



SPIE Smart Structures/NDE

Technical Program

Connecting minds for global solutions

Conference and Course Dates

6–10 March 2011

Exhibition

8–9 March 2011

Town and Country Resort
and Convention Center
San Diego, California, USA

spie.org/ss

Technologies

- Energy Harvesting/Energy Systems
- Structural Health Monitoring
- Civil Infrastructure Systems
- Real-Time NDE
- Electroactive Polymers
- Wind Energy Applications
- Bio-inspired and Robotic Systems
- Automotive and Aerospace Applications
- Actuators and Damping
- Nanotechnology
- Modeling, Control, and Optimization
- Sensor Networks
- Shape Memory Alloys
- MR Fluids and Elastomers
- Piezoelectric Materials
- Embedded and Self-Diagnostic Sensors
- Optical Fiber Sensors



Welcome to 2011 Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring

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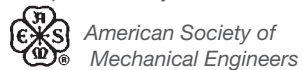
Technical Conferences

Bioinspiration, Biomimetics, and Bioreplication <i>(Martín-Palma)</i>	14-34
Electroactive Polymer Actuators and Devices (EAPAD) XIII <i>(Bar-Cohen)</i>	14-46
Active and Passive Smart Structures and Integrated Systems V <i>(Ghasemi-Nejhad)</i>	14-46
Behavior and Mechanics of Multifunctional Materials and Composites V <i>(Ounaies)</i>	14-40
Industrial and Commercial Applications of Smart Structures Technologies V <i>(McMickell)</i>	14-24
Nano-, Bio-, Info-Tech Sensors and Systems <i>(Varadan)</i>	15-40
Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems <i>(Tomizuka)</i>	15-48
Smart Sensor Phenomena, Technology, Networks, and Systems IV <i>(Peters)</i>	15-37
Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security V <i>(Shull)</i>	15-49
Health Monitoring of Structural and Biological Systems V <i>(Kundu)</i>	15-49

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National Institute of Standards and
Technology

Chung-Bang Yun,
KAIST

Welcome!

The Organizing Committee of the 18th SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring welcomes you to what promises to be an exciting meeting. This unique symposium offers many opportunities to network with colleagues from a variety of disciplines in academia, industry, and government from all over the world. Over the last two decades, this meeting has grown from small beginnings in the then-emerging field of smart systems into a premier symposium. This symposium has been the incubator for the emergence of the field of electroactive polymers, also known as artificial muscles, for which the armwrestling contest is now a famous event.

Complementary techniques and application of smart structures and materials have been discussed in the joint symposium with NDE and Health Monitoring for the past four years. This event has developed into one of the world's most important events discussing the monitoring of structural integrity and adaptive/intelligent structures. Now, both symposia are integrated into a single event. This integration offers new avenues for collaboration and interaction opportunities to bring more advances and address greater challenges that lie ahead. Such challenges include areas of homeland security, and benefiting from exciting fields of biomimetics, nanotechnologies, and others.

The symposium covers all aspects of the evolving fields of materials, enabling technologies, sensor/actuator design and fabrication, MEMS, NEMS, and other micro-, nano- and bio-electronic devices, biomimetics, signal processing and control, systems concepts, wireless sensors and sensor networks, modeling and simulation. Applications of these technologies cover the whole spectrum of life in the 21st century including commercial, medical, aerospace, military uses and many others. Also included are several parallel conferences on a range of topics related to NDE, health monitoring, safety, security, civil infrastructure, characterization of materials, and detection of materials defects and degradation, application of micro- and nanomaterial systems, health monitoring of structural and biological systems, NDE for aerospace materials and applications, and NDE technologies for homeland security.

The symposium is organized in ten parallel conferences. It will bring together emerging technologies and advanced research in instrumentation, sensing, and measurement science with progressive management and diagnostic approaches and smart systems. Engineers and researchers from government, military, academia and the commercial sector will discuss the current status and future directions of smart structures and materials, NDE, and health monitoring. Case studies, emerging research agendas, and innovative new technologies will be presented.



Symposium Chairs

Donald J. Leo, Virginia
Polytechnic Institute and
State Univ.



Kara J. Peters, North
Carolina State Univ.



Symposium Cochairs

Norbert Meyendorf,
Fraunhofer-Institut für
Zerstörungsfreie Prüfverfahren
and Univ. of Dayton

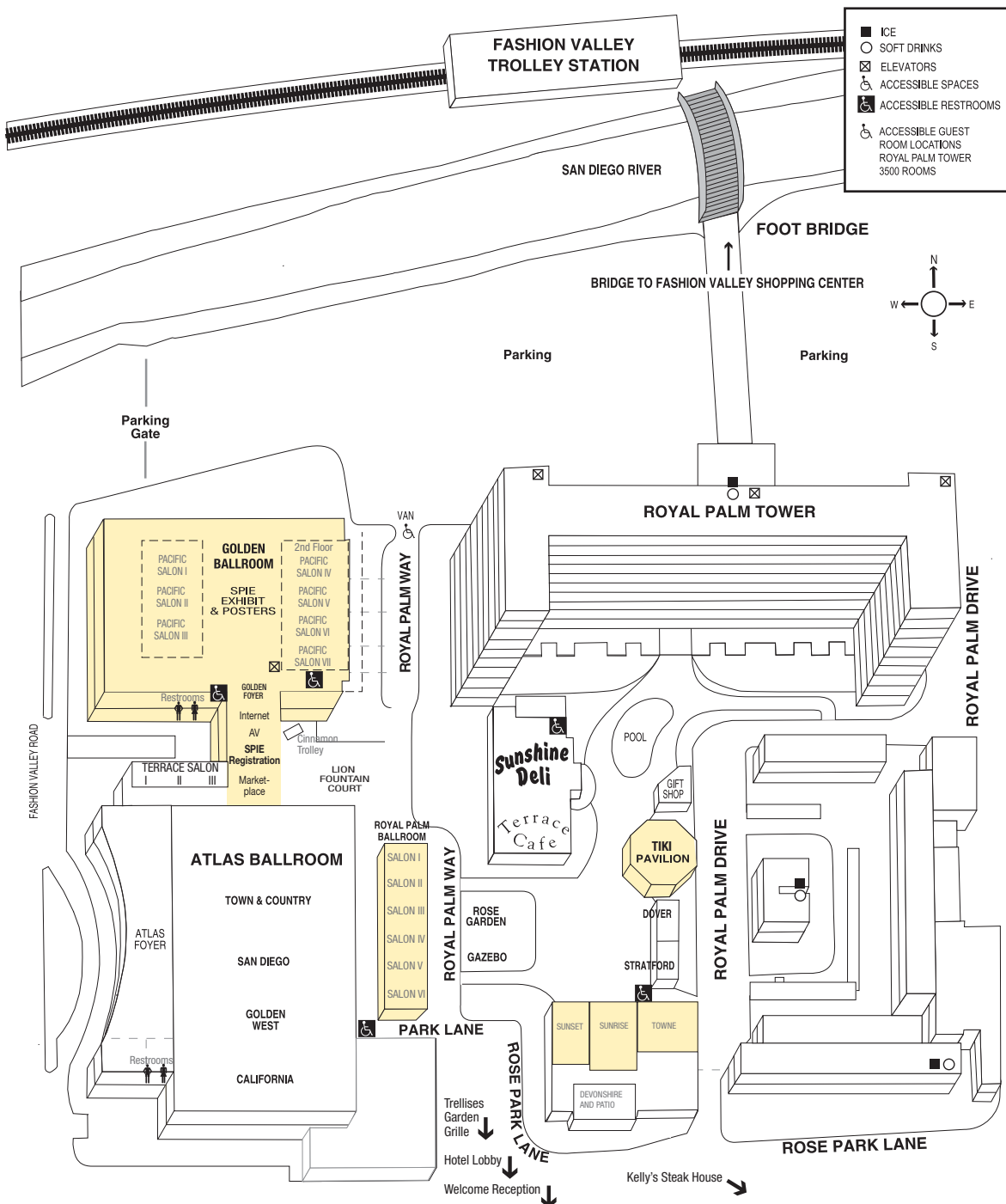


Norman Wereley, Univ. of
Maryland, College Park

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.

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

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Sunday	Monday	Tuesday	Wednesday	Thursday
Special Events				
SC634 Electroactive Polymer Actuators and Devices , 8:30 am to 5:30 pm, p. 8	2011 SSM Lifetime Achievement Award and 2011 NDE Lifetime Achievement Award presentations, 8:15 to 8:30 am, p. 11	ASME Gary Anderson Early Achievement Award and Smart Structures Product Implementation Award presentations, 8:00 to 8:05 am, p. 11	<i>Plenary Presentation: Micro-computed Tomography: Towards Nanoscale Imaging</i> (Hanke) 8:20 to 9:05 am, p. 5	SPIE/ASME Best Student Paper Award and ASME Best Paper Award presentations, 8:00 to 8:05 am, p. 11
	<i>Plenary Presentation: Advanced Sealing Technology for the Energy and Propulsion Fields</i> (Ruggiero) 8:30 to 9:15 am, p. 4	AFRL Funding Agency Talk (Lindgren) 8:05 to 8:20 am, p. 7	Poster Viewing , 10:00 am to 4:00 pm, p. 7	<i>Plenary Presentation: The European Project “Clean Sky” and an insight in the platform “Green Regional Aircraft”</i> (Carli) 8:20 to 9:05 am, p. 6
	<i>Plenary Presentation: The Upcoming Revolution in Ultrasonic Guided Waves</i> (Rose) 9:15 to 10:00 am, p. 4	<i>Plenary Presentation: Structural Magnetostrictive Alloys: An Introduction to a New Class of Transducer Materials</i> (Flatau) 8:20 to 9:05 am, p. 5	Best Student Paper Session , 6:00 to 7:30 pm, p. 7	
	EAPAD Keynote Presentation: Walking with Springs , Paper 7976-1 (Sugar) 10:30 am, p. 6	Poster Viewing , 10:00 am to 4:00 pm, p. 7		
	All Symposium Welcome Reception , 6:00 to 7:30 pm, p. 6	Student Lunch with the Experts—A Networking Event , 12:30 to 1:30 pm, p. 7		
		Posters/Exhibition Reception , 6:00 to 7:30 pm, p. 7		
		EXHIBITION , p. 10 10:00 am to 4:00 pm; 6:00 to 7:30 pm	EXHIBITION , p. 10 10:00 am to 4:00 pm	
Conferences				
		Conf. 7975 Bioinspiration, Biomimetics, and Bioreplication (Martin-Palma) p. 14-34		
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		Conf. 7978 Behavior and Mechanics of Multifunctional Materials and Composites V (Ounaies) p. 14-40		
		Conf. 7979 Industrial and Commercial Applications of Smart Structures Technologies V (Farinholt) p. 14-24		
		Conf. 7980 Nano-, Bio-, Info-Tech Sensors and Systems (Varadan) p. 15-40		
		Conf. 7981 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems (Tomizuka) p. 15-48		
		Conf. 7982 Smart Sensor Phenomena, Technology, Networks, and Systems IV (Ecke) p. 15-37		
		Conf. 7983 Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security V (Wu) p. 15-49		
		Conf. 7984 Health Monitoring of Structural and Biological Systems V (Kundu) p. 15-49		

SPIE Smart Structures/NDE is a leading conference on green photonics technology such as energy harvesting, non-destructive evaluation, wind energy, and bio-inspired engineering.



Plenary Sessions

Monday–Thursday daily sessions will consist of opening remarks, award presentations, funding talks, and plenary presentation.

Monday Plenary Session

Pacific Salon I-III

Monday 7 March 8:15 to 10:00 am

8:15 to 8:25 am

SSM Lifetime Achievement Award presented to
Dr. Amr Baz, Univ. of Maryland, College Park and
Dr. Kon-Well Wang, Univ. of Michigan

NDE Lifetime Achievement Award presented to
Dr. Joseph L. Rose, The Pennsylvania State Univ.
See page 11 for details.

SPIE Fellows Recognition

Monday 7 March 8:25 to 8:30 am



Alexander A. Balandin, Univ. of California, Riverside (United States)



Wolfgang Ecke, IPHT, Jena (Germany)

Monday 7 March 8:30 to 9:15 am

Advanced Sealing Technology for the Energy and Propulsion Fields



Eric Ruggiero, GE Global Research (United States)

Abstract: Aircraft engines need to run hotter, at greater pressures, and with incredible bypass ratios. Steam turbine and gas turbine power generation customers demand greater efficiency, greater stretches between service intervals, and more wattage. One challenge faces both land and air-based turbines from meeting their

desired operation goals: leaks!

Seals are, of course, the answer to this challenge. But seals are not very attractive from a technology standpoint. In a rather mundane way, seals keep high and low pressure working fluids within pre-defined paths within the turbomachine - any deviation

from these pre-defined paths can immediately lead to reductions in overall machine efficiency. Seals are designed conservatively to ensure they do not contact the rotor under transient operation, but then they leak excessively during steady-state operation.

A need exists for a new generation of seals that are able to run tighter clearances at greater temperatures, pressures, running speeds, and in the face of severe rotor transients.

