V. P. Wallace, A. Fitzgerald, E. Pickwell, TeraView Ltd. (United Kingdom) . . . . . [6386B-36]

11:50 am: **Device and application of quantum well photodetectors for terahertz region** (*Invited Paper*), H. Luo, H. C. Liu, C. Song, Z. R. Wasilewski, A. J. Springthorpe, National Research Council Canada (Canada) . . . [6386B-37]

**Don't Miss the Exhibition!**  
Tuesday · 10:00 am to 5:00 pm  
Wednesday · 10:00 am to 4:00 pm  
*See p. 10 for details.*

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# Conference 6387 Hynes Conv. Ctr. Room 103

Monday-Tuesday 2-3 October 2006  
Proceedings of SPIE Vol. 6387

"ITCom is a great forum to exchange ideas and insights about the technical and economic issues around the advancement of broadband networking and access, and the types of multimedia applications such networks make possible-now and in the future."

**Achyut Dutta**, Banpul Photonics; **Werner Weierhausen**, T-Systems Enterprise Services GmbH, ITCom Symposium Chairs

## Next-Generation Communication and Sensor Networks 2006

Conference Chairs: **Mohammed Atiquzzaman**, Univ. of Oklahoma; **Sergey I. Balandin**, Nokia Research Ctr. (Finland)

Program Committee: **Song Ci**, Univ. of Massachusetts/Boston; **Arjan Durresi**, Louisiana State Univ.; **William S. Hortos**, Associates in Communication Engineering Research and Technology; **Frank Huebner**, AT&T Labs; **Dilip Sarkar**, Univ. of Miami; **Robert D. van der Mei**, Vrije Univ. Amsterdam (Netherlands) and CWI (Netherlands)

### Monday 2 October

#### Plenary Session

Hynes Conv. Ctr. Room 100 . . . . . Mon. 9:30 am to 12:00 pm

Chairs: **Achyut K. Dutta**, Banpul Photonics, Inc.; **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

9:30 am: **The NSF/SBIR Innovation Model** (Invited Paper, Presentation Only), **M. S. Nair**, National Science Foundation

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

10:40 am: **Prospects of silicon photonics for future VLSI interconnects** (Invited Paper, Presentation Only), **M. J. Paniccia**, Intel Corp.

11:20 am: **Flexible optical transport networks: demands and trends on new Layer 2 techniques** (Invited Paper, Presentation Only), **G. J. Eilenberger**, Alcatel SEL AG (Germany)

Lunch Break . . . . . 12:00 to 1:30 pm

#### SESSION 1

Hynes Conv. Ctr. Room 103 . . . . . Mon. 1:30 to 3:20 pm

##### Communication Networks I

Chair: **Halid Hrasnica**, Eurescom GmbH (Germany)

1:30 pm: **Per-packet reservation MAC protocols** (Invited Paper), **H. Hrasnica**, Eurescom GmbH (Germany) . . . . . [6387-01]

2:00 pm: **A decentralized load balancer for grid networks (Presentation Only)**, **O. A. Abu-Rahmeh**, **P. Johnson**, **A. Taleb-Bendiab**, Liverpool John Moores Univ. (United Kingdom) . . . . . [6387-02]

2:20 pm: **Evaluation of reliable solutions for on-chip and off-chip embedded interconnect architectures (Presentation Only)**, **M. Gillet**, Nokia (Finland) . . . . . [6387-03]

2:40 pm: **Parallel hierarchical networks in communications**, **O. V. Malinochka**, Kiev Univ. of Economy and Transport Technology (Ukraine) . . . . . [6387-04]

3:00 pm: **Reliability evaluation model for multi-states WDM networks**, **H. Fan**, **X. Sun**, Southeast Univ. (China) . . . . . [6387-05]

Coffee Break . . . . . 3:20 to 3:50 pm

#### SESSION 2

Hynes Conv. Ctr. Room 103 . . . . . Mon. 3:50 to 4:50 pm

##### Communication Networks II

Chair: **Naoki Wakamiya**, Osaka Univ. (Japan)

3:50 pm: **A cooperation mechanism of pure P2P file-sharing networks to improve application-level QoS**, **N. Wakamiya**, **J. Konishi**, **M. Murata**, Osaka Univ. (Japan) . . . . . [6387-06]

4:10 pm: **Survivable passive access network SPAN**, **M. U. Wasim**, **S. M. H. Zaidi**, National Univ. of Science and Technology (Pakistan); **M. Y. Raja**, Univ. of North Carolina at Charlotte; **N. Ghani**, Tennessee Technological Univ.; **R. Ahmad**, National Univ. of Science and Technology (Pakistan) . . . . . [6387-07]

4:30 pm: **Information gathering system based on combination of random and selective accesses for ubiquitous environments**, **Y. Hirano**, **M. Sasabe**, **H. Nakano**, Osaka Univ. (Japan) . . . . . [6387-08]

### Tuesday 3 October

#### SESSION 3

Hynes Conv. Ctr. Room 103 . . . . . Tues. 9:00 to 10:00 am

##### Adhoc and Sensor Networks

Chair: **Mohammed Atiquzzaman**, Univ. of Oklahoma

9:00 am: **Performance evaluation of reactive and proactive routing protocol in IEEE 802.11 ad hoc network**, **S. Hamma**, **J. V. Guédon**, **E. Cizeron**, **H. Issaka**, Univ. de Nantes (France) . . . . . [6387-14]

9:20 am: **INFOCUS: information corroboration from UAV sensors**, **M. L. Talbert**, Air Force Research Lab.; **P. D. Baldwin**, United States Strategic Command . . . . . [6387-15]

9:40 am: **A novel FBG sensor network with high survivability**, **P. Wei**, **X. Sun**, Southeast Univ. (China) . . . . . [6387-16]

#### ✓ Posters-Tuesday

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

✓ **A role-based global trust model for peer-to-peer systems**, **J. Zhang**, **Z. Zhao**, Tianjin Univ. (China); **M. Ma**, Nanyang Technological Univ. (Singapore) . . . . . [6387-09]

✓ **Decentralized session initiation protocol solution in ad hoc networks**, **L. Han**, **Z. Jin**, **Y. Shu**, Tianjin University (China) . . . . . [6387-10]

✓ **Wireless network traffic modeling based on extreme value theory**, **C. Liu**, **Y. Shu**, Tianjin Univ. (China); **O. W. W. Yang**, Univ. of Ottawa (Canada); **J. Liu**, **Y. Xu**, Tianjin Univ. (China) . . . . . [6387-11]

✓ **Application of MAC delay in TCP fairness improvement in ad hoc wireless networks**, **L. Dong**, **Y. Shu**, **T. Guan**, Tianjin Univ. (China) . . . . . [6387-12]

✓ **HASN: a power saving and reliable communication paradigm for sensor networks**, **Q. Zhang**, **Z. Zhao**, Tianjin Univ. (China) . . . . . [6387-17]

✓ **Implementation of an effective video transmission scheme over ad hoc networks**, **L. Liu**, **Z. Jin**, **Y. Shu**, Tianjin Univ. (China) . . . . . [6387-18]

✓ **Agent-based web services gateway**, **N. Park**, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6387-19]

✓ **High-speed readout method of ID information on a large amount of electronic tags**, **W. Nagate**, **M. Sasabe**, **H. Nakano**, Osaka Univ. (Japan) . . . . . [6387-21]

✓ **Dynamic coordination rules in peer-to-peer database**, **Z. Zhao**, **Z. Zheng**, Tianjin Univ. (China) . . . . . [6387-22]

✓ **A new wavelength assignment scheme for supporting QoS in optical burst switching networks**, **Z. Zhang**, **L. Li**, Chongqing Univ. of Posts and Telecommunications (China) . . . . . [6387-23]

✓ **Throughput analysis of IEEE 802.11-based ad hoc networks in presence of selfish node**, **C. Liu**, **Y. Shu**, **S. Wang**, Tianjin Univ. (China) . . . . . [6387-24]

✓ **Fixed-rate layered multicast congestion control**, **B. Zhang**, **Z. Liu**, **B. Yuan**, Xidian Univ. (China) . . . . . [6387-25]

# Optical Transmission Systems and Equipment for Networking V

Conference Chairs: **Benjamin B. Dingel**, Nasfinc Photonics, Inc.; **Ken-ichi Sato**, Nagoya Univ. (Japan); **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany); **Achyut K. Dutta**, Banpil Photonics

Program Committee: **Soichiro Araki**, NEC Corp. (Japan); **Kwok-Wai Cheung**, The Chinese Univ. of Hong Kong (China); **Milorad Cvijetic**, NEC USA, Inc.; **Niloy K. Dutta**, Univ. of Connecticut; **Tarek S. El-Bawab**, Jackson State Univ.; **Ronald Freund**, Heinrich-Hertz-Institut für Nachrichtentechnik Berlin GmbH (Germany); **Weisheng Hu**, Shanghai Jiao Tong Univ. (China); **Ira Jacobs**, Virginia Polytechnic Institute and State Univ.; **Raj Jain**, Washington Univ. in St. Louis; **Bongtae Kim**, Electronic and Telecommunications Research Institute (South Korea); **Franko Küppers**, College of Optical Sciences/The Univ. of Arizona; **Hideo Kuwahara**, Fujitsu Network Communications, Inc.; **Ralph Leppla**, T-Systems International GmbH (Germany); **Ming-Jun Li**, Corning Inc.; **Hiroji Masuda**, Nippon Telegraph and Telephone Corp. (Japan); **Muriel Medard**, Massachusetts Institute of Technology; **Yoshiaki Nakano**, The Univ. of Tokyo (Japan); **Christian Schäffer**, Technische Univ. Dresden (Germany); **Ernst-Dieter Schmidt**, Siemens AG (Germany); **Masashi Usami**, KDDI R&D Labs. (Japan); **Richard E. Wagner**, Corning Inc.; **Winston I. Way**, OpVista Inc.; **Chris Xu**, Cornell Univ.

## Monday 2 October

### Plenary Session

Hynes Conv. Ctr. Room 100 ..... Mon. 9:30 am to 12:00 pm

Chairs: **Achyut K. Dutta**, Banpil Photonics, Inc.; **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

9:30 am: **The NSF/SBIR Innovation Model** (Invited Paper, Presentation Only), **M. S. Nair**, National Science Foundation

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

10:40 am: **Prospects of silicon photonics for future VLSI interconnects** (Invited Paper, Presentation Only), **M. J. Paniccia**, Intel Corp.

11:20 am: **Flexible optical transport networks: demands and trends on new Layer 2 techniques** (Invited Paper, Presentation Only), **G. J. Eilenberger**, Alcatel SEL AG (Germany)

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 1

Note Room change:

Hynes Conv. Ctr. Room 101 ..... Mon. 1:30 to 2:00 pm

#### Special Keynote Session

Chairs: **Benjamin B. Dingel**, Nasfinc Photonics, Inc.; **Ken-ichi Sato**, Nagoya Univ. (Japan)

#### Keynote

1:30 pm: **Self-managing networks** (Invited Paper, Presentation Only), **V. Bahl**, Microsoft Corp. .... [6390-01]

### SESSION 2

Note Room change:

Hynes Conv. Ctr. Room 101 ..... Mon. 2:00 to 3:30 pm

#### Joint Session/Workshop: Global Trends in Broadband Access & Optical Network Testbed Systems

Chairs: **Benjamin B. Dingel**, Nasfinc Photonics, Inc.; **Ken-ichi Sato**, Nagoya Univ. (Japan)

2:00 pm: **BREAD: a European coordination action for broadband for all** (Invited Paper), **P. Van Daele**, Univ. Gent (Belgium) .... [6390-03]

2:30 pm: **FAST copper for broadband access** (Invited Paper), **M. Chiang**, Princeton Univ. .... [6390-04]

3:00 pm: **Nation-wide GMPLS/OXC networking experiments over JGN II test bed** (Invited Paper), **Y. Sameshima**, National Institute of Information and Communications Technology (Japan) .... [6388-01]

Coffee Break ..... 3:30 to 4:00 pm

### SESSION 3

Hynes Conv. Ctr. Room 105 ..... Mon. 4:00 to 5:30 pm

#### Recent Advances in Transmission Technologies and Optical Processing

Chairs: **Ken-ichi Sato**, Nagoya Univ. (Japan); **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

4:00 pm: **Management of nonlinearity in modern optical fiber transmission** (Invited Paper), **X. Liu**, Lucent Technologies/Bell Labs. .... [6388-03]

4:30 pm: **Suppression of intrachannel nonlinear effects in high-speed WDM systems** (Invited Paper), **I. B. Djordjevic**, **B. V. Vasic**, The Univ. of Arizona ..... [6388-04]

5:00 pm: **Parametric processing of optical signals** (Invited Paper), **C. J. McKinstrie**, Lucent Technologies/Bell Labs. .... [6388-05]

## Tuesday 3 October

### SESSION 4

Note Room change:

Hynes Conv. Ctr. Room 101 ..... Tues. 8:30 to 10:30 am

#### Joint Session/Workshop: Next Generation Integrated Networks and Advanced Access Technologies

Chairs: **Benjamin B. Dingel**, Nasfinc Photonics, Inc.; **Raj Jain**, Washington Univ. in St. Louis

8:30 am: **Future integrated broadband fiber, wireless, and satellite networks** (Invited Paper), **V. W. S. Chan**, Massachusetts Institute of Technology [6388-06]

9:00 am: **Advances and challenges of IP plus photonic networks** (Invited Paper, Presentation Only), **K. Sato**, Nagoya Univ. (Japan) .... [6388-07]

9:30 am: **Toward high-speed access technologies: results from MUSE**, **J. S. Wellen**, **R. C. Smets**, **W. Hellenthal**, Lucent Technologies/Bell Labs. (Netherlands); **S. D. Walker**, **J. J. Lepley**, **I. Tsalamani**, The Univ. of Essex (United Kingdom); **T. Koonen**, **G. Rijckenberg**, **A. Ng'oma**, Technische Univ. Eindhoven (Netherlands); **K. Langer**, **K. Habel**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) .... [6390-06]

10:00 pm: **Measurement and modeling of short copper cables for ultrawideband communication**, **T. Magesacher**, Lund Univ. (Sweden); **J. Rius i Riu**, **K. Ericson**, Ericsson AB (Sweden); **P. Ödling**, **P. O. Börjesson**, Lund Univ. (Sweden) .... [6390-07]

Coffee Break ..... 10:30 to 10:50 am

**SESSION 5**

Hynes Conv. Ctr. Room 105 ..... Tues. 10:50 am to 12:00 pm

**OXC and Network Node Architecture Issues**

*Chairs:* **Ken-ichi Sato**, Nagoya Univ. (Japan);  
**Milorad Cvijetic**, NEC America, Inc.

- 10:50 am: **Optical networking: status update** (*Invited Paper*), T. S. El-Bawab, Jackson State Univ. .... [6388-08]
- 11:20 am: **Representing structural conflicts in provisioning optical protection switching**, J. B. Krocuckick, Winifred Associates; C. Hood, Illinois Institute of Technology ..... [6388-09]
- 11:40 am: **Optical switch architectures for hierarchical optical path networks**, S. Kakehashi, H. Hasegawa, K. Sato, Nagoya Univ. (Japan) [6388-10]
- Lunch/Exhibition Break ..... 12:00 to 1:30 pm

**SESSION 6**

Hynes Conv. Ctr. Room 105 ..... Tues. 1:30 to 3:20 pm

**ROADM and Switching Technologies**

*Chairs:* **Benjamin B. Dingel**, Nasfine Photonics, Inc.; **Tarek S. El-Bawab**, Jacksonville State Univ.

- 1:30 pm: **ROADM technology review: why, when, what, where, and how** (*Invited Paper*), W. I. Way, OpVista, Inc. .... [6388-11]
- 2:00 pm: **ROADM expansion and its cross-layer applications** (*Invited Paper*), M. Cvijetic, NEC America, Inc.; S. Nakamura, NEC Corp. (Japan) ..... [6388-12]
- 2:30 pm: **Hybrid burst/packet switching architectures from IP NOBEL** (*Invited Paper*), H. C. Leligou, National Technical Univ. of Athens (Greece); A. Stavdas, Univ. of Peloponnese (Greece); J. D. Angelopoulos, National Technical Univ. of Athens (Greece); G. Eilenberger, L. Dembeck, Alcatel SEL AG (Germany) ..... [6388-13]
- 3:00 pm: **Performance evaluation of wavelength contention minimization strategies for optical burst-switched networks**, J. M. Pedro, P. M. P. Monteiro, Siemens SA (Portugal); J. J. D. O. Pires, Instituto Superior Técnico (Portugal) ..... [6388-14]
- Coffee Break ..... 3:20 to 3:40 pm

**SESSION 7**

Hynes Conv. Ctr. Room 105 ..... Tues. 3:40 to 5:10 pm

**Error Correction Techniques, Modulation Schemes and Transmission Performance**

*Chairs:* **Winston I. Way**, OpVista, Inc.; **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

- 3:40 pm: **TUTORIAL: Forward error correction for advanced optical transmission** (*Invited Paper*), B. V. Vasic, I. B. Djordjevic, The Univ. of Arizona ..... [6388-16]
- 4:10 pm: **Hard decision error correcting scheme based on LDPC codes for long-haul optical transmission**, M. Ivkovic, I. B. Djordjevic, B. V. Vasic, The Univ. of Arizona ..... [6388-17]
- 4:30 pm: **Comparison and optimization of the transmission performances of various advanced modulation formats in high bit rate systems**, B. I. Maiga, K. Schumacher, P. M. Meissner, Technische Univ. Darmstadt (Germany) ..... [6388-19]
- 4:50 pm: **An efficient modulation technique for suppressing of intrachannel FWM in 40Gb/s optical transmission systems**, H. G. Batshon, I. B. Djordjevic, B. V. Vasic, The Univ. of Arizona ..... [6388-20]

**✓ Posters-Tuesday**

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

- ✓ **Performance limitations of an optical IM-DD transmission system due to polarization mode dispersion (Manuscript Only)**, S. M. Islam, Bangladesh Univ. of Engineering and Technology (Bangladesh) ..... [6388-27]

**Wednesday 4 October**

**SESSION 8**

Hynes Conv. Ctr. Room 105 ..... Wed. 8:30 am to 12:00 pm

**Compensation Technologies and High-Capacity Optical Transmission and Network Performance**

*Chairs:* **Ken-ichi Sato**, Nagoya Univ. (Japan); **Chris Xu**, Cornell Univ.

- 8:30 am: **Managing dispersion in optical networks** (*Invited Paper, Presentation Only*), K. Roberts, Nortel Networks Ltd. (Canada) ..... [6388-21]
- 9:00 am: **Scalability limitations of optical access and metro networks due to the polarization-dependent gain of semiconductor optical amplifiers** (*Invited Paper*), I. Roudas, Univ. of Patras (Greece) ..... [6388-22]
- 9:30 am: **Modeling the time-variant channel of a PMD-affected WDM transmission system in respect to the temperature activity of dispersion compensating modules**, D. Goelz, Technische Univ. Darmstadt (Germany); R. Leppla, T-Systems International GmbH (Germany); S. Salaun, R. Glatty, France Télécom R&D (France); P. M. Meissner, Technische Univ. Darmstadt (Germany) ..... [6388-23]
- Coffee Break ..... 9:50 to 10:20 am
- 10:20 am: **Basics, implementation and performance evaluation of digital equalization approach based on maximum likelihood sequence estimation (MLSE)** (*Invited Paper, Presentation Only*), W. Kaiser, CoreOptics GmbH (Germany) ..... [6388-26]
- 10:50 am: **Methods for in-service measurement of polarization mode dispersion** (*Invited Paper*), S. Boehm, K. Schumacher, P. M. Meissner, Technische Univ. Darmstadt (Germany) ..... [6388-25]
- 11:20 am: **Upgrade of optical WDM transport systems introducing linerates at 40 Gbit/s per channel**, M. Schneiders, S. Vorbeck, R. Leppla, W. Weiershausen, T-Systems International GmbH (Germany) ..... [6388-30]
- 11:40 am: **Investigation of 40Gb/s WDM multi-casting using a hybrid integrated Mach-Zehnder interferometer**, D. Reading-Picopoulos, R. V. Penty, I. H. White, Univ. of Cambridge (United Kingdom) ..... [6388-31]
- Lunch/Exhibition Break ..... 12:00 to 1:30 pm

**SESSION 9**

Hynes Conv. Ctr. Room 105 ..... Wed. 1:30 to 3:50 pm

**Optical Communication-Based Instrumentation and Novel Devices**

*Chairs:* **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany); **Nicholas Madamopoulos**, National Hellenic Research Foundation (Greece)

- 1:30 pm: **TUTORIAL: Application of telecom technologies to optical instrumentation** (*Invited Paper*), C. Xu, Cornell Univ. .... [6388-28]
- 2:00 pm: **Diffractive imaging micro-spectrometer** (*Invited Paper*), I. Avrutsky, I. F. Salakhutdinov, K. Chaganti, Wayne State Univ. .... [6388-29]
- 2:30 pm: **Optical feedback dependence of anticorrelation polarization dynamics in vertical-cavity surface-emitting lasers** (*Invited Paper*), K. A. Shore, Y. Hong, Prifysgol Cymru Bangor (United Kingdom) .... [6388-32]
- 3:00 pm: **Like and cross polarized reflections and transmission matrices for propagation across a chiral slab** (*Invited Paper*), E. Bahar, Univ. of Nebraska/Lincoln ..... [6388-33]
- 3:30 pm: **All-optical XOR gate at 80 Gb/s using SOA-MZI-DI**, H. Z. Sun, Univ. of Connecticut; H. Dong, Z. Chen, N. K. Dutta, Univ. Of Connecticut . [6388-34]

# Active and Passive Optical Components for Communications VI

Conference Chairs: **Achyut K. Dutta**, Banpil Photonics; **Yasutake Ohishi**, Toyota Technological Institute (Japan); **Niloy K. Dutta**, Univ. of Connecticut; **Jesper Moerk**, Danmarks Tekniske Univ. (Denmark)

Program Committee: **Gaetano Assanto**, Univ. degli Studi di Roma Tre (Italy); **James J. Coleman**, Univ. of Illinois at Urbana-Champaign; **Dennis G. Deppe**, The Univ. of Texas at Austin; **Benjamin B. Dingel**, Nasfinc Photonics, Inc.; **Michael D. Gerhold**, U.S. Army Research Office; **Michael J. Hayduk**, Air Force Research Lab.; **Kenichi Iga**, Japanese Society for the Promotion of Sciences (Japan); **Masataka Ito**, Ibsiden USA R&D Inc.; **Gunnar Jacobsen**, Ericsson Telecom AB (Sweden); **Steven G. Johnson**, Massachusetts Institute of Technology; **Akihiko Kasukawa**, The Furukawa Electric Co., Ltd. (Japan); **Lih-Yuan Lin**, Univ. of Washington; **James A. Lott**, Air Force Institute of Technology; **Alastair D. McAulay**, Lehigh Univ.; **Yoshiaki Nakano**, The Univ. of Tokyo (Japan); **Katsunari Okamoto**, NTT Electronics Corp. (Japan); **Jennifer C. Ricklin**, Defense Advanced Research Projects Agency; **Winslow L. Sargeant**, National Science Foundation; **Hideyuki Sotobayashi**, National Institute of Information and Communications Technology (Japan); **Atul K. Srivastava**, Bookham Corp.; **Yuichi Tohmori**, Nippon Telegraph and Telephone Corp. (Japan); **Wei-shin Tsay**, Alliance Fiber Optic Products Inc.; **Hiroshi Yasaka**, NTT Photonics Labs. (Japan); **Zuhua Zhu**, Univ. of California/Los Angeles

## Tuesday 3 October

### SESSION 1

Hynes Conv. Ctr. Room 104 ..... Tues. 8:00 to 10:30 am  
**Optical Amplifier Technology**

Chairs: **Yasutake Ohishi**, Toyota Technological Institute (Japan);  
**Hideyuki Sotobayashi**, National Institute of Information and  
Communications Technology (Japan)

8:00 am: **Recent progress on optical fiber amplifiers and their applications**  
(Invited Paper), H. Masuda, Nippon Telegraph and Telephone Corp.  
(Japan) ..... [6389-01]

8:30 am: **Bismuth-doped silicate glass fiber for ultra-broadband  
amplification media** (Invited Paper), T. Haruna, M. Onishi, Sumitomo Electric  
Industries, Ltd. (Japan) ..... [6389-02]

9:00 am: **Recent development on silicon-based Raman lasers and  
amplifiers** (Invited Paper), H. Rong, M. J. Paniccia, Intel Corp. .... [6389-03]

9:30 am: **Advances in planar waveguide integration** (Invited Paper),  
S. V. Frolov, Inplane Photonics, Inc. .... [6389-04]

10:00 am: **Raman scattering characteristics of WO<sub>3</sub> and P<sub>2</sub>O<sub>5</sub> doped TBSN  
glasses: a new gain medium for broadband fiber Raman amplifiers**  
(Invited Paper), Y. Ohishi, R. Jose, Toyota Technological Institute  
(Japan) ..... [6389-05]

Coffee Break ..... 10:30 to 11:00 am

### SESSION 2

Hynes Conv. Ctr. Room 104 ..... Tues. 11:00 am to 12:30 pm  
**Optical Amplifier and High-Power Laser**

Chairs: **Yasutake Ohishi**, Toyota Technological Institute (Japan);  
**Hideyuki Sotobayashi**, National Institute of Information and  
Communications Technology (Japan)

11:00 am: **Multicore fibers for amplifiers and lasers** (Invited Paper), S. Jiang,  
NP Photonics, Inc. .... [6389-06]

11:30 am: **Ultra-broadband amplification through nanotechnology** (Invited  
Paper), J. R. DiMaio, J. M. Ballato, B. Kokuoz, Clemson Univ. .... [6389-07]

12:00 pm: **Opportunities in high-power fiber lasers** (Invited Paper), J. K. Sahu,  
J. Kim, S. Yoo, A. Webb, C. Codemard, P. Dupriez, Y. Jeong, J. Nilsson, D. J.  
Richardson, D. N. Payne, Univ. of Southampton (United Kingdom) . . . [6389-08]

Lunch/Exhibition Break ..... 12:20 to 1:50 pm

### SESSION 3

Hynes Conv. Ctr. Room 104 ..... Tues. 1:50 to 3:40 pm  
**Polymer Waveguide and Interconnection Technologies I**

Chairs: **Masataka Ito**, Ibsiden USA R&D Inc.;  
**Achyut K. Dutta**, Banpil Photonics, Inc.