Smart structures offer a new perspective on how to revolutionize the design space for advanced sealing technologies. Advanced seal solutions should be able to track and react to the transients of the rotor or turbine. Although most smart materials are not designed to operate in the harsh environment (high temperatures and pressures) of a gas or steam turbine, the philosophy of smart material-enabled structures presents a new pathway for greater performance and more efficient power generation equipment.

The presentation will discuss the development of sealing technologies and the role that intelligent system design plays in the future of gas turbines, steam turbines, aircraft engines, and the like. The challenges facing actuators and sensors from both the environmental and from a controls perspective will be highlighted. In addition, the presentation will offer a perspective on how GE Global Research teams play a role in the innovative design and implementation of cutting edge technology like advanced seals in new and existing machines.

Biography: **Dr. Eric Ruggiero** received his Ph.D. from Virginia Tech in Mechanical Engineering in 2005 from the Center for Intelligent Material Systems and Structures and is currently a senior engineer at GE Global Research (Niskayuna, NY) in the Performance Technologies Laboratory. In his current role, Dr. Ruggiero leads global teams on the design, test, and validation of advanced sealing concepts and harsh environment sensors for AFRL, GE Aviation, GE Energy, and GE Oil and Gas. In total, he has been responsible for over \$4.5 MM in research and development efforts since joining GE Global Research in 2005.

Dr. Ruggiero is a National Science Foundation graduate research fellow. He has published over 30 peer-reviewed manuscripts, primarily in the fields of gossamer spacecraft technology and non-metallic brush seals. He is a member of AIAA, ASME, and the ASME Adaptive Structures Technical Committee. Dr. Ruggiero was the recipient of the 2004 AIAA Adaptive Structures Graduate Student Award, the 2005 Paul E. Torgersen Graduate Research Award, and the 2006 ASME Adaptive Structures and Material Systems Technical Committee Best Paper Award. In 2008, he was selected as the runner-up for the ASME Old Guard Young Engineer's Award. And in 2009, Dr. Ruggiero was honored as the AIAA Northeast New York Section Engineer of the Year.

Monday 7 March 9:15 to 10:00 am

The Upcoming Revolution in Ultrasonic Guided Waves



Joseph L. Rose, The Pennsylvania State Univ. (United States)

Abstract: The versatility and capability of Ultrasonic Guided Waves is now rapidly showing a strong face in Nondestructive Testing and Structural Health Monitoring. Computational efficiency available today and wave mechanics understanding are responsible for an upcoming revolution and widespread use. The special benefits of mode and frequency selection in

a huge phase velocity dispersion curve space are breaking through in achieving high sensitivities to certain defects and in superior penetration power when needed. Basic elements of some advanced theoretical aspects of Ultrasonic Guided Waves will be highlighted along with a brief review of a variety of practical applications from long range real time phased array techniques for pipelines and composite structures, ultrasonic guided wave tomographic applications in pipelines and composite structures, to special adhesive bonding algorithms, onto weld inspections in bridges will be illustrated. Ultrasonic Guided Wave studies in gas entrapment detection in pipelines and in ice detection and deicing of aircraft structures will be also be demonstrated. A preview of some future ultrasonic guided wave vibration applications, made possible by special loading function selections from phase velocity dispersion curve space, will also be introduced. Successes and challenges will be highlighted throughout the talk.

Biography: **Dr. Joseph L. Rose** is the Paul Morrow Professor in Design and Manufacturing in the Engineering Science & Mechanics Department of The Pennsylvania State University and also the Chief Scientist and President of FBS. Dr. Rose is a worldwide recognized guided wave expert. He is author of twenty patents, four text books, and over 500 publications on ultrasonic bulk and guided wave NDE and SHM, wave mechanics, medical ultrasound, pipe and tubing inspection, composite material inspection, ice detection, signal processing, and pattern recognition. Textbooks include Basic Physics in Diagnostic Ultrasound, John Wiley & Sons Inc, New York, 1979, and Ultrasonic Waves in Solid Media, Cambridge University Press, 1999. Ultrasonic Waves in Solid Media is one of the most cited ultrasonic guided wave references. Dr. Rose has served as principal adviser to over 60 Ph.D. and 150 M.S. students, and is a fellow of ASNT, ASME, IEEE, and the British Society for Nondestructive Testing. Dr. Rose also received many awards including the ASME NDE Engineering Division Founder's Award in 2003, the ASNT Research Award for Innovation in 2007, and the distinction of being a Finalist in the Discover Magazine Award for innovation in Aviation and Aerospace in 1995. In addition, he has presented many keynote addresses for example in the AK Rao Memorial Lecture Annual NDE 2009 Conference, Tiruchirapalli, India in November 2009, Annual Fall Conference of the Korean Society for Non-Destructive Testing, KOFST Center, Korea in December 2009, 4th Middle East Nondestructive Testing Conference, Manama, Kingdom of Bahrain in 2007 and the 11th Asia-Pacific Conference on Nondestructive Testing, Jeju Island, Korea in 2003.

Tuesday Plenary Session

Pacific Salon I-III

Tuesday 8 March 8:00 to 9:05 am

8:00 to 8:20 am

AFRL Funding Agency Talk: Future Research Needs and Challenges in NDE/in situ NDE (Lindgren)

Tuesday 8 March 8:20 to 9:05 am

Structural Magnetostrictive Alloys: An Introduction to a New Class of Transducer Materials



Alison Flatau, Univ. of Maryland, College Park

Abstract: Magnetostrictive materials belong to the family of smart materials that are enabling major advances in noise, vibration and shape control, energy harvesting and new approaches to structural health monitoring. An introduction to magnetostrictive materials will be presented, followed by an introduction to the relatively new family of “structural magnetostrictive alloys”

such as the Gallium-Iron alloy Galfenol. Examples of potential applications that would take advantage of the combination of magnetostrictive transduction and structural attributes of these alloys (e.g. ductility and a negative Poisson’s ratio) will be included in the presentation. Recent advances in development and characterization of Galfenol nanowires will be highlighted. The presentation will also include a brief overview of some of the on-going projects that are part of a Multidisciplinary University Research Initiative (MURI) Program, supported by the US Office of Naval Research (ONR) which in addition to researchers at the Univ. Maryland, includes researchers from Iowa State Univ., Univ. Minnesota, Ohio State, Pennsylvania State, Rutgers University and Virginia Tech. This MURI program is focused on structural magnetostrictive alloys, with an emphasis understanding where the large magnetostriction in structural alloys such as Galfenol comes from, how to fabricate these alloys at different scales, and how to employ these alloys in a variety of applications.

Biography: **Alison Flatau** is Professor of Aerospace Engineering, at the University of Maryland and Interim Associate Dean for Research of the Clark School of Engineering at Maryland. She began her professorial career at Iowa State University (1990-1998), and subsequently joined the NSF where she served as Program Director for Dynamic Systems and Control (1998-2002), and administered the CAREER program across the entire NSF. In 2002, Dr. Flatau joined the faculty of Aerospace Engineering at Maryland. She served as Chair of the Undergraduate Affairs Committee, Director of the Honors Program, and Faculty advisor for the AIAA Student Chapter. Her research accomplishments include the characterization, modeling and application of magnetostrictive materials as sensors and actuators to control

noise, vibration and external flows in aerospace systems, and she holds several patents on these applications. Dr. Flatau is a Fellow of the ASME and an Associate Fellow of AIAA, and has co-authored over 50 archival journal articles and book chapters and over 100 conference papers. Dr. Flatau’s extensive service to the SPIE Smart Structures and Materials / NDE Symposium includes chair of the student paper competition (1999-2003), co-Chair (2003) and Chair (2004, 2005) of the SPIE Smart Structures and Integrated Systems Conference, and most as co-Chair (2006 and 2007) and Chair (2008 and 2009) of the SPIE Symposium. She also served as the Chair of the ASME Adaptive Structures and Materials Technical Committee that coordinates five SPIE conferences.

Wednesday Plenary Session

Pacific Salon I-III

Wednesday 9 March 8:20 to 9:05 am

Micro-computed Tomography: Towards Nanoscale Imaging



Randolf Hanke, Univ. Würzburg (Germany)

Abstract: This presentation will give a review about the state of the art in high resolution computed tomography (CT), based on laboratory X-ray imaging systems.

CT has become a powerful and emerging technology for nondestructive material characterization within the last ten years. Compared to the well established methods like optical microscopy, electron microscopy, XPS, EDX and so on, CT is capable not only to provide information about the material surface but generates complete volume data information.

Progress in detector technology, microfocus x-ray generation and CT reconstruction algorithms today enables laboratory CT-microscopy with resolutions down to some 100 nanometers and it seems to be realistic to provide CT information below this 100 nanometer within in a reasonable scanning period in laboratory in the very near future.

Different approaches like enhancing the magnification in transmission radioscopy by further reducing the focal spot size of the X-ray source or alternative radioscopic imaging methods, based e.g. on X-ray focusing zone plates - already well known in synchrotron environment- are going to be applied to microfocus X-ray systems and promise resolutions even below 100 nanometer.

In particular, the method of ultra small focal spot sizes for CT imaging in the nano scale range by modifying an Electron Probe Micro Analyzer (EPMA) to a high resolution X-ray imaging system is presented. Usually an EPMA is applied to nondestructive analysis of solid state surfaces by electrons. To use an EPMA

as an X-ray source, the sample can be replaced by an X-ray target. The diameter of the electron beam, impacting this target instead of the probe, is in the range of some tens to hundreds of nanometer and a very small and constant electron spot size can be realized. Thus, depending on electron energy, thickness, material and shape of target and substrate, X-ray focal spot sizes in the range of some tens of nanometers can be generated and be used for highest resolution imaging with CT volume data down to expected 50 nm voxel sizes.

Biography: **Prof. Randolf Hanke** studied Physics at the University Erlangen and received his diploma in 1988 in the field of Applied Physics and his doctor’s degree in 1996 with an external thesis at the University Erlangen. In 1989 he started as a scientist at the Fraunhofer-Institute for Integrated Circuits IIS in Erlangen. 1991 he became a group leader of the new established group Industrial Radioscopic Image Processing. Within the scope of this task, he was responsible for the acquisition and management of different public funded and industrial projects. In 1993 he became an assistant head of department and was jointly responsible for the R&D activities of the department Electronic Systems. In 1997, he was established as a managing director of the new founded Department for X-ray Technology. In accordance with the board of directors of the Fraunhofer Gesellschaft, this department was converted to a Fraunhofer Development Center for X-ray Technology in 1999. Additionally, Randolf Hanke took over the responsibility and installation of a new project group “Ultrafeinfokus Röntgentechnologie” in Fürth in 1999. In 2001 he was awarded with the Joseph-von-Fraunhofer-Award for his contributions to the “Automation of Radioscopic Inspection of Light weight materials”.

Randolf Hanke is a member of the “Deutschen Gesellschaft für Zerstörungsfreie Prüfung (DGZFP) and actively committed to different workshops, scientific committees and commissions. In 2002, he got a university teaching position at the Chair for Materials for Electronics at the University Erlangen. In December 2004, Randolf Hanke successfully finished his Master of Business Administration study (EMBA) at TIAS NIMBAS Graduate School of Management (Associated Institute of the University of Bradford, UK).

In 2008, Randolf Hanke was the first candidate, who was awarded with the new established Max-Grundig-Memorial-Award in the field of Research of new Materials and Processes. Since 2010, July 1st Randolf Hanke is appointed to a professorship at the Julius-Maximilians-University Würzburg for the Chair “X-ray Microscopy” at the Faculty of Physics and Astronomy. He has organized and co-organized several international conferences in the field of Non-destructive Testing and is an invited key note speaker at different conferences. His Fraunhofer Research Center currently engages approximately 130 scientists and technicians including students and part time employees.

Plenary Sessions

Thursday Plenary Session

Location: Pacific Salon I-III

Thursday 10 March 8:10 to 9:05 am

8:10 to 8:20 am

ASME Best Paper Awards

SPIE/ASME Best Student Paper Award presentation

See page 11 for details.

Thursday 10 March 8:20 to 9:05

The European Project “Clean Sky” and an Insight into the Platform “Green Regional Aircraft”



Valerio Carli, Fraunhofer Gesellschaft (Germany)

Additional authors: **Alessandro Amendola**, Alenia Aeronautica (Italy); **John Cullen Simpson**, Fraunhofer Gesellschaft (Germany); **Rocco Pinto**, Alenia Aeronautica (Italy)

Abstract: “Clean Sky” represents the most challenging European project for Aeronautics. With a budget of almost 1.6 billion Euros the most representative stakeholders of the European

aircraft industry along with the European Institutions work together for the aircraft of the future. “Green” is the driving word: Less pollution – lower emissions, lower fuel burning, emitted noise reduction and environmentally friendly life-cycle of the aircraft system.

New governance contributes to the success of the project, for which also research institutions and SME contribute with their respective skills and expertise.

The project is based on six different platforms or ITD – Integrated Technology Demonstrator, covering almost every aeronautical technology and product. The “technology evaluator” coordinates the information exchange among the ITD for a synergetic approach to the different technologies.