#### Keynote

1:50 pm: **Recent development of polymer optical waveguides towards  
next generation FTTH applications** (Invited Paper), T. Kaino, Tohoku Univ.  
(Japan) ..... [6389-09]

2:30 pm: **Precisely positioned light-induced self-written (LISW) polymeric  
optical waveguide for optical transceiver module fabrication**, T. Matsui,  
T. Yamashita, M. Kagami, Toyota Central Research and Development Labs., Inc.  
(Japan) ..... [6389-10]

2:50 pm: **Laser direct writing of inorganic-organic hybrid polymeric optical  
waveguide for optical integrated circuits**, S. Wang, B. Borden, Univ. of North  
Texas ..... [6389-11]

3:10 pm: **Highly functional PLC devices for advanced photonic networks**  
(Invited Paper), K. Takiguchi, NTT Photonics Labs. (Japan) ..... [6389-12]

Coffee Break ..... 3:40 to 4:00 pm

### SESSION 4

Hynes Conv. Ctr. Room 104 ..... Tues. 4:00 to 6:10 pm  
**Polymer Waveguide and Interconnection Technologies II**

Chairs: **Masataka Ito**, Ibsiden USA R&D Inc.;  
**Achyut K. Dutta**, Banpil Photonics, Inc.

4:00 pm: **Fabrication and optical properties of the multilayered waveguide  
made by photobleaching process** (Invited Paper), E. Watanabe, K. Ogura,  
T. Oka, H. Tsushima, Nippon Paint Co., Ltd. (Japan); H. Okano, S. Suzuki, Hirose  
Electric Co., Ltd. (Japan) ..... [6389-13]

4:30 pm: **A 3D wide-angle beam propagation method for optical waveguide  
devices**, C. Ma, E. R. Van Keuren, Georgetown Univ. .... [6389-14]

4:50 pm: **Bend loss in plastic optical fiber and its applications**, G. Farrell,  
S. Shashi, C. Gao, Dublin Institute of Technology (Ireland) ..... [6389-15]

5:10 pm: **Passive integrated circuits utilizing slow light in photonic crystal  
waveguides** (Invited Paper), A. V. Lavrinenko, P. I. Borel, J. Fage-Pedersen,  
L. H. Frandsen, Danmarks Tekniske Univ. (Denmark) ..... [6389-16]

5:40 pm: **Replicated polymer optical waveguides and the application**  
(Invited Paper), H. Hosokawa, Y. Terakawa, Omron Corp. (Japan) .... [6389-17]

## Course of Related Interest

Register for courses and get full course descriptions at the SPIE  
Registration desk.

SC801 Optoelectronic Devices: Introduction to Physics and Simulation (Piprek)  
Tuesday, 8:30 am to 12:30 pm



✓ **Posters-Tuesday**

*Chairs: Niloy K. Dutta, Univ. of Connecticut;  
Achyut K. Dutta, Banpil Photonics, Inc.*

*A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.*

- ✓ **InGaAs/InAlAs multi-quantum well light modulator and detector**, P. G. Maloney, U.S. Army Night Vision & Electronic Sensors Directorate; F. E. Koch, Univ. of California/Los Angeles; K. Alavi, The Univ. of Texas at Arlington; J. G. Pellegrino, U.S. Army Night Vision & Electronic Sensors Directorate; T. Hongsmatip, D. Carothers, M. Winn, BAE Systems North America ..... [6389-28]
- ✓ **Transmission properties of tapered air-core photonic bandgap fibers**, A. Ozcan, Harvard Medical School; A. Tewary, M. J. F. Digonnet, G. S. Kino, Stanford Univ. .... [6389-32]
- ✓ **Design optimization of high-speed electro-optic modulators**, A. B. M. Rahman, City Univ. (United Kingdom); S. Haxha, Univ. of Kent at Canterbury (United Kingdom); V. Haxha, K. T. V. Grattan, City Univ. (United Kingdom) ..... [6389-33]
- ✓ **Second-order nonlinear thin film characterization using logarithmic Hilbert transform**, A. Ozcan, Harvard Medical School ..... [6389-35]
- ✓ **All-optical signal processing using mode-locked semiconductor laser diode**, Y. Hashimoto, R. Kuribayashi, S. Nakamura, I. Ogura, NEC Corp. (Japan) ..... [6389-36]
- ✓ **High efficient coupling between wedged-shaped fiber and planar lightwave circuit chip using gradient refractive-index media**, X. Liu, S. Qu, J. Xiao, X. Sun, Southeast Univ. (China) ..... [6389-37]
- ✓ **FSR-tunable Fabry-Perot filter with superimposed FBG**, S. Liu, X. Y. Dong, P. Shum, Nanyang Technological Univ. (Singapore) ... [6389-38]
- ✓ **Spectroscopic properties of Tb<sup>3+</sup>-Yb<sup>3+</sup>-codoped borosilicate glasses**, T. Yamashita, Toyota Technological Institute (Japan) and Toyota Central R&D Labs., Inc. (Japan); Y. Ohishi, Toyota Technological Institute (Japan) [6389-40]
- ✓ **Arbitrary femtosecond optical pulse shaping with a liquid crystal spatial light modulator**, M. W. Royal, M. Kavehrad, B. Y. Hamzeh, S. Lee, The Pennsylvania State Univ. .... [6389-41]
- ✓ **Michelson interferometer-based interleaver design algorithm based on IIR filter model**, C. Cheng, D. J. Goode, Miami Univ. .... [6389-42]
- ✓ **Broadband near-infrared emission properties from Bi-doped silicate glasses as new laser and optical amplification media**, Y. Ohishi, T. Suzuki, Toyota Technological Institute (Japan) ..... [6389-43]
- ✓ **Reconfigurable optical add/drop multiplexer with 8.0 dB net gain using double pass amplified scheme**, S. Liaw, National Taiwan Univ. of Science and Technology (Taiwan); C. Chiang, National Taiwan Normal Univ. (Taiwan) ..... [6389-44]
- ✓ **Comparison of wavelength conversion in SOA and EDFA fiber ring systems**, A. Siahmakoun, Y. Tang, S. C. Granieri, N. Hoghooghi, S. Teferri, Rose-Hulman Institute of Technology; M. Sayeh, Southern Illinois Univ. .... [6389-45]
- ✓ **Measurement of intensity noise correlation between lines of spatially distributed multi-wavelength fiber lasers**, G. Brochu, S. LaRochelle, Univ. Laval (Canada); J. Poëtte, P. Besnard, J. Simon, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France) ..... [6389-46]
- ✓ **Impact of XPM on the performance of optical switching with NOLM**, M. Yuan, X. Sun, Southeast Univ. (China) ..... [6389-47]
- ✓ **Performance analysis of EDFA physical model in optical fiber communication systems**, S. Singh, R. S. Kaler, H. K. Sidhu, Thapar Institute of Engineering & Technology (India) ..... [6389-50]
- ✓ **Optimization of crosstalk and power penalty in semiconductor optical amplifiers for 10Å-80 Gb/s WDM over long transmission using soliton RZ-DPSK format**, R. S. Kaler, Sant Longowal Institute of Engineering and Technology (India); H. K. Sidhu, Thapar Institute of Engineering & Technology (India) ..... [6389-51]
- ✓ **40 Gb/s optical wavelength converter for NRZ-DPSK signal based on four wave mixing in semiconductor optical amplifier**, R. S. Kaler, Sant Longowal Institute of Engineering and Technology (India); H. K. Sidhu, Thapar Institute of Engineering & Technology (India) ..... [6389-52]
- ✓ **Mode-locked phenomena of hybrid soliton pulse source**, N. Dogru, Gaziantep Univ. (Turkey) ..... [6389-53]

- ✓ **Tunable spectral switching and far-field spectral behavior of chirped Cosh-Gaussian pulses**, S. Jana, S. Konar, Birla Institute of Technology & Science (India) ..... [6389-54]
- ✓ **Isolator-free DFB laser diode operating in feedback regime V**, A. Mokhtar, L. MacEachern, S. A. Mahmoud, Carleton Univ. (Canada) ..... [6389-55]

**Wednesday 4 October**

**SESSION 5**

**Hynes Conv. Ctr. Room 104 ..... Wed. 8:30 am to 12:20 pm**

**Novel Devices and Applications**

*Chairs: Hideyuki Sotobayashi, National Institute of Information and Communications Technology (Japan);  
Niloy K. Dutta, Univ. of Connecticut*

- 8:30 am: **Generation and applications of ultrashort optical pulses from semiconductor lasers (Invited Paper, Presentation Only)**, H. Yokoyama, Tohoku Univ. (Japan) ..... [6389-18]
- 9:00 am: **Development of femtosecond optical frequency combs for optical frequency standards in NICT**, S. Nagano, H. Ito, Y. Li, K. Matsubara, M. Hosokawa, National Institute of Information and Communications Technology (Japan) ..... [6389-19]
- 9:20 am: **Optical logic operations (Invited Paper)**, N. K. Dutta, Univ. of Connecticut ..... [6389-20]
- 9:50 am: **Ultra-low timing-jitter passively mode-locked fiber lasers for long-distance timing synchronization (Invited Paper)**, F. O. Ilday, Bilkent Univ. (Turkey) ..... [6389-21]
- Coffee Break ..... 10:20 to 10:40 am
- 10:40 am: **TUTORIAL: Ultrafast optical code division multiplexing and its enabling components (Invited Paper, Presentation Only)**, H. Sotobayashi, National Institute of Information and Communications Technology (Japan) ..... [6389-22]
- 11:20 am: **Semiconductor lasers for optical clock recovery and optical regeneration (Invited Paper)**, P. B. Gallion, J. Renaudier, Ecole Nationale Supérieure des Télécommunications (France); G. Duan, Alcatel Research & Innovation (France) ..... [6389-23]
- 11:50 am: **Growth of antimonide compound semiconductor on Si(001) substrate (Invited Paper)**, K. Akahane, N. Yamamoto, S. Gozu, A. Ueta, N. Ohtani, M. Tsuchiya, National Institute of Information and Communications Technology (Japan) ..... [6389-24]
- Lunch/Exhibition Break ..... 12:20 to 2:00 pm

**SESSION 6**

**Hynes Conv. Ctr. Room 104 ..... Wed. 2:00 to 4:50 pm**

**Free-Space Communication and Sensor Technologies**

*Chairs: Michael D. Gerhold, U.S. Army Research Office;  
Niloy K. Dutta, Univ. of Connecticut*

- 2:00 pm: **Electrically tunable interband cascade laser (Invited Paper)**, S. Suchalkin, M. V. Kisin, S. Luryi, G. Belenky, State Univ. of New York/Stony Brook; F. J. Towner, J. D. Bruno, Maxion Technologies, Inc.; C. J. Monroy, R. L. Tober, Army Research Lab. .... [6389-25]
- 2:30 pm: **Analysis of message extraction in optical chaos communications based on injection-locking synchronization of semiconductor lasers**, K. A. Shore, A. Murakami, Prifysgol Cymru Bangor (United Kingdom) [6389-26]
- 2:50 pm: **Design and development of high quantum efficiency large area UV focal plane arrays for photon counting applications**, A. K. Sood, Y. R. Puri, Magnolia Optical Technologies, Inc.; R. A. Bell, E. J. Egerton, iRobot Corp.; J. Roginsky, Naval Surface Warfare Ctr.; T. Cook, Boston Univ. .... [6389-27]
- Coffee Break ..... 3:10 to 3:30 pm
- 3:30 pm: **Recent advances in high power mid- and far-wavelength infrared lasers for free space communication**, S. Slivken, M. Razeghi, Northwestern Univ. .... [6389-29]
- 3:50 pm: **Wide field-of-view retroreflector for short range free space optical communications (Invited Paper)**, J. F. Muth, K. Alhammedi, E. Grant, North Carolina State Univ. .... [6389-30]
- 4:20 pm: **Development of novel super continuum fiber lasers and wavelength tunable soliton pulses (Invited Paper)**, N. Nishizawa, Nagoya Univ. (Japan) ..... [6389-48]

# Broadband Access Communication Technologies

*Conference Chairs:* **Raj Jain**, Washington Univ. in St. Louis; **Benjamin B. Dingel**, Nasfine Photonics, Inc.; **Shozo Komaki**, Osaka Univ. (Japan); **Shlomo Ovadia**, Intel Corp.

*Program Committee:* **Arjan Duresi**, Louisiana State Univ.; **David W. Faulkner**, British Telecom Research Labs. (United Kingdom); **Mahbub Hassan**, Univ. of New South Wales (Australia); **Mohsen Kavehrad**, The Pennsylvania State Univ.; **Rangaraj Madabhushi**, Madabhushi Consultants, LLC and Covega Corp.; **Dalma Novak**, The Univ. of Melbourne (Australia); **Jean-Charles Point**, JCP-Consult (France); **Ken-ichi Sato**, Nagoya Univ. (Japan); **Katsutoshi Tukamoto**, Osaka Univ. (Japan); **Peter Van Daele**, Univ. Gent (Belgium); **Jeroen S. Wellen**, Lucent Technologies (Netherlands)

## Monday 2 October

### Plenary Session

Hynes Conv. Ctr. Room 100 ..... Mon. 9:30 am to 12:00 pm

*Chairs:* **Achyut K. Dutta**, Banpil Photonics, Inc.; **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

9:30 am: **The NSF/SBIR Innovation Model** (*Invited Paper, Presentation Only*), **M. S. Nair**, National Science Foundation

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

10:40 am: **Prospects of silicon photonics for future VLSI interconnects** (*Invited Paper, Presentation Only*), **M. J. Paniccia**, Intel Corp.

11:20 am: **Flexible optical transport networks: demands and trends on new Layer 2 techniques** (*Invited Paper, Presentation Only*), **G. J. Eilenberger**, Alcatel SEL AG (Germany)

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 1

Hynes Conv. Ctr. Room 101 ..... Mon. 1:30 to 2:00 pm

#### Special Keynote Session

*Chairs:* **Benjamin B. Dingel**, Nasfine Photonics, Inc.; **Ken-ichi Sato**, Nagoya Univ. (Japan)

#### Keynote

1:30 pm: **Self-managing networks** (*Invited Paper, Presentation Only*), **V. Bahl**, Microsoft Corp. .... [6390-01]

### SESSION 2

Hynes Conv. Ctr. Room 101 ..... Mon. 2:00 to 3:30 pm

#### Joint Session/Workshop: Global Trends in Broadband Access & Optical Network Testbed Systems

*Chairs:* **Benjamin B. Dingel**, Nasfine Photonics, Inc.; **Ken-ichi Sato**, Nagoya Univ. (Japan)

2:00 pm: **BREAD: a European coordination action for broadband for all** (*Invited Paper*), **P. Van Daele**, Univ. Gent (Belgium) .... [6390-03]

2:30 pm: **FAST copper for broadband access** (*Invited Paper*), **M. Chiang**, Princeton Univ. .... [6390-04]

3:00 pm: **Nation-wide GMPLS/OXC networking experiments over JGN II test bed** (*Invited Paper*), **Y. Sameshima**, National Institute of Information and Communications Technology (Japan) .... [6388-01]

Coffee Break ..... 3:30 to 4:00 pm

### SESSION 3

Hynes Conv. Ctr. Room 101 ..... Mon. 4:00 to 5:10 pm

#### Ultra-High-Speed Broadband Access Technologies

*Chairs:* **Peter Van Daele**, Univ. Gent (Belgium); **Benjamin B. Dingel**, Nasfine Photonics, Inc.

4:00 pm: **Mobile wimax (802.16e)** (*Invited Paper, Presentation Only*), **J. Puthenkulam**, Intel Corp. .... [6390-05]

4:30 pm: **Toward high-speed access technologies: results from MUSE**, **J. S. Wellen**, **R. C. Smets**, **W. Hellenthal**, Lucent Technologies/Bell Labs. (Netherlands); **S. D. Walker**, **J. J. Lepley**, **I. Tsalamani**, The Univ. of Essex (United Kingdom); **T. Koonen**, **G. Rijckenberg**, **A. Ng'Oma**, Technische Univ. Eindhoven (Netherlands); **K. Langer**, **K. Habel**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) .... [6390-06]

4:50 pm: **Measurement and modeling of short copper cables for ultrawideband communication**, **T. Magesacher**, Lund Univ. (Sweden); **J. Rius i Riu**, **K. Ericson**, Ericsson AB (Sweden); **P. Ödling**, **P. O. Börjesson**, Lund Univ. (Sweden) .... [6390-07]

## Tuesday 3 October

### SESSION 4

Hynes Conv. Ctr. Room 101 ..... Tues. 8:30 to 10:30 am

#### Joint Session/Workshop: Next Generation Integrated Networks and Advanced Access Technologies

*Chairs:* **Benjamin B. Dingel**, Nasfine Photonics, Inc.; **Raj Jain**, Washington Univ. in St. Louis

8:30 am: **Future integrated broadband fiber, wireless, and satellite networks** (*Invited Paper*), **V. W. S. Chan**, Massachusetts Institute of Technology [6388-06]

9:00 am: **Advances and challenges of IP plus photonic networks** (*Invited Paper, Presentation Only*), **K. Sato**, Nagoya Univ. (Japan) .... [6388-07]

9:30 am: **Toward high-speed access technologies: results from MUSE**, **J. S. Wellen**, **R. C. Smets**, **W. Hellenthal**, Lucent Technologies/Bell Labs. (Netherlands); **S. D. Walker**, **J. J. Lepley**, **I. Tsalamani**, The Univ. of Essex (United Kingdom); **T. Koonen**, **G. Rijckenberg**, **A. Ng'Oma**, Technische Univ. Eindhoven (Netherlands); **K. Langer**, **K. Habel**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) .... [6390-06]

10:00 pm: **Measurement and modeling of short copper cables for ultrawideband communication**, **T. Magesacher**, Lund Univ. (Sweden); **J. Rius i Riu**, **K. Ericson**, Ericsson AB (Sweden); **P. Ödling**, **P. O. Börjesson**, Lund Univ. (Sweden) .... [6390-07]

Coffee Break ..... 10:30 to 10:50 am

**SESSION 5**

**Hynes Conv. Ctr. Room 101 . . . . . Tues. 10:50 am to 12:00 pm**

**Wireless Broadband Access and Radio-Over-Fiber-Based Access Technologies**

*Chair: Mohsen Kavehrad, The Pennsylvania State Univ.*

- 10:50 am: **TUTORIAL: Hot issues in wireless broadband networking** (*Invited Paper, Presentation Only*), R. Jain, Washington Univ. in St. Louis . . . . . [6390-10]
- 11:20 am: **Design and performance of hybrid FSO/RF next-generation broadband wireless access networks**, A. Sana, City College/CUNY [6390-11]
- 11:40 am: **Performance improvement of radio on fiber ubiquitous antenna system using sub-carrier resource management**, L. H. Hai, T. Higashino, K. Tsukamoto, S. Komaki, Osaka Univ. (Japan) . . . . . [6390-13]
- Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

**SESSION 6**

**Hynes Conv. Ctr. Room 101 . . . . . Tues. 1:30 to 4:30 pm**

**Simulation Tools, Advanced Components, FSO/RF/ Powerline-Based Access Technologies and Systems**

*Chairs: Peter Van Daele, Univ. Gent (Belgium); Jeroen S. Wellen, Lucent Technologies (Netherlands)*

- 1:30 pm: **Modeling software for optical broadband access network design and optimization** (*Invited Paper*), D. Herrmann, E. Ghillino, RSoft Design Group . . . . . [6390-16]
- 2:00 pm: **Performance analysis of the ultralinear optical intensity modulator**, N. Madamopoulos, National Hellenic Research Foundation (Greece); B. Dingel, Nasfinc Photonics, Inc. . . . . [6390-15]
- 2:20 pm: **Fractal transmission in a hybrid RF and wireless optical link: a reliable way to beam bandwidth in a 3D grid** (*Invited Paper*), M. Kavehrad, The Pennsylvania State Univ. . . . . [6390-17]
- 2:50 pm: **Nonlinear optical tracking for high-speed free-space communications**, A. E. Dudelzak, A. Koujelev, Canadian Space Agency (Canada) . . . . . [6390-18]
- Coffee Break . . . . . 3:10 to 3:30 pm
- 3:30 pm: **Experimental study on next-generation FSO communication system**, K. R. Kazaura, K. Omae, T. Suzuki, M. Matsumoto, Waseda Univ. (Japan); E. Mutafungwa, Helsinki Univ. of Technology (Finland); K. Asatani, Kogakuin 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) . . . . . [6390-19]
- 3:50 pm: **Frequency domain equalization of optical channel distortion in free-space optical wireless communications**, M. Kavehrad, S. Lee, The Pennsylvania State Univ. . . . . [6390-20]
- 4:10 pm: **A feasibility study of PowerLine communication technology for digital inclusion in Brazilian Amazon**, J. C. W. A. Costa, Univ. Federal do Para (Brazil) . . . . . [6390-21]

**✓ Posters-Tuesday**

*A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.*

- ✓ **Performance analysis of high-capacity integrated fiber radio communication systems**, A. Goel, Maulana Azad National Institute of Technology (India) . . . . . [6390-12]
- ✓ **A packet scheduling algorithm for ad hoc optical networks**, K. V. S. Sairam, Bharat Institute of Engineering and Technology (India) . . . . . [6390-22]
- ✓ **The research and scheme of RBAC using J2EE security mechanisms**, F. Zhang, Daqing Petroleum Institute (China) . . . . . [6390-23]
- ✓ **A methodology for measurements of basic parameters in a xDSL system**, J. C. W. A. Costa, A. Castro, L. V. Souza, E. Patricio, E. Brito, Univ. Federal do Para (Brazil) . . . . . [6390-24]
- ✓ **Characterization of subscriber local loop by measures and analysis of frequency response and TDR**, J. C. W. A. Costa, A. Castro, I. Negrão, J. Reis, Univ. Federal do Para (Brazil) . . . . . [6390-25]
- ✓ **Firewall using LINUX 8.0**, P. Ganguly, CESC Ltd. (India) . . . . . [6390-26]
- ✓ **Improvement to fairness algorithm of resilient packet ring network**, W. Tang, S. Fu, L. Zhang, P. Shum, Nanyang Technological Univ. (Singapore) . . . . . [6390-27]

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# Multimedia Systems and Applications IX

Conference Chairs: **Susanto Rahardja**, Institute for Infocomm Research (Singapore); **JongWon Kim**, Gwangju Institute of Science and Technology (South Korea); **Qi Tian**, The Univ. of Texas at San Antonio; **Chang Wen Chen**, Florida Institute of Technology

Program Committee: **Farid Ahmed**, The Catholic Univ. of America; **John G. Apostolopoulos**, Hewlett-Packard Labs.; **Jianfei Cai**, Nanyang Technological Univ. (Singapore); **Lei Cao**, The Univ. of Mississippi; **Lekha Chaisorn**, Institute for Infocomm Research (Singapore); **Lulin Chen**, Mobilygen Corp.; **Jianguo Dong**, California State Univ./Los Angeles; **Moncef Gabbouj**, Tampereen Teknillinen Yliopisto (Finland); **Yun He**, Tsinghua Univ. (China); **Zhihai He**, Univ. of Missouri/Columbia; **Lei Huang**, Loyola Marymount Univ.; **Yutaka Ishibashi**, Nagoya Institute of Technology (Japan); **Byeungwoo Jeon**, Sungkyunkwan Univ. (South Korea); **Chang-Su Kim**, Korea Univ. (South Korea); **C. C. J. Kuo**, Univ. of Southern California; **Jiebo Luo**, Eastman Kodak Co.; **Philip O. Ogunbona**, Univ. of Wollongong (Australia); **Po-Chyi Su**, National Central Univ. (Taiwan); **Yap-Peng Tan**, Nanyang Technological Univ. (Singapore); **Anthony Vetro**, Mitsubishi Electric Research Labs.; **Susie J. Wee**, Hewlett-Packard Labs.; **Heather H. Yu**, Panasonic Information & Networking Technologies Lab.; **Jian Zhang**, National ICT Australia (Australia)

## Monday 2 October

### Plenary Session

Hynes Conv. Ctr. Room 100 ..... Mon. 9:30 am to 12:00 pm

Chairs: **Achyut K. Dutta**, Banpil Photonics, Inc.; **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

9:30 am: **The NSF/SBIR Innovation Model** (Invited Paper, Presentation Only), **M. S. Nair**, National Science Foundation

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

10:40 am: **Prospects of silicon photonics for future VLSI interconnects** (Invited Paper, Presentation Only), **M. J. Paniccia**, Intel Corp.