Alenia Aeronautica leads with the support of Fraunhofer the ITD “Green Regional Aircraft - GRA”. In this platform, through a high integrated approach, the future regional aircraft able to match the environmental goals will be developed, contributing to the success of the Clean Sky project. Within GRA the Low Weight Configurations domain contributes to lighter airframes by means of sensorised structures, innovative materials and advanced methodologies. Novel adaptable wing design and landing gear systems contribute to the reduction of the noise footprint. This ITD will be presented as most representative of the technologies under consideration within Clean Sky and for the high integration level.

Biography: **Dr. Valerio Carli** received his degree in Aerospace Engineering at the University of Rome “La Sapienza” (Italy) in 1999. He moved then to the German Aerospace Center (Department of Smart Structures) of Braunschweig where he had completed his Master degree. During this time Dr. Carli worked for the design and realisation of adaptive wings for different aircraft configurations and wind tunnel models. In 2001 Dr. Carli moved to the Technical University of Darmstadt (Germany), where he specialized in biomechanics and adaptive structures and coordinated the “Smart structures” working group. In 2006 he completed his Ph.D. in Mechanical Engineering at the same University. In the same year he moved to the Institute for Structural Durability and system Reliability (LBF) of the Fraunhofer Gesellschaft in Darmstadt. Currently Dr. Carli works at LBF as Project Manager. He is Fraunhofer’s General Manager of the Green Regional Aircraft platform (GRA) of the European Project “Clean Sky.” In addition, he directs the GRA platform’s SHM technologies’ team, which includes more than ten groups working in several European countries.

Special Events

All Symposium Welcome Reception

Trellises Poolside

Monday 7 March 6:00 to 7:30 pm

All attendees are invited to relax, socialize, and enjoy refreshments at the Trellises Pool Area.

Please remember to wear your conference registration badges. Dress is casual.

EAPAD Keynote Presentation: Walking with Springs (Paper 7976-1)

Pacific Salon I-III

Monday 7 March 10:30 am



Thomas Sugar, Arizona State Univ.

Abstract: At the Human and Machine Integration Laboratory at Arizona State University, we are developing a new generation of powered prosthetic devices based on lightweight, energy storing springs that will allow for more functional gait. Current ankle-foot prosthetic devices are passive, un-tunable, and function well in only one task. We believe that a powered spring-based

robotic ankle will allow one prosthetic device to be used in different scenarios such as walking, running, and donning a heavy pack. Our bionic systems mimic the power, energy, motion, and weight of the human ankle. More importantly, the tuned spring minimizes the peak motor requirements allowing for a much lighter device. We use a robotic-tendon to store and release energy properly during the gait cycle. We have demonstrated walking, jogging, jumping, walking up and down slopes, and ascending and descending stairs.

Biography: **Dr. Thomas Sugar** works in the areas of mobile robot navigation and wearable robotics for rehabilitation. He majored in business and mechanical engineering for his Bachelor’s degrees and mechanical engineering for his Doctoral degree all from the University of Pennsylvania. In industry, he worked as a project engineer for W. L. Gore and Associates. He has been a faculty member in the Department of Mechanical and Aerospace Engineering and the Department of Engineering at Arizona State University. His research focuses on compliant wearable robots using tunable springs. He is developing robotic orthoses and prostheses for rehabilitation and mobility. His current research projects include SPARKy, Spring Ankle with Regenerative Kinetics, and PAFO, a powered ankle foot orthosis for stroke rehabilitation.



AFRL Funding Agency Talk: Future Research Needs and Challenges in NDE/in situ NDE

Pacific Salon I-III

Tuesday 8:05 to 8:20 am

Eric Lindgren, Air Force Research Lab. (United States)

Student Lunch with the Experts - A Networking Event

Tuesday 8 March. 12:30 to 1:30 pm

Seating is limited. Tickets are required.

Enjoy a casual meal with colleagues at this engaging networking opportunity. Hosted by SPIE Student Services, this event features experts willing to share their experience and wisdom on career paths in optics and photonics. *Students receive one complimentary ticket with registration.*



Posters/Exhibition Reception

Exhibition Hall/Golden Ballroom

Tuesday 8 March 6:00 to 7:30 pm

Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, ask questions, and enjoy the refreshments. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Posters will also be available for viewing on Wednesday during Exhibition Hours.

Poster Viewing

Tuesday 8 March. 10:00 am to 4:00 pm

Wednesday 9 March 10:00 am to 4:00 pm

Poster Setup

Poster presenters may set up between 10:00 am and 4:00 pm on Tuesday 8 March. Poster presenters who have not set up by 4:00 pm on Tuesday will be considered a “no show” and their manuscript will not be published. Presenters must remove their posters on Wednesday by 4:00 pm. Posters not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after 4:00 pm on Wednesday 9 March.

NSF Poster Session

Tuesday 8 March. 6:00 to 7:30 pm

See a special collection of poster presentations representing projects funded by NSF grants.

Biomimicry, Bioinspiration, and the San Diego Zoo: The Zoo as a Living Library and Resource for Innovation



Royal Palm VI

Wednesday 9 March 10:40 am to 12:00 pm

Nature has developed solutions to nearly every design problem found on this planet. Not only are these solutions innovative and elegant, they are also closed-loop and in harmony with the ecosystem. Biomimicry is the discipline of observing nature and applying nature’s lessons to human design and innovation. If we can learn to design, manufacture, and live according to nature’s principles, we can develop the tools needed to transform our world.

The San Diego Zoo, has developed biomimicry education workshops that bridge the connection between nature and innovation. By sharing our knowledge of the unique characteristics of the plants and animals we steward, we hope to inspire better and more efficient designs, systems, and processes.

This session will include an introduction to biomimetic processing, interactive exercises to help stimulate creative thinking, and a discussion of new bio-inspired concepts. There will also be special presentation by a San Diego Zoo “animal ambassador.”

Conference attendees will receive a discount on tickets to the San Diego Zoo! Log on to www.sandiegozoo.org/tickets Use promo code 6051 to receive \$4.00 off ticket prices.

Best Student Paper Session

Royal Palm I

Wednesday 9 March 6:00 to 7:30 pm

Finalists for the SPIE/ASME Best Student Paper Award will present their papers in this special session. Winners will be announced at the Thursday plenary session.



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SPIE Course

Electroactive Polymer Actuators and Devices

SC634

Course level: Introductory
CEU .65 \$500 / \$590 USD
Sunday 8:30 am to 5:30 pm

This course will provide an overview of the field of EAP covering the state of the art, challenges and potential. Two general classes of polymer materials are described, namely those that involve ionic mechanisms (Ionic EAP), and field activated materials (Electronic EAP). The basic mechanisms responsible for the electroactive behavior of EAP materials will be covered and compared with natural muscles. Analytical models, fabrication processes and methods of characterizing these materials will be described. Moreover, the currently considered applications will be reviewed including actuators, robotics, animatronics, medical, and biologically inspired mechanisms, so called biomimetics. The course begins with an overview of the field, current capabilities, potential and challenges. The course follows with a description of the currently available EAP materials and principles of operating them as actuators and artificial muscles. The course ends with a review of the future prospect of EAP as actuators in systems, mechanisms and smart structures for space, industrial and medical applications.

LEARNING OUTCOMES

This course will enable you to:

- identify EAP based available and emerging actuators
- learn the fundamentals of electroactive behavior in leading EAP materials
- describe the capabilities, limitations and benefits of electroactive polymers
- assess the applicability of current EAP actuators while accounting for their limitations
- understand mechanical analysis and design principles associated with EAP
- describe the future prospects of EAP materials as actuators and their applications

INTENDED AUDIENCE

Engineers, scientists and managers who need to understand the basic concepts of EAP, or are interested in learning, applying or engineering mechanisms or devices using EAP materials. Also those who wish to discover the excitement of research and development in EAP materials and their applications - present and future.

INSTRUCTORS

Yoseph Bar-Cohen, Jet Propulsion Lab; **John Madden**, Univ of British Columbia; **Qibing Pei**, Univ of California Los Angeles

Thirteenth Annual EAP-in-Action Session and Demonstrations

Electroactive Polymer Actuators and Devices (EAPAD) XIII

Pacific Salon I-III · 7 March 2011 · 4:30 to 5:45 pm

Moderator: **Yoseph Bar-Cohen**, Jet Propulsion Lab.

This session that is held annually as part of the SPIE EAPAD conference is intended to turn the spotlight on Electroactive Polymer (EAP) materials and their applications, as well as increase the recognition of their potential for smart structures. New materials and applications are continuing to emerge, and this session is intended to provide the attendees an opportunity to see a demonstration of EAP materials in action. This session offers a forum of interaction between the technology developers and potential users, as well as a “hands-on” experience with this emerging technology. It provides a great opportunity to see the capability of state-of-the-art EAP as potential actuators-of-choice. The first Human/EAP-Robot Armwrestling Contest was held during this session of the 2005 EAPAD conference.

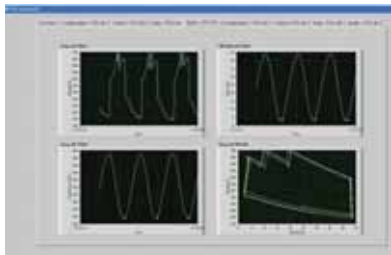
PolyPower® DEAP energy harvesting system

HansErik Kiil and **Michael Tryson**, Danfoss PolyPower A/S, (Denmark)

The demonstration will include a medium scale DEAP energy harvesting system comprised of control and monitor electronics, PolyPower DEAP generator elements, and mechanical energy source. “Constant charge, constant voltage, and constant electric field” energy conversion cycles will be demonstrated.



PolyPower Energy Harvesting System



Sample display output for constant voltage

Handheld haptic user interface with localized tactile feedback

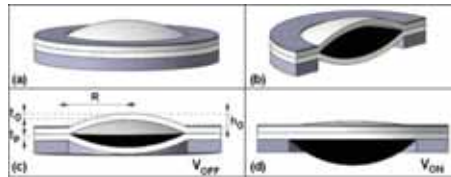
P. Lotz, H. Haus, H. F. Schlaak, Technische Univ. Darmstadt, Germany; **M. Matysek, H. Moessinger, D. Brokken**, Philips Research, Eindhoven, (The Netherlands)



A battery-driven bidirectional user interface based on dielectric elastomer transducers will be shown. Its actuator-mode is used to present tactile information (e.g., display device status) while its sensor-mode enables user interaction (e.g., change device status). Energy efficient design and additional wireless communication emphasize the autonomous usability.

Hydrostatically and granularly coupled dielectric elastomer actuators

Federico Carpi, Univ. of Pisa, Research Centre “E. Piaggio” (Italy)



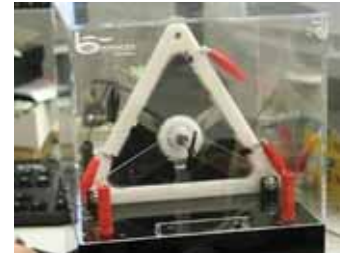
Prototype samples of new types of dielectric elastomer actuators (DEAs) will be shown. They are called ‘hydrostatically coupled’ DEAs and ‘granularly coupled’ DEAs. In such devices either a fluid or a fine powder is used to transfer forces to a load, without direct contact between the

latter and any DEA active element. This solution has specific advantages, including electrical safety and design versatility.

Artificial Muscles in Aotearoa

Iain Anderson Emilio Calius, Todd Gisby, Andrew Lo, Thomas McKay, Ben O’Brien, and Tony Tse, The Biomimetics Lab of the Auckland Bioengineering Institute (New Zealand)

Dielectric elastomer (DE) technology demonstration will be made including bio-inspired DE self-sensing and logic circuits as follows:



- 1) A capacitive, high specific torque rotary motor - Sequential actuation of electroded zones on the thin dielectric elastomer membrane produces an orbiting motion in a gear at the centre of the membrane that contacts and turns a rotor.



- 2) A four channel artificial muscle controller unit - A stand-alone portable laboratory tool simplifies the generation and control of high voltages for artificial muscle research. The unit features include 4 channel computer controlled output and battery operation.

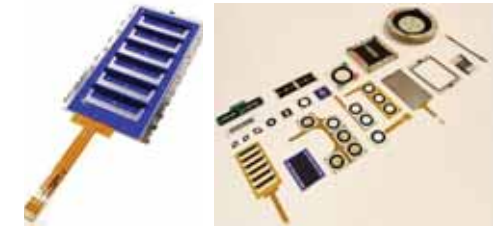


- 3) A portable dielectric elastomer generator - A portable and autonomous generator technology will be demonstrated.

Reflex haptic actuators integrated into consumer products

Marcus Rosenthal, Artificial Muscle, Inc., a Bayer MaterialScience Company (United States)

Demos will be made showing the latest Reflex actuators integrated in products for high fidelity haptic feedback in mobile and gaming applications.



Refreshable tactile display devices

Qibing Pei, Univ. of California, Los Angeles (United States)

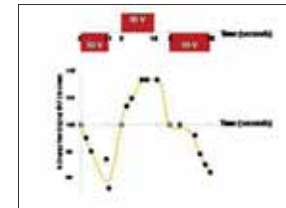


A bistable electroactive polymer actuator and a refreshable Braille display will be demonstrated. The device can display Braille text and tactile images, and its content is refreshable.

Control algorithm

Lenore Rasmussen, Ras Labs, LLC (United States)

Voltage step functions applied to a contractile EAP controls the level of contraction and modulates the movement.