11:20 am: **Flexible optical transport networks: demands and trends on new Layer 2 techniques** (Invited Paper, Presentation Only), **G. J. Eilenberger**, Alcatel SEL AG (Germany)

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 1

Hynes Conv. Ctr. Room 100 ..... Mon. 1:30 to 3:10 pm

#### Video and Audio Coding

Chairs: **Yap-Peng Tan**, Nanyang Technological Univ. (Singapore); **JongWon Kim**, Gwangju Institute of Science and Technology (South Korea)

1:30 pm: **An evaluation of flexible macroblock ordering in error-prone environments**, **Y. Dhondt**, **S. Mys**, **P. Lambert**, **R. Van de Walle**, Univ. Gent (Belgium) ..... [6391-01]

1:50 pm: **A performance evaluation of the data partitioning tool in H.264/AVC**, **S. Mys**, **Y. Dhondt**, **D. Van de Walle**, **D. De Schrijver**, **R. Van de Walle**, Univ. Gent (Belgium) ..... [6391-02]

2:10 pm: **Macroblock-level adaptive dynamic resolution conversion technique**, **W. I. Choi**, **J. Yang**, **B. Jeon**, Sungkyunkwan Univ. (South Korea) ..... [6391-03]

2:30 pm: **Flickering effect reduction for H.264/AVC intra frames**, **J. Yang**, **B. Jeon**, Sungkyunkwan Univ. (South Korea) ..... [6391-04]

2:50 pm: **Performance comparison of audio codecs for high-quality color ring-back-tone services over CDMA**, **Y. Lee**, **H. Kim**, Gwangju Institute of Science and Technology (South Korea); **J. Yu**, **S. Park**, **D. Lee**, **D. Woo**, SK Telecom (South Korea) ..... [6391-05]

Coffee Break ..... 3:10 to 3:40 pm

### SESSION 2

Hynes Conv. Ctr. Room 100 ..... Mon. 3:40 to 5:20 pm

#### QoS Management and Multimedia Synchronization

Chairs: **Jianguo Dong**, California State Univ./Los Angeles; **Chang Wen Chen**, Florida Institute of Technology

3:40 pm: **Quality assessment of media synchronization of preventive control schemes in video and voice communications**, **S. Minezawa**, **Y. Ishibashi**, Nagoya Institute of Technology (Japan) ..... [6391-06]

4:00 pm: **Influence of network latency in a remote control system using haptic media**, **T. Asano**, **Y. Ishibashi**, **Y. Kurokawa**, Nagoya Institute of Technology (Japan) ..... [6391-07]

4:20 pm: **Perception of synchronization errors in haptic and visual communications**, **S. Kameyama**, **Y. Ishibashi**, Nagoya Institute of Technology (Japan) ..... [6391-08]

4:40 pm: **Performance evaluation of transport protocols for networked haptic collaboration**, **S. Lee**, **J. Kim**, **S. Moon**, Gwangju Institute of Science and Technology (South Korea) ..... [6391-09]

5:00 pm: **A synchronized multiplexing scheme for view-switchable stereoscopic HD video over IP system**, **J. Kim**, **S. Lee**, **J. Kim**, Gwangju Institute of Science and Technology (South Korea) ..... [6391-10]

## Tuesday 3 October

### SESSION 3

Hynes Conv. Ctr. Room 100 ..... Tues. 8:40 to 11:30 am

#### Networked/Wireless Multimedia Systems and Technology

Chairs: **Lei Cao**, The Univ. of Mississippi; **Jianguo Dong**, California State Univ./Los Angeles

8:40 am: **Optimum intra-cluster cooperative caching in content delivery networks** (Presentation Only), **D. T. Ahmed**, **S. Shirmohammadi**, Univ. of Ottawa (Canada) ..... [6391-11]

9:00 am: **A hierarchical P2P overlay network for interest-based media content lookup**, **H. Lee**, **J. Kim**, Gwangju Institute of Science and Technology (South Korea) ..... [6391-12]

9:20 am: **Joint source and space time decoding over fading channel**, **H. Chen**, **L. Cao**, The Univ. of Mississippi ..... [6391-13]

9:40 am: **Server-assisted prefetching for Internet streaming media delivery**, **J. Yuan**, **Q. Sun**, **S. Rahardja**, Institute for Infocomm Research (Singapore) ..... [6391-14]

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

10:30 am: **A hybrid admission control algorithm for multimedia server** (Presentation Only), **D. T. Ahmed**, Univ. of Ottawa (Canada); **M. M. Akbar**, Bangladesh Univ. of Engineering and Technology (Bangladesh) ..... [6391-15]

10:50 am: **Implementation of a robust transmission system for astronomical images over error-prone link**, **J. Dong**, **P. Thienphrapa**, **H. Boussalis**, **C. Liu**, California State Univ./Los Angeles ..... [6391-16]

11:10 am: **Design and implementation of dual-stream high-performance transport system for uncompressed HD video streaming over gigabit IP network**, **M. Faisal**, **J. Kim**, Gwangju Institute of Science and Technology (South Korea) ..... [6391-17]

Lunch/Exhibition Break ..... 11:30 am to 1:00 pm

**SESSION 4**

**Hynes Conv. Ctr. Room 100 . . . . . Tues. 1:00 to 2:00 pm**

**Image Processing/Analysis**

*Chairs:* **Lekha Chaisorn**, Institute for Infocomm Research (Singapore);  
**Susanto Rahardja**, Institute for Infocomm Research (Singapore)

1:00 pm: **Multiframe mesh editing using differential coordinate features**, S. Lee, S. Park, Seoul National Univ. (South Korea); C. Kim, Korea Univ. (South Korea); S. Lee, Seoul National Univ. (South Korea) . . . . . [6391-18]

1:20 pm: **Approaches to consumer image organization based on semantic categories**, C. D. Cerosaletti, M. Das, A. C. P. Loui, B. D. Kraus, Eastman Kodak Co. . . . . [6391-19]

1:40 pm: **Turbo codes based image transmission for channels with both random errors and packet loss**, L. Yao, L. Cao, The Univ. of Mississippi . . . . . [6391-20]

**SESSION 5**

**Hynes Conv. Ctr. Room 100 . . . . . Tues. 2:00 to 3:00 pm**

**Multimedia Analysis**

*Chairs:* **Lekha Chaisorn**, Institute for Infocomm Research (Singapore);  
**Qi Tian**, The Univ. of Texas at San Antonio

2:00 pm: **Empowering file-based radio production through media asset management systems**, B. Muylaert, T. Beckers, VRT (Belgium) . . . . [6391-21]

2:20 pm: **Transition logo detection in sports videos for highlight extraction**, P. Su, Y. Wang, C. Chen, National Central Univ. (Taiwan) . . . . . [6391-23]

2:40 pm: **Robust anchorperson detection for TV news segmentation via visual features**, K. Lu, M. Chang, National Chung Hsing Univ. (Taiwan); C. Yeh, National Dong Hwa Univ. (Taiwan); H. Shih, MAVs Lab. Inc. (Taiwan) . [6391-24]

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

**SESSION 6**

**Hynes Conv. Ctr. Room 100 . . . . . Tues. 3:30 to 4:10 pm**

**Multimedia Adaptation and Collaborative Environment**

*Chair:* **Anthony Vetro**, Mitsubishi Electric Research Labs.

3:30 pm: **Collaborative virtual experience based on reconfigurable simulation**, Q. M. Shahab, Y. Kwon, H. Ko, Korea Institute of Science and Technology (South Korea) . . . . . [6391-25]

3:50 pm: **Integrating multiple HD video services over tiled display for advanced multi-party collaboration**, S. Han, J. Kim, K. Choi, J. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6391-26]

**SESSION 7**

**Hynes Conv. Ctr. Room 100 . . . . . Tues. 4:10 to 4:50 pm**

**Media Security**

*Chair:* **Anthony Vetro**, Mitsubishi Electric Research Labs.

4:10 pm: **A model for the distribution of watermarked digital contents on mobile networks**, F. Frattolillo, S. D'Onofrio, Univ. degli Studi del Sannio (Italy) . . . . . [6391-27]

4:30 pm: **Robust watermarking for authentication of 3D QSplat models**, S. Park, Y. Lee, Seoul National Univ. (South Korea); C. Kim, Korea Univ. (South Korea); S. Lee, Seoul National Univ. (South Korea) . . . . . [6391-28]

**✓ Posters-Tuesday**

*A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.*

- ✓ **A comparison of HMM and global rule induction techniques on story boundary extraction in news video**, L. Chaisorn, Institute for Infocomm Research (Singapore); T. Chua, National Univ. of Singapore (Singapore) . . . . . [6391-29]
- ✓ **360-degree viewing display for collaborative tasks on the round table**, sK. Sakamoto, T. Nishida, Shimane Univ. (Japan) . . . . . [6391-30]
- ✓ **Robust compression of 3D point clouds using multiple description coding**, S. Park, Seoul National Univ. (South Korea); C. Kim, Korea Univ. (South Korea); S. Lee, Seoul National Univ. (South Korea) . . . . . [6391-31]
- ✓ **Using edge histogram descriptor of MPEG-7 for the measurement of image quality and modifications**, C. S. Won, Dongguk Univ. (South Korea) . . . . . [6391-32]
- ✓ **Information searching protocol: a smart protocol for specific content search over Internet**, P. Bhattarakosol, Chulalongkorn Univ. (Thailand); L. Preechaveerakul, Prince of Songkla Univ. (Thailand) . . . . . [6391-33]
- ✓ **Extended multicast connectivity solution for collaborative environments**, N. Kim, H. Lee, J. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6391-34]
- ✓ **Virtual revolving lantern: kaleidoscopic floating images by interactive tabletop hologram**, Y. Iwaze, K. Sakamoto, Shimane Univ. (Japan) [6391-35]
- ✓ **Integrating multiview transmission system into MPEG-21 stereoscopic and multiview DIA (digital item adaptation)**, S. Lee, I. Park, Yonsei Univ. (South Korea); M. Kim, Kangwon National Univ. (South Korea); H. Byun, Yonsei Univ. (South Korea) . . . . . [6391-36]
- ✓ **On the design and implementation of an automated astronomical image analyzer**, J. Dong, H. Boussalis, C. Liu, L. Zhao, S. Orellana, G. Sharaf, California State Univ./Los Angeles . . . . . [6391-37]
- ✓ **Tree-based server-middleman-client architecture: improving scalability and reliability for voting-based network games in ad hoc wireless networks**, H. Fujinoki, Southern Illinois Univ. . . . . [6391-40]

# Three-Dimensional TV, Video, and Display V

Conference Chairs: **Bahram Javidi**, Univ. of Connecticut; **Fumio Okano**, NHK Science & Technical Research Labs. (Japan); **Jung-Young Son**, Hanyang Univ. (South Korea)

Program Committee: **Rene De la Barre**, Fraunhofer Institute for Telecommunication (Germany); **Toshiaki Fujii**, Nagoya Univ. (Japan); **William E. Higgins**, The Pennsylvania State Univ.; **Byoung-ho Lee**, Seoul National Univ. (South Korea); **Manuel Martínez-Corral**, Univ. de València (Spain); **Osamu Matoba**, Kobe Univ. (Japan); **Thomas J. Naughton**, National Univ. of Ireland/Maynooth (Ireland); **Takanori Nomura**, Wakayama Univ. (Japan); **Wa J. Tam**, Communications Research Ctr. Canada (Canada)

## Tuesday 3 October

### SESSION 1

Hynes Conv. Ctr. Room 103 ..... Tues. 1:00 to 2:50 pm

#### Integral Imaging

Chair: **Fumio Okano**, NHK Science & Technical Research Labs. (Japan)

##### Keynote

1:00 pm: **An optical viewer based on integral imaging for three-dimensional images** (*Invited Paper*), F. Okano, J. Arai, M. Okui, NHK Science & Technical Research Labs. (Japan) ..... [6392-01]

##### Keynote

1:30 pm: **3D imaging, visualization, and recognition of biological microorganisms** (*Invited Paper*), B. Javidi, Univ. of Connecticut . [6392-02]

2:00 pm: **Orthoscopic long focal depth integral imaging amplitude modulation and pixel processing** (*Invited Paper*), B. Javidi, Univ. of Connecticut; R. Martínez-Cuenca, G. Saavedra, Univ. de Valencia (Spain); M. Martínez-Corral, Univ. de València (Spain) ..... [6392-04]

2:30 pm: **Integral imaging with variable image planes using polymer-dispersed liquid crystal layers**, Y. Kim, H. Choi, J. Kim, S. Cho, B. Lee, Seoul National Univ. (South Korea) ..... [6392-05]

Coffee Break ..... 2:50 to 3:30 pm

### SESSION 2

Hynes Conv. Ctr. Room 103 ..... Tues. 3:30 to 5:30 pm

#### 3D Display Systems I

Chair: **Jung-Young Son**, Hanyang Univ. (South Korea)

##### Keynote

3:30 pm: **Stereo-photography with handphone** (*Invited Paper*), J. Son, Hanyang Univ. (South Korea); S. Kim, Korea Institute of Science and Technology (South Korea); K. Cha, SAMSUNG Electronics Co., Ltd. (South Korea); M. Park, Korea Institute of Science and Technology (South Korea); S. Jang, Korea Telecom (South Korea) ..... [6392-06]

4:00 pm: **Three-dimensional imaging system with a stereo vision capturing and wavefront reconstruction**, K. Nitta, N. Nishikawa, O. Matoba, T. Yoshimura, Kobe Univ. (Japan) ..... [6392-07]

4:20 pm: **Novel autostereoscopic single-user displays with user interaction**, K. Hopf, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) ..... [6392-08]

4:40 pm: **Autostereoscopic displays for visualization of urban environments**, V. Markov, S. A. Kupiec, MetroLaser, Inc.; A. Zakhor, Univ. of California/Berkeley ..... [6392-09]

5:00 pm: **Flatbed-type 3D display systems using integral imaging method** (*Invited Paper*), Y. Hirayama, H. Nagatani, T. Saishu, R. Fukushima, K. Taira, Toshiba Corp. (Japan) ..... [6392-10]

### ✓ Posters-Tuesday

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- ✓ **Elemental images for undistorted integral image display**, B. Javidi, Univ. of Connecticut; R. Martínez-Cuenca, G. Saavedra, A. Pons, Univ. de Valencia (Spain); M. Martínez-Corral, Univ. de València (Spain) ..... [6392-03]
- ✓ **A new coding technique of digital hologram video based on view-point MCTF**, Y. Seo, Hansung Univ. (South Korea); H. Choi, J. Yoo, D. Kim, Kwangwoon Univ. (South Korea) ..... [6392-29]
- ✓ **Parallax barrier 3D reflection display using polarizer slit**, M. Nishida, K. Sakamoto, Shimane Univ. (Japan) ..... [6392-30]
- ✓ **The basic experiments of cine holography as physics education in universities**, H. Katsuma, S. Hiyama, Tama Art Univ. (Japan); T. Shibuya, M. Wakaki, Tokai Univ. (Japan) ..... [6392-31]
- ✓ **3D recognition of occluded and distorted objects using computational integral imaging**, S. Hong, B. Javidi, Univ. of Connecticut ..... [6392-32]

## Wednesday 4 October

### SESSION 3

Hynes Conv. Ctr. Room 103 ..... Wed. 9:00 to 11:50 am

#### Image Processing

Chair: **Thomas J. Naughton**, National Univ. of Ireland/Maynooth (Ireland)

9:00 am: **Combined optimal quantization and lossless coding of digital holograms of three-dimensional objects** (*Invited Paper*), A. E. Shortt, T. J. Naughton, National Univ. of Ireland/Maynooth (Ireland); B. Javidi, Univ. of Connecticut ..... [6392-11]

9:30 am: **Development of a HMD-type multifocus**, S. Kim, D. Kim, M. Park, Y. Kwon, Korea Institute of Science and Technology (South Korea); J. Son, Hanyang Univ. (South Korea) ..... [6392-12]

9:50 am: **View-dependent scalable coding of light fields using ROI-based techniques**, Y. Taguchi, K. Takahashi, T. Naemura, The Univ. of Tokyo (Japan) ..... [6392-13]

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

10:40 am: **Stereoscopic imaging: filling disoccluded areas in image-based rendering**, C. A. Vazquez, W. J. Tam, F. Speranza, Communications Research Ctr. Canada (Canada) ..... [6392-14]

11:00 am: **Transmissive optical imaging device with micromirror array** (*Invited Paper*), S. Maekawa, National Institute of Information and Communications Technology (Japan); K. Nitta, O. Matoba, Kobe Univ. (Japan) ..... [6392-15]

11:30 am: **Perspective view reconstruction of partially occluded objects by using computational integral imaging**, Y. S. Hwang, B. Javidi, Univ. of Connecticut ..... [6392-16]

Lunch/Exhibition Break ..... 11:50 am to 1:00 pm

**SESSION 4**

**Hynes Conv. Ctr. Room 103 . . . . . Wed. 1:00 to 2:20 pm**

**3D Display Systems II**

*Chair: George Barbastathis*, Massachusetts Institute of Technology

1:00 pm: **3D optics** (*Invited Paper*), G. Barbastathis, Massachusetts Institute of Technology . . . . . [6392-17]

1:30 pm: **Integral floating 3D display system: principle and analysis** (*Invited Paper*), B. Lee, J. Kim, Seoul National Univ. (South Korea); S. Min, Virginia Polytechnic Institute and State Univ. . . . . [6392-18]

2:00 pm: **Developments of 128-directional 3D display system**, J. Ouchi, H. Kamei, K. Kikuta, Y. Takaki, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [6392-19]

**SESSION 5**

**Hynes Conv. Ctr. Room 103 . . . . . Wed. 2:20 to 5:30 pm**

**3D Display Systems III**

*Chair: Osamu Matoba*, Kobe Univ. (Japan)

2:20 pm: **Research on gaze-based interaction to 3D display system**, Y. Kwon, K. W. Jeon, S. Kim, Korea Institute of Science and Technology (South Korea) . . . . . [6392-20]

2:40 pm: **A smart remote controller for free viewpoint generation of the future 3D TV**, M. Park, S. Kim, Korea Institute of Science and Technology (South Korea); J. Son, Hanyang Univ. (South Korea) . . . . . [6392-22]

3:00 pm: **Scan made diffraction screens for HoloTV: diverging sources case**, J. J. Lunazzi, Univ. Estadual de Campinas (Brazil) and Institute of Physics (Brazil); D. S. Ferreira Magalhães, Univ. Estadual de Campinas (Brazil) [6392-23]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Perceptual depth range adaptation for eight-view autostereoscopic displays**, A. R. Boev, A. P. Gotchev, K. O. Egiazarian, Tampere Univ. of Technology (Finland) . . . . . [6392-24]

4:10 pm: **A thin size 3D-2D convertible integral imaging system with a pinhole array on a polarizer**, H. Choi, S. Cho, J. Kim, B. Lee, Seoul National Univ. (South Korea) . . . . . [6392-25]

4:30 pm: **Development of the 3D adapter using an optical grating film for stereoscopic viewing**, K. Sakamoto, T. Morii, Shimane Univ. (Japan) [6392-26]

4:50 pm: **Display of magnified 3D images in integral imaging by use of intermediate-view reconstruction technique**, J. Hyun, D. Hwang, Kwangwoon Univ. (South Korea); J. Park, Kwangwoon Univ (South Korea); D. Shin, E. Kim, Kwangwoon Univ. (South Korea) . . . . . [6392-27]

5:10 pm: **Implementation of color matching between mobile camera and mobile LCD based on RGB-LUT**, C. Son, K. Park, T. Park, Y. Ha, Kyungpook National Univ. (South Korea) . . . . . [6392-28]

**Course of Related Interest**

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SC189 Image Recognition Using Statistical Filtering Techniques, Wavelets and Neural Networks (Javidi) Monday, 8:30 am to 5:30 pm

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# Nanophotonics for Communication: Materials, Devices, and Systems III

Conference Chairs: **Martina Gerken**, Univ. Karlsruhe (Germany); **Nibir K. Dhar**, Army Research Lab.; **Achyut K. Dutta**, Banpil Photonics; **M. Saif Islam**, Univ. of California/Davis

Program Committee: **Alyssa B. Apsel**, Cornell Univ.; **Connie J. Chang-Hasnain**, Univ. of California/Berkeley; **Shanhui Fan**, Stanford Univ.; **Philippe M. Fauchet**, Univ. of Rochester; **Ahalapitiya H. Jayatissa**, Univ. of Toledo; **Sanjay Krishna**, The Univ. of New Mexico; **Michal F. Lipson**, Cornell Univ.; **Jony Jiang Liu**, Army Research Lab.; **Gernot S. Pomrenke**, Air Force Office of Scientific Research; **Dennis W. Prather**, Univ. of Delaware; **Hideyuki Sotobayashi**, National Institute of Information and Communications Technology (Japan); **Mehmet F. Yanik**, Stanford Univ.

## Monday 2 October

### Plenary Session

Hynes Conv. Ctr. Room 100 ..... Mon. 9:30 am to 12:00 pm

Chairs: **Achyut K. Dutta**, Banpil Photonics, Inc.; **Werner Weiershausen**, T-Systems Enterprise Services GmbH (Germany)

9:30 am: **The NSF/SBIR Innovation Model** (*Invited Paper, Presentation Only*), **M. S. Nair**, National Science Foundation

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

10:40 am: **Prospects of silicon photonics for future VLSI interconnects** (*Invited Paper, Presentation Only*), **M. J. Paniccia**, Intel Corp.

11:20 am: **Flexible optical transport networks: demands and trends on new Layer 2 techniques** (*Invited Paper, Presentation Only*), **G. J. Eilenberger**, Alcatel SEL AG (Germany)

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 1

Hynes Conv. Ctr. Room 102 ..... Mon. 1:30 to 3:10 pm

#### Nanophotonics for Interconnection

Chairs: **Martina Gerken**, Univ. Karlsruhe (Germany); **Hilmi V. Demir**, Bilkent Univ. (Turkey)

#### Keynote

1:30 pm: **Applications of nanophotonics to classical and quantum information technology** (*Invited Paper*), **R. G. Beausoleil**, Hewlett-Packard Labs. .... [6393-01]

2:05 pm: **Rapid micro-optical prototyping technology for fabricating optical interconnection modules at the MCM and PCB level** (*Invited Paper*), **C. Debaes**, **M. Vervaeke**, **J. Van Erps**, **L. Desmet**, **H. Ottevaere**, **V. Gomez**, **P. Vynck**, **S. Van Overmeire**, **Y. Ishii**, **A. Herrmann**, **H. Thienpont**, Vrije Univ. Brussel (Belgium) ..... [6393-02]

2:30 pm: **Nanopillar coupled periodic waveguides: from basic properties to applications** (*Invited Paper*), **D. N. Chigrin**, Univ. Bonn (Germany) ... [6393-03]

2:55 pm: **Coupled-mode theory for stimulated Raman scattering in high-Q/Vm silicon photonic band gap nanocavity lasers**, **X. Yang**, **C. W. Wong**, Columbia Univ. .... [6393-04]

Coffee Break ..... 3:10 to 3:30 pm

### SESSION 2

Hynes Conv. Ctr. Room 102 ..... Mon. 3:30 to 4:15 pm

#### Negative Refractive Index Materials

Chairs: **Nibir K. Dhar**, Army Research Lab.; **Achyut K. Dutta**, Banpil Photonics, Inc.