Roll-actuator made of terpolymer ferroelectric EAP

Chris Rahn, Qiming Zhang, The Pennsylvania State Univ. (United States)

Braille cells with individual pins actuated by terpolymer ferroelectric EAP that were tested by persons with visual impairments will be demonstrated.





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Exhibition: 8–9 March 2011

Tuesday 10:00 am to 4:00 pm; 6:00 to 7:30 pm (Posters/Exhibition Reception)

Wednesday 10:00 am to 4:00 pm

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Monday Award Presentations

Pacific Salon I-III

Monday 7 March 8:15 to 8:30 am

SSM Lifetime Achievement Award



Presented to
Amr Baz, Univ. of Maryland,
College Park (United States)



and
Kon-Well Wang, Univ. of Michigan
(United States)

Biographies: **Dr. Amr Baz** is a Professor of Mechanical Engineering at University of Maryland, College Park and serves as the Director of the Smart Materials and Structures Research Center. He holds a B.Sc.'66 from Cairo University (Egypt), as well as M.Sc.'70 and Ph.D.'73 from the University of Wisconsin, Madison. Dr. Baz's research interests include active and passive control of vibration and noise using smart structures, and invented Active Constrained Layer Damping and Magnetic Constrained Layer Damping treatments to control vibration and sound radiation in structures. A notable application is interior noise control of a Cessna Citation. Dr. Baz has published more than 150 archival journal papers and holds six US patents. He is a Fellow of the American Society of Mechanical Engineers, a recipient of Egypt's Presidential Award & First Class Medal for Best Achievements in Science and Arts. Dr. Baz received the ASME Adaptive Structures and Material Systems Prize (2009) and the Pi-Tau-Sigma Purple Cam-Shaft Teaching Award (2009). Dr. Baz serves on the editorial boards of journals of *Vibration and Control*, *Smart Structures & Systems*, and *Mechanics of Advanced Materials and Structures*. Dr. Baz served as Chairman of the ASME National Capital Chapter (1990-1991), as well as its Vice-Chairman, Treasurer, and Secretary from 1987-1990. He served as a member of ASME Edwin Church Medal Award (1993-2002). Dr. Baz served as Chair and Co-Chair of the SPIE Smart Structures and Integrated Systems Conference (2002-2003) and has served for over a decade on the international program committees of the SPIE SS/NDE Symposium.

Dr. Kon-Well Wang is the Stephen P. Timoshenko Collegiate Professor and Department Chair of Mechanical Engineering at the University of Michigan. Dr. Wang received his Ph.D. degree from the University of California at Berkeley in 1985, worked at the General Motors Research Labs as a Senior Research Engineer, and started his academic career at the Pennsylvania State University in 1988. Professor Wang joined the University

of Michigan in 2008. Professor Wang's research on adaptive structural systems has cross-linked multiple fields. He has developed methodologies in synthesizing novel structures with piezoelectric circuitry networks, bio-inspired composites, or nano-scale materials. He has published over 250 technical articles and is the holder of several patents. Professor Wang is a Fellow of the American Society of Mechanical Engineers (ASME) and a Fellow of the Institute of Physics. He has received numerous recognitions for his accomplishments; including the ASME Adaptive Structures and Materials Systems Prize, the ASME N.O. Myklestad Award, the ASME Adaptive Structures and Material Systems Best Paper Award, the ASME Rudolf Kalman Best Paper Award, and the NASA Tech Brief Award. Professor Wang has chaired the SPIE Damping and Isolation Conference and served on the Executive Committee and Program Committees for the SPIE Symposium on Smart Structures and Materials. He is on both the AIAA and ASME Adaptive Materials and Structures Technical Committees, and has chaired the ASME Technical Committee on Vibration and Sound. Professor Wang has been the Chief Editor for the ASME *Journal of Vibration and Acoustics* and is an Associate Editor for the *Journal of Intelligent Material Systems and Structures*.

NDE Lifetime Achievement Award



Presented to
Joseph L. Rose, The Pennsylvania State Univ.
(United States)

Biography: **Dr. Joseph L. Rose** is the Paul Morrow Professor in Design and Manufacturing in the Engineering Science & Mechanics Department of The Pennsylvania State University and also the Chief Scientist and President of FBS. Dr. Rose is a worldwide recognized guided wave expert. He is author of twenty patents, four text books, and over 500 publications on ultrasonic bulk and guided wave NDE and SHM, wave mechanics, medical ultrasound, pipe and tubing inspection, composite material inspection, ice detection, signal processing, and pattern recognition. Textbooks include *Basic Physics in Diagnostic Ultrasound*, John Wiley & Sons Inc, New York, 1979, and *Ultrasonic Waves in Solid Media*, Cambridge University Press, 1999. *Ultrasonic Waves in Solid Media* is one of the most cited ultrasonic guided wave references. Dr. Rose has served as principal adviser to over 60 Ph.D. and 150 M.S. students, and is a fellow of ASNT, ASME, IEEE, and the British Society for Nondestructive Testing. Dr. Rose also received many awards including the ASME NDE Engineering Division Founder's Award in 2003, the ASNT Research Award for Innovation in 2007, and the distinction of being a Finalist in the Discover Magazine Award for innovation in Aviation and Aerospace in 1995. In addition, he has presented many keynote addresses for example in the AK Rao Memorial Lecture Annual NDE 2009 Conference, Tiruchirapalli, India in November 2009, Annual Fall Conference of the Korean Society for Non-Destructive Testing, KOFST Center, Korea in December 2009, 4th Middle East Nondestructive Testing Conference, Manama, Kingdom of Bahrain in 2007 and the 11th Asia-Pacific Conference on Nondestructive Testing, Jeju Island, Korea in 2003.

Tuesday Award Presentations

Pacific Salon I-III

Tuesday 8 March 8:00 to 8:05 am

ASME Gary Anderson Early Achievement Award

This award is given for notable contribution(s) to the field of Adaptive Structures and Material Systems.

Smart Structures Product Implementation Award

This award is intended to recognize those individuals or companies who have taken the critical step of transitioning smart structures technologies into viable industrial and commercial products. These visionaries are required for this important field of science and engineering to be recognized and accepted in the world at large.

A panel of independent experts selects the best product based on its importance, uniqueness, and usefulness to defense or commercial industries. We are looking for the most innovative—but realistic—products using smart structures and materials technologies. System integration aspects are very important criteria as well.

The award will be presented during SPIE Smart Structures and Materials in front of a group of peers and potential customers. SPIE will publish news items that will be sent to appropriate trade journals. In addition, the winning company will be able to use the recognition associated with this award in any of its subsequent marketing and promotional endeavors.

Thursday Award Presentations

Pacific Salon I-III

Thursday 10 March 8:10 to 8:20 am

SPIE/ASME Best Student Paper Award

SPIE and the ASME Adaptive Structures and Material Technical Committee are sponsoring the best student paper presentation contest. Entrants will be judged by a committee of the ASME Adaptive Structures and Materials Technical Committee. The finalists will present their papers at a special session on Wednesday evening of the meeting. The committee will then vote to determine the top three finalists. The top three finalist student authors and/or student co-authors will receive certificates and cash awards.

2010 ASME Best Paper Award

The ASME Technical Committee presents two awards annually: Best Paper in Structures and Best Paper in Materials.

Conference Session Schedule

Conf. 7975	Conf. 7976	Conf. 7977	Conf. 7978	Conf. 7979	Conf. 7980	Conf. 7981	Conf. 7982	Conf. 7983	Conf. 7984
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Monday

8:00 to 10:00 am												
Plenary Session												
10:30 am to 12:30 pm	Sensors I	EAP as Emerging Actuators	Biological-Inspired Systems and Bio-MEMS	Modeling of Ferroelectric Ceramics	Embedded Sensing Applications	Keynote Session Nanowire, Nanotube, and Nanostructures I	Keynote Session		Fiber Bragg Grating Sensors I	Laser, Ultrasound, Acoustic Emission NDE I	NDE in Civil Infrastructure I	Guided Waves in Complex Structures
1:20 to 3:10 pm	Sensors II	Energy Harvesting Special Session: Part I	Passive and Active Vibration Isolation Systems I	Ceramic-Polymer Piezoelectric Composites	Aerospace Applications	Keynote Session Nanowire, Nanotube, and Nanostructures II	Emerging Sensing Systems for SHM I	Wireless Sensors for SHM	Distributed Sensors	Laser, Ultrasound, Acoustic Emission NDE II	NDE in Civil Infrastructure II	Guided Waves in Composites
3:30 to 6:00 pm	Mechanical Properties	EAP-in-Action	Passive and Active Vibration Isolation Systems II	Responsive Polymers	Smart Materials and Devices for Vehicle Applications	Nano Devices and Sensors I	Emerging Sensing Systems for SHM II	Ultrasonics Methods	Fiber Bragg Grating Sensors II	NASA-based NDE/SHM Activities PNNL-based NDE in Homeland Security Applications	NDE in Composites	Guided Waves for Large Structure Monitoring: Pipe, Rail, Ship, etc.

Tuesday

8:00 to 9:05 am													
Plenary Session													
9:10 to 10:10 am	Optics	Energy Harvesting Special Session: Part II	Energy Harvesting and Scavenging I: Piezoelectric and Synchronization	Modeling of Piezoelectric Ceramics	Active Materials in Wind Applications I	Keynote Session	MEMS and Nanotechnology I	Impact Damage Detection	Sensors for SHM I	NIST—Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems I	Fiber Optics Sensors Technologies	Guided Waves with Distributed Sensors I	
10:30 to 12:30 pm	Flight	European Scientific Network for Artificial Muscle (ESNAM) Special Session: Energy Harvesting		Carbon Nanotube-based Multifunctional Materials	Active Materials in Wind Applications II	Nano Devices and Sensors II	MEMS and Nanotechnology II	Fatigue Assessment in Metallic Structures	Sensors for SHM II				Nonlinear Acoustics for SHM
1:30 to 3:10 pm	Fabrication and Applications I	ESNAM Special Session: Materials and Devices I	Energy Harvesting and Scavenging II: Piezoelectric and Magnetic Systems	Nanocomposites		Smart Electronics	Nanostructures for Sensing	Piezoelectric Sensors for SHM	Wireless Sensors	NIST—Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems II	Radar/Lidar NDE Technologies	Guided Waves with Distributed Sensors II	Biological and Medical Applications I
3:30 to 6:00 pm	Biomedical Applications		Energy Harvesting and Scavenging III: General	Multifunctional Composites and Metamaterials		Wireless Sensor System	Emerging Sensing Systems for SHM III	Advance Sensors for Civil Structures	Fiber Optic Sensors	NIST—Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems III	Thermal, Infrared, and Radiographic NDE Technologies	Guided Waves: Novel Applications and Damage Detection	Biological and Medical Applications: II

Conference Session Schedule

Conf. 7975	Conf. 7976	Conf. 7977	Conf. 7978	Conf. 7980	Conf. 7981	Conf. 7982	Conf. 7983	Conf. 7984
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Wednesday

8:00 to 9:05 am														
Plenary Session														
9:10 am	Fabrication and Applications II	ESNAM Special Session: Materials and Devices II	Field Activated EAP	Passive and Active Vibration Isolation Systems III: Magnetorheological Systems		SMPs	Fabrication and Characterization I	Modeling of Guided Waves	Bio-inspired Sensors I	Finite Element Updating for SHM	Thermography Sensors	NIST – Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems III	Guided Waves for Impact Monitoring	
10:40 am	Biomimicry, Bioinspiration, and the San Diego Zoo: The Zoo as a Living Library and Resource for Innovation	ESNAM Special Session: Materials and Devices III Haptic and Braille Displays I	Ionic EAP				Fabrication and Characterization II	Bridge Monitoring Technologies I	Bio-inspired Sensors II	Pattern Classification Methods in SHM	Acoustics Sensors		Vibration-Based SHM	
1:30 pm		Haptic and Braille Displays II	Ionic EAP (continued)	Magnetorheological Systems	SMA- and Piezo-Based Materials and Systems	SMA I	Applications I	Bridge Monitoring Technologies II	Fiber Optic Sensors I	Damage Detection in Concrete		NIST – Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems IV	Novel Devices and Techniques	Modeling and Simulation I
2:30 pm		ESNAM Special Session: Applications and Controls	Modeling and Analysis of EAP	Micro and Nano Integrated Systems	Aircraft, MAV/ UAV, and Morphing Systems	SMA I MSMA	Applications II	Piezoelectric Sensors: Theory and Applications	Fiber Optic Sensors II	Polymer Based Sensors			Guided Waves: Modeling Aspects	Civil Structures: Wind Turbine and Pipe