3:30 pm: **Realization of 3D isotropic negative index materials using self-assembled microfabrication technology**, **V. J. Logeeswaran**, **M. S. Islam**, **M. Chan**, **D. A. Horsley**, Univ. of California/Davis; **W. Wu**, **S. Wang**, **R. S. Williams**, Hewlett-Packard Labs. .... [6393-05]

3:45 pm: **Fabrication of optical negative index meta-structure at sub-10 micron using nanoimprint lithography** (*Presentation Only*), **W. Wu**, **Z. Yu**, Hewlett-Packard Labs.; **Y. Liu**, Univ. of California/Berkeley; **P. Chaturvedi**, Univ. of Illinois at Urbana-Champaign; **E. Kim**, Univ. of California/Berkeley; **A. Bratkovski**, **E. Ponizovskaya**, Hewlett-Packard Labs.; **N. X. Fang**, Univ. of Illinois at Urbana-Champaign; **X. Zhang**, Univ. of California/Berkeley; **S. Wang**, **R. S. Williams**, Hewlett-Packard Labs. .... [6393-06]

4:00 pm: **Transmission and reflection of highly anisotropic layered semiconductor structures with plasmonic resonances** (*Presentation Only*), **A. J. Hoffman**, Princeton Univ. and Lucent Technologies; **L. V. Alekseyev**, **E. E. Narimanov**, **C. F. Gmachl**, Princeton Univ.; **D. L. Sivco**, Lucent Technologies/Bell Labs. .... [6393-07]

### SESSION 3

Hynes Conv. Ctr. Room 102 ..... Mon. 4:15 to 5:40 pm

#### Nanodevices: Quantum-dots, Nanowires, and Nanocrystals I

Chairs: **Hideyuki Sotobayashi**, National Institute of Information and Communications Technology (Japan); **Martina Gerken**, Univ. Karlsruhe (Germany)

#### Keynote

4:15 pm: **Prospect of quantum dot lasers and single photon sources for advanced optical communication systems** (*Invited Paper, Presentation Only*), **Y. Arakawa**, The Univ. of Tokyo (Japan) .... [6393-08]

4:50 pm: **Nonlinear absorption of highly stacked InAs quantum dot layers on an InP(311) substrate** (*Invited Paper*), **T. Isu**, National Institute of Information and Communications Technology (Japan) and CREST JST (Japan); **J. Inoue**, **K. Akahane**, **M. Tsuchiya**, National Institute of Information and Communications Technology (Japan) .... [6393-09]

5:15 pm: **Sb-based quantum dot for creating novel light-emitting devices for optical communications** (*Invited Paper*), **N. Yamamoto**, **K. Akahane**, **S. Gozu**, **A. Ueta**, **N. Ohtani**, **M. Tsuchiya**, National Institute of Information and Communications Technology (Japan) .... [6393-10]



**Tuesday 3 October**

**SESSION 4**

**Hynes Conv. Ctr. Room 102 . . . . . Tues. 8:30 to 10:15 am**

**Nanodevices: Quantum-dots, Nanowires, and Nanocrystals II**

*Chairs:* **Hideyuki Sotobayashi**, National Institute of Information and Communications Technology (Japan);  
**Martina Gerken**, Univ. Karlsruhe (Germany)

8:30 am: **Electrodeposition of semiconductor nanowires and detailed characterization of their growth quality** (*Invited Paper*), K. Yu-Zhang, D. Z. Guo, J. Mallet, Univ. de Reims Champagne-Ardenne (France); M. Molinari, Univ. of Rochester; A. Loualiche, M. Troyon, Univ. de Reims Champagne-Ardenne (France) . . . . . [6393-11]

8:55 am: **Superconducting nanowire single-photon detectors for applications** (*Invited Paper, Presentation Only*), K. K. Berggren, V. Anant, E. Dauler, Massachusetts Institute of Technology; A. Kerman, MIT Lincoln Lab.; K. M. Rosfjord, J. Yang, Massachusetts Institute of Technology; G. N. Gol'tsman, B. M. Voronov, Moscow State Pedagogical Univ. (Russia) [6393-12]

9:20 am: **Photonic devices and systems embedded with nanocrystals for new functionality** (*Invited Paper*), H. V. Demir, Bilkent Univ. (Turkey) . [6393-13]

9:45 am: **Observations of optical nonlinearities in strongly quantum confined PbSe nanocrystals for all-optical tunable nanophotonics**, C. J. Chen, J. I. Dadap, Columbia Univ.; J. Urban, C. B. Murray, IBM Thomas J. Watson Research Ctr.; R. M. Osgood, Jr., C. W. Wong, Columbia Univ. . . . . [6393-14]

10:00 am: **Heteroepitaxial growth of InP nanowires on silicon surfaces with large diameters** (*Presentation Only*), M. S. Islam, I. Kimukin, C. D. Johns, Univ. of California/Davis; S. Yi, Lumileds Lighting . . . . . [6393-15]

Coffee Break . . . . . 10:15 to 10:45 am

**SESSION 5**

**Hynes Conv. Ctr. Room 102 . . . . . Tues. 10:45 am to 12:20 pm**

**Nanophotonic Switching Devices**

*Chairs:* **M. Saif Islam**, Univ. of California/Davis;  
**Nibir K. Dhar**, Army Research Lab.

10:45 am: **Photonically engineered nanostructures: device concepts and material characterization for all-optical switching** (*Invited Paper, Presentation Only*), S. Jochim, N. Moll, IBM Zürich Research Lab. (Switzerland); S. Gulde, ETH Zürich (Switzerland); B. J. Offrein, R. F. Mahrt, IBM Zürich Research Lab. (Switzerland) . . . . . [6393-16]

11:10 am: **Coherent phonons in nanostructures** (*Invited Paper*), T. Dekorsy, Univ. Konstanz (Germany) . . . . . [6393-17]

11:35 am: **Active manipulation of surface plasmons in metal-molecule-metal devices** (*Presentation Only*), R. Pala, K. Shimizu, N. A. Melosh, M. L. Brongersma, Stanford Univ. . . . . [6393-18]

11:50 am: **Ultrafast all-optical bistability in AlGaAs photonic crystals**, C. Husko, C. W. Wong, Columbia Univ. . . . . [6393-19]

12:05 pm: **Design of a 1:N switch using nonlinear optical materials in one-dimensional photonic nanostructures**, F. Gloeckler, S. Peters, M. Gerken, U. Lemmer, Univ. Karlsruhe (Germany) . . . . . [6393-20]

**✓ Posters-Tuesday**

A poster reception, with authors present at their posters, will be held Tuesday evening from 6:00 to 7:30 pm in the Hynes Convention Center Exhibit Hall A. Light refreshments will be served. Poster authors may begin displaying their posters after Noon on Monday and will be asked to leave their posters up until 7:30 pm on Tuesday. All posters must be posted by 5:00 pm on Tuesday. Poster authors, see p. 76 for setup instructions.

**✓ All-optical wavelength conversion configuration with increased extinction ratio**, Z. Zalevsky, Bar-Ilan Univ. (Israel); D. Goldring, D. Mendlovic, Tel-Aviv Univ. (Israel) . . . . . [6393-22]

**Course of Related Interest**

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SC801 Optoelectronic Devices: Introduction to Physics and Simulation (Pipek) Tuesday, 8:30 am to 12:30 pm

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## Optics East

Hynes Convention Center  
110 Huntington Avenue, Boston, Massachusetts, 02116  
Headquarters Hotel: **Boston Marriott Copley Place**,  
110 Huntington Avenue, Boston, Massachusetts, 02116  
Phone: 617 236 5800, Guest fax: 617 236 5885

## Onsite Registration and Information Hours

*Hynes Convention Center, 1st Floor, Hall A*

Sunday 1 October ..... 7:00 am to 5 pm  
Monday 2 October ..... 7:30 am to 5 pm  
Tuesday 3 October ..... 7:30 am to 5 pm  
Wednesday 4 October ..... 7:30 am to 4 pm

Full conference registration includes: Admittance to the conferences and exhibition, coffee breaks, dessert and lunches in the Exhibition hall, Welcome reception, poster session, and proceedings of SPIE as applicable under the specific registration plans. Proceedings of SPIE purchased as part of your registration plan include tax and shipping charges. Student author registration does not include Proceedings of SPIE.

Course only registration includes your selected short course(s), course notes, coffee breaks, poster session, and admittance to the exhibition.

## Lunch

Technical attendees will receive a lunch coupon for the concession in Exhibition Hall A. Each coupon will be good for \$5 and there will be a coupon for both Tuesday and Wednesday.

## Exhibition Hours

*Hynes Convention Center, 1st Floor, Hall A*

Tuesday 3 October ..... 10:00 am to 5:00 pm  
Wednesday 4 October ..... 10:00 am to 4:00 pm

## Speakers Audiovisual Desk Hours

*Hynes Convention Center, Room 112*

Sunday through Wednesday ..... 7:30 am to 5:00 pm  
All Conference rooms will have a LCD projector (for IBM compatible and Macintosh computers), an overhead projector, screen, lapel microphone, and laser pointer. Speakers using a laptop are requested to come to the Audiovisual Desk to confirm display compatibility with LCD projectors prior to their presentation.

## Messages for Attendees

*Hynes Convention Center, Pre-function Hall A*

Messages for attendees at the Optics East Symposium can be left by calling the Hynes Convention Center at (617) 954-2000 and asking for the SPIE Registration Desk. Messages will be taken during registration hours Sunday through Wednesday. Attendees should check the message board at the message center on a daily basis to receive their messages.

## Audio/Video/Digital Recording Policy

In the meeting rooms: For copyright reasons, recordings of any kind are strictly prohibited without prior written consent of the presenter in any conference session, short course or of posters presented. Each presenter being taped must file a signed written consent form. Individuals not complying with this policy will be asked to leave a given session and asked to surrender their film or recording media. Consent forms are available at the SPIE Audiovisual Desk.

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 on-site company representatives. Individuals not complying with this policy will be asked to surrender their film and to leave the exhibit hall.

Laser Pointers: It recently has come to our attention that there are potential safety concerns about green or blue/violet laser pointers due to possible labeling errors as to their power output and wavelength. Because of this, SPIE asks that you only use the laser pointers that SPIE provides for each conference room. SPIE has tested the red laser pointers available in each conference room for wavelength and power output and are assured they are within acceptable safety limits. If you wish to use your own laser pointer, SPIE requires that you stop at the AV Desk onsite and sign a waiver of liability form.

## Internet Access

*Hynes Convention Center, Pre-function Hall A*

Open during registration hours

Internet access terminals will allow attendees to access their e-mail during the conference. There will be a 10-minute time limit per each person's internet session.

## Wireless

*Hynes Convention Center and Boston Marriott Copley Place*

The Hynes Convention Center offers complimentary wireless access.

Boston Marriott Copley Place offers wireless access on the 1st floor and in the lobby is charged as follows; \$2.95 to connect and 25 cents per minute thereafter. This is only available to wireless computers. There is no wired access available. Rates are subject to change. Please direct questions to the Marriott business center.

## High Speed Internet

Guestrooms at the Boston Marriott Copley Place are equipped with internet connection, available at \$9.95 for 24 hours.

## SPIE Marketplace

*Hynes Convention Center, Pre-function Hall A*

The SPIE Marketplace is your source for the latest SPIE Press books, Proceedings, and Educational and Professional Development materials. You can become a member of SPIE, explore the Digital Library, and take home a souvenir.

## SPIE Digital Library

Stop by the Marketplace to try out the SPIE Digital Library. The SPIE Digital Library gives you unprecedented access to SPIE Proceedings and Journals from 1990 forward — approximately 220,000 articles with 17,000 new articles added each year. Editor-reviewed papers from post-meeting SPIE Proceedings are now available online within two to four weeks after each meeting. Journal articles are published online as they are approved.

# General Information



## Employment Opportunities

Bring a copy of your resume to Optics East and look for the notebook located near the job posting boards; place your resume inside this book for review by interested employers. Plan to stop by these same job boards throughout the meeting and review current employment opportunities.

In addition to our onsite posting boards, SPIEWorks, the SPIE employment website, offers you an online job database, resume posting, and email notification services year round. Visit [www.spieworks.com](http://www.spieworks.com)

## Recruiting Services

Bring copies of your open positions to Optics East and post them on the boards provided for this purpose. While at the meeting you will also be able to review any resumes posted by meeting attendees; look for the notebook located near the job posting boards. If you're searching for highly skilled candidates for hard-to-fill positions this is a great place to start.

If you don't find the candidates you need, SPIEWorks, the SPIE employment website can help you target a skilled group of optics and photonics professionals after the meeting. Contact Dave Baggenstos at +1 360 715 3705 or email [sales@spieworks.com](mailto:sales@spieworks.com)

Membership in SPIE is not required to post jobs.

## Welcome Reception

*Boston Marriott Copley Place, 3rd Floor Atrium*

Sunday 1 October . . . . . 5:30 pm to 6:30 pm

All attendees are invited to the Welcome Reception. Relax, socialize, and enjoy refreshments. Please remember to wear your conference registration badges. Dress is casual.

## Poster Session

*Hynes Convention Center, Hall A (entry from main lobby)*

Tuesday 3 October . . . . . 6:00 to 7:30 pm

## Poster Set-Up and Preview

Monday 2 October . . . . . 12:00 to 5:00 pm

Tuesday 3 October . . . . . 10:00 am to 5:00 pm

Poster authors will be able to set up starting at Noon on Monday and asked to leave their posters up until 7:30 pm on Tuesday. Poster Presenters who have not set up by 5:00 pm on Tuesday will be considered a "no show" and their manuscript will not be published.

Presenters will be at their poster papers to answer questions from 6:00 pm to 7:30 pm on Tuesday.

It is the author's responsibility to remove their posters at the end of the session. Papers not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of the poster session.

## Coffee Breaks

*Hynes Convention Center, Outside Rooms 103-104*

Sunday and Monday . . . . . 10:00 to 11:00 am; 3:00 to 4:00 pm

*Hynes Convention Center, Exhibition Hall A*

Tuesday and Wednesday . . . . . 10:00 to 11:00 am; 3:00 to 4:00 pm

Coffee will be served during the morning and afternoon break. Please check the individual technical conference listings for exact times.