Thursday

8:00 to 9:05 am														
Plenary Session														
9:10 am	Applications of EAP I: Field Activated	Non-EAP Actuators I	Modeling, Simulations, Signal Processing, and Controls	SMA- and Piezo-Based Materials and Systems II: Piezoelectrics				Acoustic and Ultrasonic Sensors	Power Harvesting	Decentralized Algorithms	Wind Turbine Structures	Wireless Sensor Network and Energy Harvesting	Sensor Network	SHM with Fiber Optics
10:40 am	Applications of EAP I: Field Activated (continued)	Applications of EAP II: Ionic EAP	Optimization and Design of Integrated Systems	Passive and Active Vibration Isolation Systems IV				Vibration and Control	SHM of Composite Structures	Damage Detection Methods I	Ultrasonic Methods for Damage Detection	Vibration-Based NDE Technologies	Civil Engineering Applications: Concrete and Building Monitoring	Signal Processing
1:30 pm	Applications of EAP I: Field Activated (continued)	Applications of EAP II: Ionic EAP (continued)							Novel Sensors I	Crack Detection in Structures	Damage Detection Methods II		Control of Smart Systems	
3:40 pm								Novel Sensors II	SHM of Civil Infrastructures	Vibration Control of Structures	Advances in SHM	Smart Materials Sensing Technologies	Guided Waves, Modeling, and Signal Processing	

Technical Conferences

Conference 7975 Monday-Wednesday 7-9 March 2011 Proceedings of SPIE Vol. 7975	Conference 7976 Monday-Thursday 7-10 March 2011 Proceedings of SPIE Vol. 7976	Conference 7977 Monday-Thursday 7-10 March 2011 Proceedings of SPIE Vol. 7977	Conference 7978 Monday-Wednesday 7-9 March 2011 Proceedings of SPIE Vol. 7978	Conference 7979 Monday-Tuesday 7-8 March 2011 Proceedings of SPIE Vol. 7979
<p style="text-align: center;">Bioinspiration, Biomimetics, and Bioreplication</p> <p><i>Conference Chair:</i> Raúl J. Martín-Palma, Univ. Autónoma de Madrid (Spain)</p> <p><i>Conference Co-Chair:</i> Akhlesh Lakhtakia, The Pennsylvania State Univ.</p> <p><i>Program Committee:</i> Yoseph Bar-Cohen, Jet Propulsion Lab.; Michael H. Bartl, The Univ. of Utah; Frank E. Fish, West Chester Univ. of Pennsylvania; Joshua L. Hertz, Univ. of Delaware; Shuichi Kinoshita, Graduate School of Frontier Biosciences (Japan); Sunghoon Kwon, Seoul National Univ. (Korea, Republic of); Torben A. Lenau, Technical Univ. of Denmark (Denmark); Radislav A. Potyrailo, GE Global Research; Mehmet Sarikaya, Univ. of Washington; Jean-Pol Vigneron, Facultes Univ. Notre Dame de la Paix (Belgium); James D. Weiland, The Univ. of Southern California; H. Donald Wolpert, Bio-Optics</p>	<p style="text-align: center;">Electroactive Polymer Actuators and Devices (EAPAD) XIII</p> <p><i>Conference Chair:</i> Yoseph Bar-Cohen, Jet Propulsion Lab.</p> <p><i>Conference Co-Chair:</i> Federico Carpi, Univ. of Pisa (Italy)</p> <p><i>Program Committee:</i> Barbar J. Akle, Lebanese American Univ. (Lebanon); Tunku Ishak Al-Irsyad, Univ. Teknologi MARA (Malaysia); Siegfried Bauer, Johannes Kepler Univ. Linz (Austria); Ray Henry Baughman, The Univ. of Texas at Dallas; Václav Bouda, Czech Technical Univ. in Prague (Czech Republic); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Suresh Chandra, Institute of Technology, Banaras Hindu Univ. (India); Toribio Fernández Otero, Univ. Politécnica de Cartagena (Spain); Edwin W. H. Jager, Linköping Univ. (Sweden); Keiichi Kaneto, Kyushu Institute of Technology (Japan); Jaehwan Kim, Inha Univ. (Korea, Republic of); Kwang J. Kim, Univ. of Nevada, Reno; Roy D. Kornbluh, SRI International; Gabor M. Kovacs, EMPA (Switzerland); Maarja Kruusmaa, Univ. of Tartu (Estonia); Jinsong Leng, Harbin Institute of Technology (China); Wen-Liang Liu, Industrial Technology Research Institute (Taiwan); John David W. Madden, The Univ. of British Columbia (Canada); Jae-Do Nam, Sungkyunkwan Univ. (Korea, Republic of); Siavouche Nemat-Nasser, Univ. of California, San Diego; Qibing Pei, Univ. of California, Los Angeles; Mehdi Razzaghi-Kashani, Tarbiat Modares Univ. (Iran, Islamic Republic of); Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Anuvat Sirivat, Chulalongkorn Univ. (Thailand); Elisabeth Smela, Univ. of Maryland, College Park; Peter Sommer-Larsen, Risø National Lab. (Denmark); Ji Su, NASA Langley Research Ctr.; Minoru Taya, Univ. of Washington; Gordon G. Wallace, Univ. of Wollongong (Australia); Thomas Wallmersperger, Univ. Stuttgart (Germany); Gary Zaiats, Rafael Armament Development Authority Ltd. (Israel); Qiming M. Zhang, The Pennsylvania State Univ.</p>	<p style="text-align: center;">Active and Passive Smart Structures and Integrated Systems V</p> <p><i>Conference Chair:</i> Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i at Manoa</p> <p><i>Conference Co-Chair:</i> Henry A. Sodano, Arizona State Univ.</p> <p><i>Program Committee:</i> Gregory S. Agnes, Jet Propulsion Lab.; Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ.; Eric H. Anderson, CSA Engineering, Inc.; Hiroshi Asanuma, Chiba Univ. (Japan); Amr M. Baz, Univ. of Maryland, College Park; Diann E. Brei, Univ. of Michigan; Gregory P. Carman, Univ. of California, Los Angeles; Aditi Chattopadhyay, Arizona State Univ.; Seung-Bok Choi, Inha Univ. (Korea, Republic of); William W. Clark, Univ. of Pittsburgh; Alison B. Flatau, Univ. of Maryland, College Park; Farhan Gandhi, The Pennsylvania State Univ.; Ephraim Garcia, Cornell Univ.; Victor Giurgiutiu, Univ. of South Carolina; Fernando D. Goncalves, Lord Corp.; Faramarz Gordaninejad, Univ. of Nevada, Reno; Nakhiah C. Goulbourne, Univ. of Michigan; Tristram Tupper Hyde, NASA Goddard Space Flight Ctr.; Daniel J. Inman, Sr., Virginia Polytechnic Institute and State Univ.; Conor D. Johnson, CSA Engineering, Inc.; Seung Jo Kim, Seoul National Univ. (Korea, Republic of); Jeong-Hoi Koo, Miami Univ.; Wei-Hsin Liao, The Chinese Univ. of Hong Kong (Hong Kong, China); Yuji Matsuzaki, Nagoya Univ. (Japan); Roger Ohayon, Conservatoire National des Arts et Métiers (France); Mohammad Rastgaar Aagaah, Massachusetts Institute of Technology; Norbert Schwesinger, Technische Univ. München (Germany); Steve Southward, Virginia Polytechnic Institute and State Univ.; Roger Stanway, The Univ. of Sheffield (United Kingdom); Kon-Well Wang, Univ. of Michigan; Norman M. Wereley, Univ. of Maryland, College Park</p>	<p style="text-align: center;">Behavior and Mechanics of Multifunctional Materials and Composites V</p> <p><i>Conference Chair:</i> Zoubeida Ounaies, The Pennsylvania State Univ.</p> <p><i>Conference Co-Chair:</i> Stefan S. Seelecke, North Carolina State Univ.</p> <p><i>Program Committee:</i> Abhijit Bhattacharyya, Univ. of Arkansas at Little Rock; Gregory P. Carman, Univ. of California, Los Angeles; Pavel M. Chaplya, Sandia National Labs.; Constantin Ciocanel, Northern Arizona Univ.; Marcelo J. Dapino, The Ohio State Univ.; Christopher P. Henry, HRL Labs., LLC; Daniel J. Inman, Virginia Polytechnic Institute and State Univ.; Marc Kamlah, Forschungszentrum Karlsruhe GmbH (Germany); Haluk E. Karaca, Univ. of Kentucky; Ibrahim Karaman, Texas A&M Univ.; Dimitris C. Lagoudas, Texas A&M Univ.; Chad M. Landis, The Univ. of Texas at Austin; Kam K. Leang, Univ. of Nevada, Reno; Donald J. Leo, Virginia Polytechnic Institute and State Univ.; Jiangyu Li, Univ. of Washington; Sergio Luis dos Santos e Lucato, Teledyne Scientific Co.; Christopher S. Lynch, Univ. of California, Los Angeles; Karla M. Mossi, Virginia Commonwealth Univ.; Robert C. O'Handley, Massachusetts Institute of Technology; Etienne Patoor, Univ. Metz (France); Ralph C. Smith, North Carolina State Univ.; Jonghwan Suhr, Univ. of Nevada, Reno</p>	<p style="text-align: center;">Industrial and Commercial Applications of Smart Structures Technologies V</p> <p><i>Conference Chair:</i> Kevin M. Farinholt, Los Alamos National Lab.</p> <p><i>Conference Co-Chair:</i> Steve F. Griffin, Boeing-SVS, Inc.</p> <p><i>Program Committee:</i> Eric H. Anderson, CSA Engineering, Inc.; Emil V. Ardelean, Schafer Corp.; Brandon J. Arritt, Air Force Research Lab.; Christian Boller, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Diann E. Brei, Univ. of Michigan; Alan L. Browne, General Motors Corp.; Peter C. 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Conference 7980 Sunday-Tuesday 7-9 March 2010 Proceedings of SPIE Vol. 7980	Conference 7981 Monday-Thursday 7-10 March 2011 Proceedings of SPIE Vol. 7981	Conference 7982 Monday-Wednesday 7-9 March 2011 Proceedings of SPIE Vol. 7982	Conference 7983 Monday-Thursday 7-10 March 2011 Proceedings of SPIE Vol. 7983	Conference 7984 Monday-Thursday 7-10 March 2011 Proceedings of SPIE Vol. 7984
<p>Nano-, Bio-, Info-Tech Sensors and Systems</p> <p><i>Conference Chair:</i> Vijay K. Varadan, Univ. of Arkansas</p> <p><i>Conference Co-Chairs:</i> Jaehwan Kim, Inha Univ. (Korea, Republic of); Kyo D. Song, Norfolk State Univ.; Sang H. Choi, NASA Langley Research Ctr.; Yongrae Roh, Kyungpook National Univ. (Korea, Republic of)</p> <p><i>Program Committee:</i> Pratul K. Ajmera, Louisiana State Univ.; William C. Edwards, NASA Langley Research Ctr.; Sean Jones, National Science Foundation; Ravindra P. Joshi, Old Dominion Univ.; Kimiya Komurasaki, The Univ. of Tokyo (Japan); Kunik Lee, Turner-Fairbank Highway Research Ctr.; Uhn Lee, Gachon Univ. Gil Medical Ctr. (Korea, Republic of); Xinxin Li, Shanghai Institute of Microsystem and Information Technology (China); N. Manoharan, Sathyabama Deemed Univ. (India); Seshadri X. Mohan, Univ. of Arkansas at Little Rock; Yeonjoon Park, National Institute of Aerospace; Aswini K. Pradhan, Norfolk State Univ.; Paul B. Ruffin, U.S. Army Armament Research, Development and Engineering Ctr.; Ashok Srivastava, Louisiana State Univ.; Malathi Srivatsan, Arkansas State Univ.; Richard K. Watt, Brigham Young Univ.; Frances Williams, Norfolk State Univ.; Tian-Bing Xu, National Institute of Aerospace; T. C. Yih, Oakland Univ.; Ming Zhou, Suzhou Institute of Nanotech and Nano-bionics (China)</p>	<p>Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems</p> <p><i>Conference Chair:</i> Masayoshi Tomizuka, Univ. of California, Berkeley</p> <p><i>Conference Co-Chairs:</i> Chung-Bang Yun, KAIST (Korea, Republic of); Victor Giurgiutiu, Univ. of South Carolina; Jerome P. Lynch, Univ. of Michigan</p> <p><i>Program Committee:</i> Yoshio Akimune, National Institute of Advanced Industrial Science and Technology (Japan); Amr M. 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Wang, Northeastern Univ.; Yang Wang, Georgia Institute of Technology; Zhishen Wu, Ibaraki Univ. (Japan); Chengying Xu, Univ. of Central Florida; Li Zhou, Nanjing Univ. of Aeronautics and Astronautics (China); Hong Susan Zhou, Worcester Polytechnic Institute</p>	<p>Smart Sensor Phenomena, Technology, Networks, and Systems IV</p> <p><i>Conference Chair:</i> Wolfgang Ecke, IPHT Jena (Germany)</p> <p><i>Conference Co-Chairs:</i> Kara J. Peters, North Carolina State Univ.; Theodore E. Matikas, Univ. of Ioannina (Greece)</p> <p><i>Program Committee:</i> Farhad Ansari, Univ. of Illinois at Chicago; George Y. Baaklini, NASA Glenn Research Ctr.; Horst J. Baier, Technische Univ. München (Germany); Curtis E. Banks, NASA Marshall Space Flight Ctr.; Xiaoyi Bao, Univ. of Ottawa (Canada); Hartmut Bartel, IPHT Jena (Germany); Brian Culshaw, Univ. of Strathclyde (United Kingdom); Wolfgang R. Habel, Bundesanstalt für Materialforschung und -prüfung (Germany); Daniele Inaudi, Smartec S.A. 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(Japan); Chung-Bang Yun, KAIST (Korea, Republic of); Zhi Zhou, Dalian Univ. of Technology (China)</p>	<p>Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security V</p> <p><i>Conference Chair:</i> H. Felix Wu, National Institute of Standards and Technology</p> <p><i>Conference Co-Chairs:</i> Aaron A. Diaz, Pacific Northwest National Lab.; Andrew Gyekenyesi, NASA Glenn Research Ctr.; Peter J. Shull, The Pennsylvania State Univ.</p> <p><i>Program Committee:</i> A. Emin Aktan, Drexel Univ.; Sreenivas Alampalli, New York State Dept. of Transportation; Farhad Ansari, Univ. of Illinois at Chicago; George Y. Baaklini, NASA Glenn Research Ctr.; Yoseph Bar-Cohen, Jet Propulsion Lab.; Radu Barsan, Redfern Integrated Optics, Inc.; Shawn J. 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Adams, Purdue Univ.; Sourav Banerjee, Acellent Technologies, Inc.; Yoseph Bar-Cohen, Jet Propulsion Lab.; Fu-Kuo Chang, Stanford Univ.; Anthony J. Croxford, Univ. of Bristol (United Kingdom); Paul Fromme, Univ. College London (United Kingdom); Olivier Girault, ONERA (France); Victor Giurgiutiu, Univ. of South Carolina; Shivan Haran, Arkansas State Univ.; Guoliang Huang, Univ. of Arkansas at Little Rock; Kumar V. Jata, Asian Office of Aerospace Research and Development; Sridhar Krishnaswamy, Northwestern Univ.; Francesco Lanza di Scalea, Univ. of California, San Diego; Jerome P. Lynch, Univ. of Michigan; Jennifer E. Michaels, Georgia Institute of Technology; Won-Bae Na, Pukyong National Univ. (Korea, Republic of); Christopher Niezrecki, Univ. of Massachusetts Lowell; Pemgjin F. Pai, Univ. of Missouri-Columbia; Paul D. Panetta, Applied Research Associates, Inc.; Dominique Placko, École Normale Supérieure de Cachan (France); Henrique L. 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Conference 7975

Conference 7976

Conference 7977

Conference 7978

Conference 7979

Announcements, Awards, and Plenary Presentations

Pacific Salon I-III

8:15 to 8:30 am

2010 SSM Lifetime Achievement Award

presented to **Amr Baz**, Univ. of Maryland, College Park (United States) and **Kon-Well Wang**, Univ. of Michigan (United States)

2010 NDE Lifetime Achievement Award

presented to **Joseph L. Rose**, The Pennsylvania State Univ. (United States)



Plenary Presentation · 8:30 to 9:15 am Advanced Sealing Technology for the Energy and Propulsion Fields

Eric Ruggiero, GE Global Research (United States)



Plenary Presentation · 9:15 to 10:00 am The Upcoming Revolution in Ultrasonic Guided Waves

Joseph L. Rose, The Pennsylvania State Univ. (United States)

SESSION 1

Room: Royal Palm VI
Mon. 10:30 am to 12:20 pm

Sensors I

Session Chair: **Raúl J. Martín-Palma**, Univ. Autónoma de Madrid (Spain)

10:30 am: **Structural colors in nature as bio-inspiration for selective vapor sensing** (*Invited Paper*), Radislav A. Potyrailo, GE Global Research (United States) [7975-01]

11:00 am: **Bioinspired optical sensors for unmanned aerial systems** (*Invited Paper*), Javan S. Chahl, Kent Rosser, Defence Science and Technology Organisation (Australia); Akiko Mizutani, Odonatrix Pty Ltd. (Australia) [7975-02]

11:30 am: **A bioinspired methodology for odor recognition using chemical sensor arrays** (*Invited Paper*), Joshua L. Hertz, Univ. of Delaware (United States); Baranidharan Raman, Washington Univ. in St. Louis (United States); Kurt D. Benkstein, Stephen Semancik, National Institute of Standards and Technology (United States) [7975-03]

12:00 pm: **Biomimetic gas sensors for large-scale drying of wood particles**, Stefan Schütz, Sebastian Paczkowski, Univ. Göttingen (Germany); Till M. Essinger, Justus-Liebig-Universität Giessen (Germany); Jörg Gottschald, Univ. Göttingen (Germany); Benjamin Becker, Tilman Sauerwald, Dieter Kohl, Justus-Liebig-Universität Giessen (Germany) . . . [7975-04]
Lunch Break 12:20 to 1:30 pm

SESSION 1

Room: Pacific Salon I-III
Mon. 10:30 am to 12:10 pm

EAP as Emerging Actuators

Session Chairs: **Yoseph Bar-Cohen**, Jet Propulsion Lab.; **Federico Carpi**, Univ. di Pisa (Italy)

10:30 am: **Walking with springs** (*Keynote Presentation*), Thomas G. Sugar, Arizona State Univ. (United States) [7976-01]

11:10 am: **Dielectric elastomers: from the beginning of modern science to applications in actuators and energy harvesters** (*Invited Paper*), Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria) [7976-02]

11:50 am: **Directions for development of the field of electroactive polymer (EAP)**, Yoseph Bar-Cohen, Jet Propulsion Lab. (United States) [7976-03]

Lunch Break 12:10 to 1:30 pm

SESSION 1

Room: Sunrise
Mon. 10:30 to 11:50 am

Biological-Inspired Systems and Bio-MEMS

10:30 am: **Electrical power generation from insect flight**, Timothy Reissman, Cornell Univ. (United States) and Northwestern Univ. (United States); Robert B. MacCurdy, Ephraim Garcia, Cornell Univ. (United States) [7977-01]

10:50 am: **Energy harvesting from heartbeats for pacemakers**, Mohammad A. Karami, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7977-02]

11:10 am: **A practical application of using tree movement to power a wireless sensor node**, Scott A. McGarry, Christopher G. Knight, Commonwealth Scientific and Industrial Research Organisation (Australia) [7977-03]

11:30 am: **Sensor seeking, wireless power transfer and management**, Steven Percy, Christopher G. Knight, Commonwealth Scientific and Industrial Research Organisation (Australia) [7977-04]

Lunch Break 11:50 am to 1:20 pm

SESSION 1

Room: Royal Palm II
Mon. 10:30 to 11:50 am

Modeling of Ferroelectric Ceramics

Session Chairs: **Christopher S. Lynch**, Univ. of California, Los Angeles; **William S. Oates**, The Florida State Univ.

10:30 am: **Progress on 3D finite element analysis with ferroelectric constitutive laws**, David M. Pisani, Christopher S. Lynch, Univ. of California, Los Angeles (United States) [7978-01]

10:50 am: **Phase field models of ferroelectric materials as part of a multiscale modeling chain**, Benjamin Voelker, Marc Kamlah, Karlsruher Institut für Technologie (Germany) [7978-02]

11:10 am: **Phase transformations of ferroelectric rhombohedral to antiferroelectric orthorhombic in phase-field model of 95/5 PZT**, Wen Dong, Christopher S. Lynch, Univ. of California, Los Angeles (United States) [7978-03]

11:30 am: **Constitutive model for rate dependent behavior of ferroelectric materials**, Tadashige Ikeda, Keigo Yoshida, Tetsuhiko Ueda, Nagoya Univ. (Japan) [7978-04]

Lunch Break 11:50 am to 1:20 pm

SESSION 1

Room: Towne
Mon. 10:30 to 11:50 am

Embedded Sensing Applications

Session Chairs: **Gyuhae Park**, Los Alamos National Lab.; **Kevin Farinholt**, Los Alamos National Lab.

10:30 am: **Temperature measurement in a turbine stator assembly using an integratable high-temperature ultrasonic sensor network**, Kuo-Ting Wu, Zhigang Sun, Makiko Kobayashi, Brian Galeote, National Research Council Canada (Canada); Nezhir Mrad, Defence Research and Development Canada (Canada) [7979-01]

10:50 am: **Performance and modeling of active metal-matrix composites manufactured by ultrasonic additive manufacturing**, Ryan M. Hahnlen, Marcelo J. Dapino, The Ohio State Univ. (United States) [7979-02]

11:10 am: **Embedded processing for SHM with integrated software control of a wireless impedance device**, Stuart G. Taylor, Carroll Joetta, Kevin M. Farinholt, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (United States); Michael D. Todd, Univ. of California, San Diego (United States) [7979-03]

11:30 am: **Hybrid energy sources for embedded sensor nodes**, Ramon Silva, Texas A&M Univ. (United States); Kevin M. Farinholt, Gyuhae Park, Los Alamos National Lab. (United States) [7979-04]