## Desserts

*Exhibition Hall A*

Tuesday & Wednesday 3-4 October . . . . . 3:00 to 3:30 pm

Desserts will be served in Hall A on Tuesday and Wednesday, 3:00 to 3:30 pm.

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## Course Materials Desk

*Located in 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 pickup your badge, to get 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 of customized In-Company courses.

## Sightseeing

Attendees should visit the concierge desk at the hotel for assistance in arranging tours, sightseeing, and shopping in Boston and vicinity.

The Greater Boston Convention & Visitors Bureau operates an information desk in the Prudential Center to assist visitors with city sightseeing, shopping, and dining plans. Hours are Monday-Saturday from 10am to 9pm and Sunday from 11:00 am to 6:00 pm. Walk from the Marriott, over the footbridge to the Center Mall, or call Prudential Center Information at 617-236-3100.

## Child Care Services

The following child care facilities were suggested by the Boston Marriott Copley Place Hotel. SPIE does not imply an endorsement nor recommendation of these services. They are provided on an "information only" basis for your further analysis and decision. Other services may be available.

Best Babysitter: [www.bbbabysitters.com](http://www.bbbabysitters.com); Phone: (617) 268-7148  
Fax: (617) 269-3307; Email: [jennifer.garnache@bbbabysitters.com](mailto:jennifer.garnache@bbbabysitters.com)

Parents in a Pinch: Phone: (617) 739-5437, Fax: (617) 739-1939  
Toll Free outside MA: 1-800-688-4697; [www.parentsinapinch.com](http://www.parentsinapinch.com)  
Email: [TempCare@parentsinapinch.com](mailto:TempCare@parentsinapinch.com)

## Car Rental



Hertz Car Rental will not be offering meeting rates during this symposium due to a black out for Fall Foliage. Attendees can rent from this location at the best available published rate. By referring to the SPIE 2006 Hertz Meeting Code CV# 029B0009, they may or may not receive a further discount but will receive the best available published rate.

In the United States call 1-800-654-2240.

## Parking

### Hynes Convention Center Parking

Within a three-block walk of the Hynes Convention Center are numerous parking garages totaling over 4,400 spaces. There is limited meter parking available around the Hynes and adjacent streets. Check the website [www.massconvention.com](http://www.massconvention.com) for further parking garages.

The Sheraton Boston Hotel Parking Garage, 39 Dalton Street, operated by Auditorium Parking (617) 247-8006, is located across from the John B. Hynes Convention Center.

Cash or credit cards accepted and a parking attendant is on duty 24 hours/day.

Rates: \$4 for each half hour or:

Arrive 3:00 am -8:30 am & leave before 6:00 pm \$17 Maximum

Arrive after 8:30 am & leave before 6:00 pm \$22 Maximum

Arrive after 8:30 am & leave after 6:00 pm \$26 Maximum

(24 hour rate)

Arrive after 4:00 pm & leave before 6:00 am \$10 Maximum

Rates are subject to change.

Prudential Center Parking Garage, 800 Boylston Street (617) 236-3060

Cash or credit cards accepted and a parking attendant is on duty 24 hours/day. Rates: \$6 for 1/2 hour, \$9 for 1 hour, \$17 for 1 1/2 hours, \$24 for 2 hours, \$30 for 3 hours, \$38 for 4-10 hours, overnight \$38. Rates are subject to change.

Guest Parking at the Boston Marriott Copley Place

Valet Parking \$39 per 24-hour period, with unlimited in/out privileges. Can be charged to the guest's room. Prices are subject to change without notice, and parking is based on availability.

Parking at The Copley Place Mall Complex

Self Parking Only - 3 Hours or less \$7 with validated ticket from any store in complex \$32 per 24-hour period. Cash and credit cards accepted - no checks.

Taxi Service: Taxi service is available 24 hours. Approximate travel time between Logan Airport and the Marriott Copley Place Hotel is 20 - 25 minutes depending on traffic. Taxi fare is approximately \$30.

## Airport Shuttles

City Transportation: Telephone: (617) 877-3109 or (617) 331-8388

The cost for one to four passengers one way is \$12.00 cash payment to the driver from Logan Airport to the Boston Marriott Copley Place (2nd or 3rd stop). For five to ten people, the fare is \$10/pp. Rates are subject to change. (Form of payment accepted is cash only). Fare includes Tunnel toll fee. Each van holds 10 passengers. Shuttles run from Logan to Boston area hotels seven days a week, every 15 minutes from 3:45 AM - 2:00 AM. The trip from Logan to the Boston Marriott takes approximately 25 minutes. When arriving at Logan Airport, call dispatch (617) 561-9000 (or either number above) to arrange your pick-up. To catch the shuttle, wait outside the Baggage Claim Area on the median strip at the yellow sign that reads, "Bus Stop/Shared Van Pickup." Shuttle buses are red and white and read, "City Transportation" across the side.

Gray Van Express: Transportation from Logan International Airport to the Boston Marriott Copley Place Hotel may be obtained through Gray Van Express shuttles (formerly Back Bay Coach), which depart from bus stop locations in front of the baggage claim areas of the airport. Call 1-888-222-5229 or (617) 884-9131 to make reservations for pickup at least 24 hours in advance. The vans are gray with the name on the back window. The fare is \$12.00 per person one way (form of payment accepted is cash only) and the shuttles, which serve all of the greater Boston area hotels, operate from 5:00 am to 10:00 pm. Fare includes tunnel toll fee. Trip takes approximately 25 minutes. For RETURN transportation from the Boston Marriott Copley Place to Logan International Airport, call one day in advance to arrange for pick up and allow one hour driving time to the airport.

MBTA Service (Massachusetts Bay Transit Authority: The Boston Marriott Copley Place can be reached via Boston's excellent transit system MBTA referred to as the "T". The "T" has several systems within a system: the subway, the trackless trolleys, the diesel bus system, commuter trains and commuter boats. You may purchase visitor passes, which include all transportation services, on-line by visiting their website at <http://www.mbta.com/passfares/pass-programs/visitor/index.cfm>. The subway is the oldest, most interesting part of the "T" system, running on four different lines which have been color-coded for ease of use.

Complimentary Shuttle to the Airport Subway Station: Take the complimentary Logan Massport Shuttle Bus (Route 22 from Terminals A & B and Route 33 from Terminals C, D and E, from the Arrivals Level) to the Airport Subway Station on the MBTA Blue Line. The Massport Shuttle Bus operates seven days per week, from 4:00 am to 1:00 am. All shuttle buses are wheelchair lift equipped.

Logan International Airport - Blue Line/Green Line: Take the Blue Line (Inbound) to Government Center where you will transfer to any Green Line train (Outbound). Get off at the Copley Station stop. Exit the station onto Boylston Street (in front of the Boston Public Library) - turn right from station exit. At end of block (corner of Boylston and Exeter), take left onto Exeter and walk all the way to the end. Marriott Copley Place Hotel is straight ahead.

Logan International Airport - Blue Line/Orange Line: Take the Blue Line (Inbound) to State Street where you will transfer to any Orange Line train (Outbound). Get off at Back Bay station. Go out onto Dartmouth Street. Walk across the street to the Copley Place Mall (Neiman Marcus). Go through the mall and follow signs to the Marriott Copley Place Hotel, located on the other side of the mall across from Tiffany's.

## Public Transportation Fares

Note: All rates are subject to change

Subway or Commuter Rail: Gradually during 2006 and 2007, Charlie tickets (paper tickets) are replacing tokens. Vending machines will gradually be converted. Cost of an adult one-way trip within the city on the subway or commuter rail is \$1.25 or one token or one Charlie ticket. Tokens (or Charlie tickets) are required to pass through the turnstile and can be purchased from the attendant at the transit token booth (open 24 hours). (The booth attendant will make change).

Commuter Rail:

- North Station: (coming to Boston from points north) At North Station pick up either the Green Line or the Orange Line.
- South Station: (coming to Boston from points south) At South Station, take the Red Line to the Park Street stop, where you can pick up the Green Line.
- Back Bay/South End: The Commuter Rail comes in at the same place as the subway's Orange Line at the Back Bay/South End stop.

Boston Visitor Pass for public transportation in Greater Boston is valid for unlimited travel on all subways, city buses and inner harbor water ferry services. It can be purchased as follows:

1 day pass \$7.50; 3 day pass \$18 for 3 consecutive days; 7 day pass \$35; Weekly pass for 7 days (bus & subway only) \$16.50

Bus: Cost of an adult one-way trip within the city on the bus is \$.90 cents. The passenger must have the exact change for the bus. The bus driver will not make change. Fares vary when traveling from outlying areas. For further information on specific routes and fares call MBTA Customer Service at (617) 222-3200 or visit their website at [www.mbta.com](http://www.mbta.com)

Amtrak (Back Bay Station): Exit station onto Dartmouth Street and follow directions as above (Logan International Airport - Blue Line/Orange Line).

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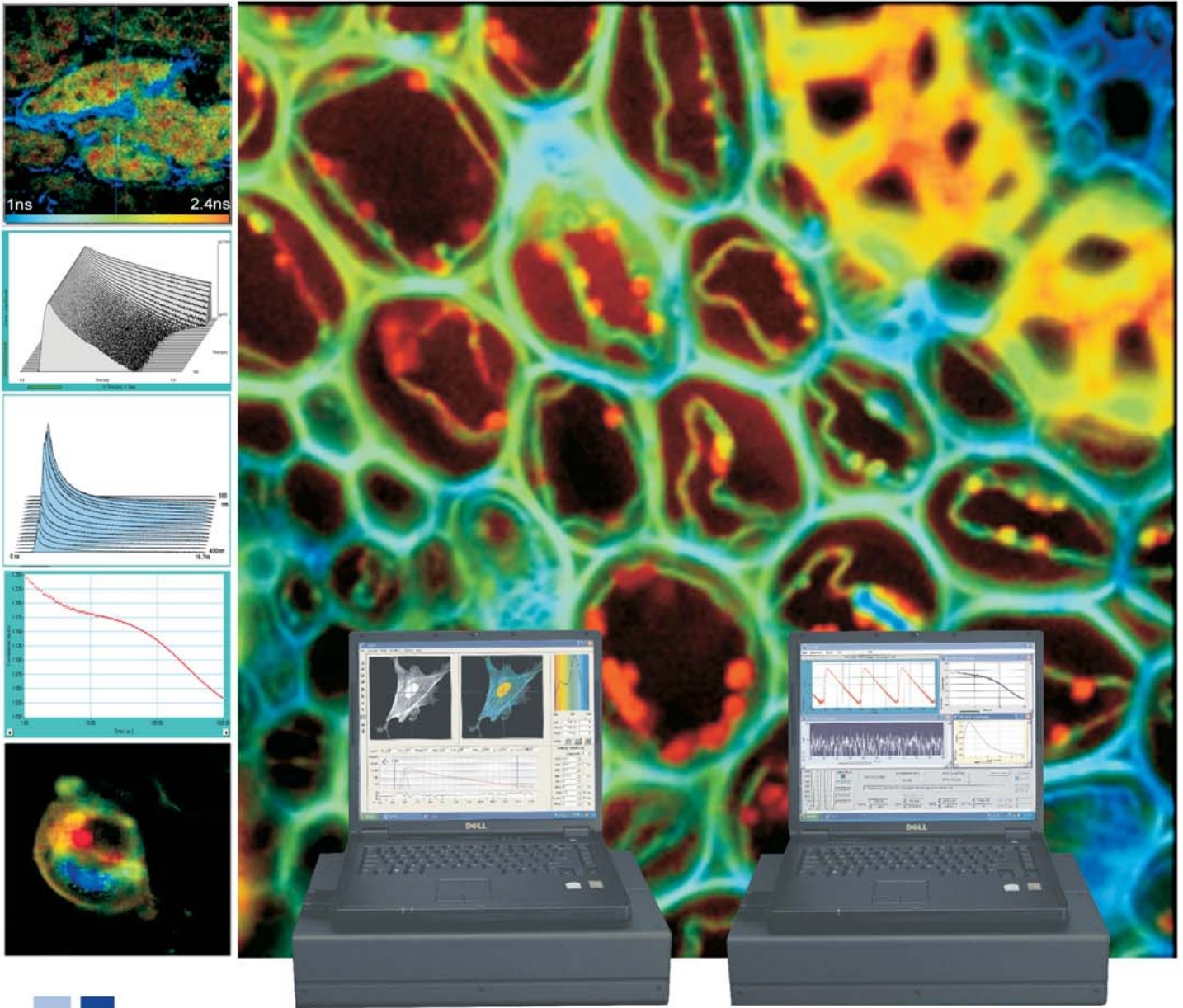


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