Lunch Break 11:50 am to 1:40 pm

Monday · 7 March

Conference 7980	Conference 7981	Conference 7982	Conference 7983	Conference 7984
<p style="text-align: center;">SESSION 1</p> <p style="text-align: center;">Room: Royal Palm III Mon. 10:30 to 11:10 am</p> <p style="text-align: center;">Keynote Session</p> <p><i>Session Chair: Vijay K. Varadan, Univ. of Arkansas</i></p> <p>10:30 am: Nanotechnology research and development for military and industrial applications (<i>Keynote Presentation</i>), Paul B. Ruffin, U.S. Army Armament Research, Development and Engineering Ctr. (United States); Christina Brantley, Eugene Edwards, Keith J. Roberts, William Chew, Larry Warren, Paul R. Ashley, Henry O. Everitt, Eric D. Webster, Mark G. Temmen, John V. Foreman, Mohan Sanghadasa, U.S. Army Research, Development and Engineering Command (United States) [7980-01]</p> <p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm III Mon. 11:10 am to 12:10 pm</p> <p style="text-align: center;">Nanowire, Nanotube, and Nanostructures I</p> <p><i>Session Chair: Linfeng Chen, Univ. of Arkansas</i></p> <p>11:10 am: Carbon nanotube heterojunctions: unusual deformations and mechanical vibration properties, Fabrizio L. Scarpa, Univ. of Bristol (United Kingdom); Jakub Narojczyk, Krzysztof W. Wojciechowski, Institute of Molecular Physics (Poland); Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7980-02]</p> <p>11:30 am: Collinear 2-dot QCA nano-electronic wire structure to improve QCA computing device reliability, Loyd R. Hook IV, Samuel C. Lee, The Univ. of Oklahoma (United States) [7980-03]</p> <p>11:50 am: Synthesis of vertically aligned iron oxide nanotubes for engineering and biomedical applications, Linfeng Chen, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-04]</p> <p>Lunch Break 12:10 to 1:30 pm</p>	<p style="text-align: center;">Announcements, Awards, and Plenary Presentations</p> <p style="text-align: center;"><i>Pacific Salon I-III</i></p> <p style="text-align: center;">8:15 to 8:30 am</p> <p style="text-align: center;">2010 SSM Lifetime Achievement Award</p> <p style="text-align: center;"><i>presented to Amr Baz, Univ. of Maryland, College Park (United States) and Kon-Well Wang, Univ. of Michigan (United States)</i></p> <p style="text-align: center;">2010 NDE Lifetime Achievement Award</p> <p style="text-align: center;"><i>presented to Joseph L. Rose, The Pennsylvania State Univ. (United States)</i></p> <p style="text-align: center;">Room: Pacific Salon IV-V Mon. 10:30 to 11:50 am</p> <p style="text-align: center;">Keynote Session</p> <p><i>Session Chairs: Chung-Bang Yun, KAIST (Korea, Republic of); Victor Giurgiutiu, Univ. of South Carolina</i></p> <p>10:30 am: Bio-inspired sensing technologies for structural health monitoring (<i>Keynote Presentation</i>), Jerome P. Lynch, Univ. of Michigan (United States) [7981-01]</p> <p>11:10 am: Multifunctional materials exhibiting distributed actuation, sensing, and control: Uncovering the hierarchical control of fish for developing smarter materials (<i>Keynote Presentation</i>), Michael K. Philen, Virginia Polytechnic Institute and State Univ. (United States) [7981-02]</p> <p>Lunch Break 11:50 am to 1:20 pm</p>	<p style="text-align: center;">SESSION 1</p> <p style="text-align: center;">Room: Royal Palm IV Mon. 10:30 am to 12:10 pm</p> <p style="text-align: center;">Fiber Bragg Grating Sensors I</p> <p><i>Session Chair: Wolfgang Ecke, IPHT Jena (Germany)</i></p> <p>10:30 am: Fibre optic sensors in smart structures: achievements, challenges, and prospects (<i>Invited Paper</i>), Brian Culshaw, Univ. of Strathclyde (United Kingdom) [7982-01]</p> <p>11:00 am: Active fiber sensor array for cryogenic environments (<i>Invited Paper</i>), Kevin P. Chen, Univ. of Pittsburgh (United States) [7982-02]</p> <p>11:30 am: Memorization and detection of an arrested crack in a foam-core sandwich structure using a crack arrester with embedded metal wires and FBG sensors, Shu Minakuchi, Nobuo Takeda, Ipppei Yamauchi, The Univ. of Tokyo (Japan); Yasuo Hirose, Kawasaki Heavy Industries, Ltd. (Japan) . [7982-04]</p> <p>11:50 am: Embedded optical fiber Bragg gratings for in-situ measurement of residual stress in al cold sprayed magnesium parts, Seyyed H. Alemohammad, Hassan Mahmoudi, Ehsan Toyserkani, Hamid Jahed, Univ. of Waterloo (Canada) [7982-05]</p> <p>Lunch Break 12:10 to 1:50 pm</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Plenary Presentation · 8:30 to 9:15 am</p> <p>Advanced Sealing Technology for the Energy and Propulsion Fields</p> <p>Eric Ruggiero, GE Global Research (United States)</p> </div> <div style="text-align: center;">  <p>Plenary Presentation · 9:15 to 10:00 am</p> <p>The Upcoming Revolution in Ultrasonic Guided Waves</p> <p>Joseph L. Rose, The Pennsylvania State Univ. (United States)</p> </div> </div> <p style="text-align: center;">Concurrent Sessions</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 1A</p> <p style="text-align: center;">Room: Royal Palm V Mon. 10:30 to 11:50 am</p> <p style="text-align: center;">Laser, Ultrasound, Acoustic Emission NDE I</p> <p><i>Session Chairs: Xiaoning Jiang, North Carolina State Univ.; Didem Ozevin, Univ. of Illinois at Chicago</i></p> <p>10:30 am: Early state damage detection of aluminum 7075-T6 based on acoustic emission, Didem Ozevin, Univ. of Illinois at Chicago (United States); Li Zhong, China Aircraft Strength Research Institute (China); Zahra Heidary, Univ. of Illinois at Chicago (United States) [7983-01]</p> <p>10:50 am: Environmentally stimulated acoustic emission from reinforced concrete, Adrian A. Pollock, Miguel A. Gonzalez-Nunez, MISTRAS Group, Inc. (United States); Tala Shokri, Univ. of Miami (United States) [7983-02]</p> <p>11:10 am: Innovative sensor and nondestructive testing technologies for evaluating internal-frost damage in concrete, Kenny Ng, Michigan Technological Univ. (United States); Xiong Yu, Case Western Reserve Univ. (United States); Qingli Dai, Michigan Technological Univ. (United States) [7983-04]</p> <p>11:30 am: Continuous acoustic emission monitoring during an accelerated corrosion test, Matteo Di Benedetti, Univ. of Miami (United States); Giovanni Loreto, Univ. degli Studi di Napoli Federico II (Italy); Antonio Nanni, Fabio Matta, Univ. of Miami (United States); Miguel A. Gonzalez-Nunez, MISTRAS Group, Inc. (United States) [7983-110]</p> <p>Lunch Break 11:50 am to 1:20 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 1B</p> <p style="text-align: center;">Room: Sunset Mon. 10:30 to 11:50 am</p> <p style="text-align: center;">NDE in Civil Infrastructure I</p> <p><i>Session Chairs: A. Emin Aktan, Drexel Univ.; Genda Chen, Missouri Univ. of Science and Technology</i></p> <p>10:30 am: Control of robotic drilling of concrete bridge decks, Mitja Trkov, Fei Liu, Jingang Yi, Rutgers, The State Univ. of New Jersey (United States) [7983-05]</p> <p>10:50 am: Nanoscale materials for non-destructive repair of transportation infrastructures, Husam S. Najm, Rutgers, The State Univ. of New Jersey (United States) [7983-06]</p> <p>11:10 am: Multisensor data fusion for nondestructive evaluation of bridge decks, Ying Zhang, Georgia Institute of Technology (United States) [7983-07]</p> <p>11:30 am: Evaluation of corrosion effect in reinforced concrete by chloride exposure, Giovanni Loreto, Univ. degli Studi di Napoli Federico II (Italy); Matteo Di Benedetti, Univ. of Miami (United States); Renato Iovino, Univ. degli Studi di Napoli Federico II (Italy); Antonio Nanni, Univ. of Miami (United States); Miguel Gonzalez, MISTRAS Group, Inc. (United States) [7983-08]</p> <p>Lunch Break 11:50 am to 1:20 pm</p> </div> </div>	<p style="text-align: center;">SESSION 1</p> <p style="text-align: center;">Room: Royal Palm I Mon. 10:30 to 11:50 am</p> <p style="text-align: center;">Guided Waves in Complex Structures</p> <p><i>Session Chairs: Tribikram Kundu, The Univ. of Arizona; Wolfgang Grill, Univ. Leipzig (Germany)</i></p> <p>10:30 am: Wave propagation in isogrid structures, Whitney D. Reynolds, Derek T. Doyle, Brandon J. Arritt, Air Force Research Lab. (United States) [7984-01]</p> <p>10:50 am: Monitoring of hidden damage in multi-layered aerospace structures using high-frequency guided waves, Adrien Semoroz, HES-SO Fribourg (Switzerland) and Univ. College London (United Kingdom); Bernard Masserey, HES-SO Fribourg (Switzerland); Paul Fromme, Univ. College London (United Kingdom) [7984-02]</p> <p>11:10 am: Acoustic emission-based structural health monitoring of stiffened panels, Travis Whitlow, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7984-03]</p> <p>11:30 am: Holographic imaging of acoustic waves in piezo-electric ceramics by Coulomb coupling, Anowarul Habib, Univ. Siegen (Germany); Amit Shelke, The Univ. of Arizona (United States); Umar Amjad, Mieczyslaw Pluta, Univ. Leipzig (Germany); Tribikram Kundu, The Univ. of Arizona (United States); Ullrich Pietsch, Univ. Siegen (Germany); Wolfgang Grill, Univ. Leipzig (Germany) . . . [7984-04]</p> <p>Lunch Break 11:50 am to 1:20 pm</p>

* Indicates paper that will also be presented in the NSF Poster Session, p. 30.

Monday · 7 March

Conference 7975	Conference 7976	Conference 7977	Conference 7978	Conference 7979
<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm VI Mon. 1:30 to 2:50 pm</p> <p style="text-align: center;">Sensors II <i>Session Chair: Joshua L. Hertz, Univ. of Delaware</i></p> <p>1:30 pm: Biomimetic infrared sensors based on the infrared receptors of pyrophilous insects, Helmut Schmitz, Thilo Kahl, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Herbert Bousack, Forschungszentrum Jülich GmbH (Germany) [7975-05]</p> <p>1:50 pm: Lateral line canal morphology and signal to noise ratio, Adrian T. Klein, Hendrik Herzog, Horst Bleckmann, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [7975-06]</p> <p>2:10 pm: Bioinspired vision sensors with hyperacuity, Steven F. Barrett, Cameron H. G. Wright, Univ. of Wyoming (United States) . [7975-07]</p> <p>2:30 pm: Hair cell sensing with encapsulated interface bilayers, Stephen A. Sarles, Preston Pinto, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) [7975-08]</p> <p>Coffee Break. 2:50 to 3:40 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Pacific Salon I-III Mon. 1:30 to 3:10 pm</p> <p style="text-align: center;">Energy Harvesting Special Session: Part I <i>Session Chairs: Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria); Roy D. Kornbluh, SRI International</i></p> <p>1:30 pm: From boots to buoys: promises and challenges of dielectric elastomer energy harvesting (Invited Paper), Roy D. Kornbluh, Ron Pelrine, Harsha Prahlad, Annjoe Wong-Foy, Brian McCoy, Susan Kim, Joseph Eckerle, SRI International (United States) [7976-04]</p> <p>2:10 pm: Acrylic IPNs for dielectric elastomer generators, Paul Brochu, Xiaofan Niu, Qibing Pei, Univ. of California, Los Angeles (United States) [7976-05]</p> <p>2:30 pm: Characterization of effects of energy harvesting on the dynamic response of dielectric elastomers, Heather L. Lai, Chin-An Tan, Yong Xu, Wayne State Univ. (United States) [7976-06]</p> <p>2:50 pm: Energy harvesting from flutter instabilities of heavy flags in water through ionic polymer metal composites, Alberto Giacomello, Maurizio Porfiri, Polytechnic Institute of NYU (United States) [7976-07]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Sunrise Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Passive and Active Vibration Isolation Systems I</p> <p>1:20 pm: Active flutter control of composite plate with embedded and surface bonded piezoelectric composites, Gopinath Thamilselvan, Ryerson Univ. (Canada); Raja Samikannu, National Aerospace Labs. (India); Tadashige Ikeda, Nagoya Univ. (Japan) [7977-05]</p> <p>1:40 pm: Finite element formulation of laminated plate with flexible piezoelectric actuators and vibration control analysis, Gopinath Thamilselvan, Ryerson Univ. (Canada); Raja Samikannu, National Aerospace Labs. (India); Tadashige Ikeda, Nagoya Univ. (Japan) [7977-06]</p> <p>2:00 pm: Two degree-of-freedom parallel mechanisms for high bandwidth vibration suppression and tracking, John F. O'Brien, Dustin Carruthers, Univ. of Wyoming (United States) [7977-07]</p> <p>2:20 pm: Semi-active vibration isolation using fluidic flexible matrix composite mounts: analysis and experiment, Michael K. Philen, Virginia Polytechnic Institute and State Univ. (United States) [7977-08]</p> <p>2:40 pm: Sound pressure damping using piezoelectric membranes with negative capacitance circuits, Jacob Z. Kizer, Michael Fontaine, Umesh A. Korde, South Dakota School of Mines and Technology (United States) . . . [7977-09]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm II Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Ceramic-Polymer Piezoelectric Composites <i>Session Chairs: Henry A. Sodano, Arizona State Univ.; Ralph C. Smith, North Carolina State Univ.</i></p> <p>1:20 pm: Modeling the nonlinear behavior of macro fiber composite actuators, Zhengzheng Hu, Ralph C. Smith, North Carolina State Univ. (United States); Michael Hays, William S. Oates, The Florida State Univ. (United States) [7978-18]</p> <p>1:40 pm: Time-dependent response of active composites with thermal, electrical, and mechanical coupling effect, Anastasia Muliiana, Hassene Ben Atitallah, Zoubeida Ounaies, Texas A&M Univ. (United States) [7978-19]</p> <p>2:00 pm: Estimating mechanical properties of bi-continuous two-phase composites for optimised multi-functionality, Yuying Xia, Erick I. Saavedra Flores, Swansea Univ. (United Kingdom); Hua-Xin Peng, Univ. of Bristol (United Kingdom); Michael I. Friswell, Swansea Univ. (United Kingdom) [7978-20]</p> <p>2:20 pm: Micromechanical analysis of constitutive properties of active piezoelectric structural fiber (PSF) composites, Kenny Ng, Qingli Dai, Michigan Technological Univ. (United States) [7978-21]</p> <p>2:40 pm: Functionally-modified bimorph PZT actuator for cm-scale flapping wing, Jaret C. Riddick, U.S. Army Research Lab. (United States); Asha Hall, Motile Robotics Inc. (United States) [7978-22]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Towne Mon. 1:40 to 3:00 pm</p> <p style="text-align: center;">Aerospace Applications <i>Session Chairs: Brandon J. Arritt, Air Force Research Lab.; Kevin Farinholt, Los Alamos National Lab.</i></p> <p>1:40 pm: Direct force measurement system for assessment of aircraft/store interface loads and integrity, Howard M. Matt, Kevin L. Napolitano, ATA Engineering, Inc. (United States) [7979-05]</p> <p>2:00 pm: Comparative analysis of shape memory alloy beam actuators for increased power output, Stephen Oehler, Darren J. Hartl, Dimitris C. Lagoudas, Texas A&M Univ. (United States)[7979-06]</p> <p>2:20 pm: Chiral auxetics for shape memory polymer deployable structures, Jonathan M. Rossiter, Fabrizio L. Scarpa, Univ. of Bristol (United Kingdom); Kazuto Takashima, Kyushu Institute of Technology (Japan) [7979-08]</p> <p>2:40 pm: Microfibrous metallic cloth for acoustic isolation of a MEMS gyroscope, Robert N. Dean, Jr., Nisha H. Burch, Meagan N. Black, Aubrey Beal, George T. Flowers, Auburn Univ. (United States) [7979-09]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>

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Conference 7980

SESSION 3

Room: Royal Palm III
Mon. 1:30 to 2:10 pm

Keynote Session

Session Chair: Sang H. Choi,
NASA Langley Research Ctr.

1:30 pm: **Development of diagnosis and treatment technology for brain disease using quantum material and nano probe pin device (Keynote Presentation),** Uhn Lee M.D., Gachon Univ. Gil Medical Ctr. (Korea, Republic of) [7980-05]

SESSION 4

Room: Royal Palm III
Mon. 2:10 to 3:10 pm

Nanowire, Nanotube, and Nanostructures II

Session Chair: Sang H. Choi,
NASA Langley Research Ctr.

2:10 pm: **Synthesis and characterization of thiol-functionalized polymer as binder in conductive ink,** Jungmin Lee, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-06]

2:30 pm: **Optical properties of a novel nanostructured CdS/CdTe material,** Luca Cozzarini, Univ. degli Studi di Trieste (Italy); Francesca Antonioli, MaXun s.r.l. (Italy); Vanni Lughì, Univ. degli Studi di Trieste (Italy) [7980-07]

2:50 pm: **Magnetoresistance of flexible CNT-Fe composite thin films in a dynamic electric field,** Rejin Isaac, D. Roy Mahapatra, Indian Institute of Science (India) [7980-08]

Coffee Break. 3:10 to 3:40 pm

Conference 7981

Concurrent Sessions

SESSION 2a

Room: Pacific Salon IV-V
Mon. 1:20 to 3:00 pm

Emerging Sensing Systems for SHM I

Session Chairs: Kenneth J. Loh, Univ. of California, Davis; **Yang Wang,** Georgia Institute of Technology

1:20 pm: **An implementation of a data-transmission pipelining algorithm on imote2 platforms,** Xu Li, Siavash Dorvash, Lehigh Univ. (United States) [7981-03]

1:40 pm: *** Hybrid smart sensor network for full-scale structural health monitoring of a cable-stayed bridge,** Hongki Jo, Sung-Han Sim, Kirill A. Mechitov, Robin Kim, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States); JongWoong Park, Soojin Cho, Hyung-Jo Jung, Chung-Bang Yun, KAIST (Korea, Republic of); Jennifer A. Rice, Texas Tech Univ. (United States); Tomonori Nagayama, The Univ. of Tokyo (Japan) [7981-04]

2:00 pm: **Comparison study of feature extraction methods in structural damage pattern recognition,** Wenjia Liu, Bo Chen, R. Andrew Swartz, Michigan Technological Univ. (United States) [7981-05]

2:20 pm: **Embedding empirical mode decomposition within an FPGA-based design: challenges and progress,** Jonathan D. Jones, Jin-Song Pei, The Univ. of Oklahoma (United States); Joseph P. Wright, Weidlinger Associates, Inc. (United States) [7981-06]

2:40 pm: **Investigating the electromechanical performance of carbon nanotube strain sensors embedded in GFRP composites,** Bryan R. Loyola, Kenneth J. Loh, Valeria La Saponara, Univ. of California, Davis (United States) [7981-07]

Coffee Break. 3:00 to 3:30 pm

SESSION 2b

Room: Pacific Salon VI-VII
Mon. 1:20 to 3:00 pm

Wireless Sensors for SHM

Session Chairs: Jennifer A. Rice, Texas Tech Univ.; **Shamim N. Pakzad,** Lehigh Univ.

1:20 pm: **Ultra-low power wireless sensing for long-term structural health monitoring,** Argenis Bilbao, Davis Hoover, Jennifer A. Rice, Texas Tech Univ. (United States); Jamie Chapman, Vestas Technology R&D (United States) [7981-08]

1:40 pm: **Leveraging real-time hydrologic data for the control of large-scale water distribution systems in the Sierra Nevada,** Branko Kerkez, Steven D. Glaser, Univ. of California, Berkeley (United States); Christian U. Grosse, Technische Univ. München (Germany) [7981-09]

2:00 pm: *** Data transmission performance modeling for rotating wireless sensors using automatic repeat request,** Fan Yang, Lei Tang, Kuang-Ching Wang, Yong Huang, Clemson Univ. (United States) [7981-10]

2:20 pm: **An equivalent circuit model of supercapacitors for applications in wireless sensor networks,** Hengzhao Yang, Ying Zhang, Georgia Institute of Technology (United States) [7981-11]

2:40 pm: **Multi-scale hybrid sensor nodes for acceleration-impedance-temperature monitoring in truss structures,** Duc-Duy Ho, Jae-Hyung Park, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of) [7981-12]

Coffee Break. 3:00 to 3:30 pm

* Indicates paper that will also be presented in the NSF Poster Session, p. 32.

Conference 7982

SESSION 2

Room: Royal Palm IV
Mon. 1:50 to 3:00 pm

Distributed Sensors

Session Chair: Kara J. Peters,
North Carolina State Univ.

1:50 pm: **FDM (frequency division multiplexing) and TDM (time division multiplexing) BOTDA for long sensing length (Invited Paper),** Xiaoyi Bao, Univ. of Ottawa (Canada) [7982-06]

2:20 pm: **Distributed fiber optic sensor testing, data interpretation, and evaluation for monitoring in the geotechnical field,** Michael R. Iten, Dominik Hauswirth, Alexander M. Puzrin, ETH Zurich (Switzerland) [7982-07]

2:40 pm: **Research on SRSI method of selecting valid measuring points,** Peng Gong, Xuefeng Zhao, Yang Liu, Jie Lu, Dalian Univ. of Technology (China) [7982-08]

Coffee Break. 3:00 to 3:30 pm

Conference 7983

Concurrent Sessions

SESSION 2A

Room: Royal Palm V
Sun. 1:20 to 3:00 pm

Laser, Ultrasound, Acoustic Emission NDE II

Session Chairs: Xiaoning Jiang, North Carolina State Univ.; **Didem Ozevin,** Univ. of Illinois at Chicago

1:20 pm: **Assessment of carbon fiber-reinforced polyphenylene sulfide by means of laser ultrasound,** Michael K. Kalms, Bremer Institut für angewandte Strahltechnik GmbH (Germany); Christian Peters, Faserinstitut State e.V. (Germany); Ronald Wierbos, TenCate Advanced Composites Netherlands (Netherlands) . [7983-09]

1:40 pm: **Measurement of pore size distribution in concrete by advanced ultrasonic analyses,** Ye Sun, Yan Liu, Xiong Yu, Case Western Reserve Univ. (United States) [7983-10]

2:00 pm: **Real-time health monitoring of metal matrix composites using nonlinear acoustics,** Mixalhs Ntovas, Antonios Charalambopoulos, Theodoros E. Matikas, Univ. of Ioannina (Greece) [7983-11]

2:20 pm: **Vibration modulated Lamb waves for structure health monitoring,** Jingpin Jiao, Guorong Song, Cunfu He, Bin Wu, Beijing Univ. of Technology (China) [7983-12]

2:40 pm: **Development of a portable ultrasonic phased array inspection imaging apparatus for NDT,** Baohua Shan, Xiaoyan Liu, Jiu Lou, Hua Wang, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) [7983-13]

Coffee Break. 3:00 to 3:30 pm

SESSION 2B

Room: Sunset
Mon. 1:20 to 3:00 pm

NDE in Civil Infrastructure II

Session Chairs: A. Emin Aktan, Drexel Univ.; **Genda Chen,** Missouri Univ. of Science and Technology

1:20 pm: **Bridge scour monitoring system: a pilot field evaluation,** Xiong Yu, Xinbao Yu, Junliang Tao, Case Western Reserve Univ. (United States) [7983-14]

1:40 pm: **Smart-label-based behavior monitoring IOT system for the infrastructures under harsh environments,** Zhi Zhou, Dalian Univ. of Technology (China); Minghua Huang, Harbin Institute of Technology (China); Jianping He, Dalian Univ. of Technology (China); Genda Chen, Missouri Univ. of Science and Technology (United States); Jinping Ou, Harbin Institute of Technology (China) [7983-15]

2:00 pm: **Model updating for a continuous rigid frame bridge based on long-term structural health monitoring,** Lei Wang, Harbin Institute of Technology (China); Binbin Li, Jinping Ou, Dalian Univ. of Technology (China) [7983-16]

2:20 pm: **Bridge reliability assessment based on PDF of long-term monitored static strain,** Mei Ju Jiao, Li-Min Sun, Tongji Univ. (China) [7983-17]

2:40 pm: **Advanced bridge asset management and the role of structural health monitoring: a New Zealand perspective,** Piotr Omenzetter, The Univ. of Auckland (New Zealand); Simon Bush, Opus (New Zealand); Theuns Henning, The Univ. of Auckland (New Zealand); Peter McCarten, Opus (New Zealand) [7983-18]

Coffee Break. 3:00 to 3:30 pm

Conference 7984

SESSION 2

Room: Royal Palm I
Mon. 1:20 to 3:00 pm

Guided Waves in Composites

Session Chairs: Hoon Sohn, KAIST (Korea, Republic of); **Francesco Lanza di Scalea,** Univ. of California, San Diego

1:20 pm: **Delamination detection in a composite plate using a dual piezoelectric transducer network,** Chulmin Yeum, Hoon Sohn, KAIST (Korea, Republic of); Jeong-Beom Ihn, The Boeing Co. (United States) [7984-05]

1:40 pm: **Structural health monitoring strategy for detection of interlaminar delamination in composite plates,** Nicolas Quaegebeur, Philippe Micheau, Patrice Masson, Ahmed Masloui, Univ. de Sherbrooke (Canada) [7984-06]

2:00 pm: **Composite piezoelectric strip transducer development for structural health monitoring,** Sheng Li, Cliff J. Lissenden, The Pennsylvania State Univ. (United States) [7984-07]

2:20 pm: **Design of mode selective actuators for Lamb wave excitation in composite plates,** Daniel Schmidt, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [7984-08]

2:40 pm: **Modeling of three-dimensional guided wave propagation in composite plate and extreme temperature environment,** Guoliang Huang, F. Song, Univ. of Arkansas at Little Rock (United States) [7984-09]

Coffee Break. 3:00 to 3:30 pm

Monday · 7 March

Conference 7975	Conference 7976	Conference 7977	Conference 7978	Conference 7979	Conference 7980
<p>SESSION 3</p> <p>Room: Royal Palm VI Mon. 3:40 to 5:30 pm</p> <p>Mechanical Properties <i>Session Chair: Radislav A. Potyrailo, GE Global Research</i></p> <p>3:40 pm: Mechanical behavior of autonomic gelatin and polyacrylamide gels (<i>Invited Paper</i>), Richard A. Vaia, Matthew L. Smith, Air Force Research Lab. (United States); Kevin Heitfeld, Renegade Materials Corp. (United States); Maxim Tchoul, Air Force Research Lab. (United States) [7975-11]</p> <p>4:10 pm: The importance of water for the mechanical properties of insect cuticle, David Klocke, Helmut Schmitz, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [7975-12]</p> <p>4:30 pm: Bio-inspired assembly of nanoplatelets for reinforced nanocomposites and gas-barrier coatings, Peng Jiang, Univ. of Florida (United States) [7975-13]</p> <p>4:50 pm: Computational multi-scale constitutive model for wood cells and its application to the design of bio-inspired composites, Erick I. Saavedra Flores, Michael I. Friswell, Eduardo A. de Souza Neto, Swansea Univ. (United Kingdom) [7975-14]</p> <p>5:10 pm: Nonhomogeneity and anisotropy of membrane and finite element modelling of a beetle wing, Tailie Jin, Ngoc-San Ha, Nam-Seo Goo, Hoon Cheol Park, Konkuk Univ. (Korea, Republic of) [7975-15]</p>	<p>SESSION 3</p> <p>Room: Pacific Salon I-III Mon. 4:30 to 5:45 pm</p> <p>EAP-in-Action Demonstration Session <i>Yoseph Bar-Cohen, Jet Propulsion Lab.</i></p> <p>This Session highlights some of the latest capabilities and applications of Electroactive Polymers (EAP) materials where the attendees are shown demonstrations of these materials in action. Also, the attendees interact directly with technology developers and given "hands-on" experience with this emerging technology. The first Human/EAP-Robot Armwrestling Contest was held during this session of the 2005 EAPAD conference. See the program and descriptions of EAP presentations, page 9.</p>	<p>SESSION 3</p> <p>Room: Sunrise Mon. 3:30 to 4:50 pm</p> <p>Passive and Active Vibration Isolation Systems II</p> <p>3:30 pm: An adaptive-passive support for the absorption of tonal waves in structures, Emiliano Rustighi, Brian R. Mace, Univ. of Southampton (United Kingdom) [7977-10]</p> <p>3:50 pm: Active vibration control of a stiffened panel through application of negative capacitance shunts, Benjamin S. Beck, Kenneth A. Cunefare, Georgia Institute of Technology (United States) .. [7977-11]</p> <p>4:10 pm: Performance of piezoelectric-based damping techniques for structures with changing excitation frequencies, Jeffrey L. Kauffman, George A. Lesieutre, The Pennsylvania State Univ. (United States) [7977-12]</p> <p>4:30 pm: Active control of structures with adaptive modified positive position feedback, Seyed Nima Mahmoodi, The Univ. of Alabama (United States); Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ. (United States) [7977-13]</p>	<p>SESSION 3</p> <p>Room: Royal Palm II Mon. 3:30 to 5:45 pm</p> <p>Responsive Polymers <i>Session Chairs: Ralph C. Smith, North Carolina State Univ.; Zhengzheng Wu, North Carolina State Univ.</i></p> <p>3:30 pm: Dynamics of ion transport in a bio-derived ionic transistor, Vishnu Baba Sundaresan, Hao Zhang, Nathan Kitchen, Virginia Commonwealth Univ. (United States) [7978-23]</p> <p>3:45 pm: Nonlinear mechanics and structural dynamics of azobenzene photoelastomer films, Liang Cheng, Yanira Torres, William S. Oates, The Florida State Univ. (United States) [7978-24]</p> <p>4:00 pm: Finite element modeling of electromechanical behavior of a dielectric electroactive polymer actuator, Aseem Deodhar, Stefan S. Seelecke, North Carolina State Univ. (United States) [7978-25]</p> <p>4:15 pm: A novel hp-FEM model for IPMC actuation, David Pugal, Kwang J. Kim, Univ. of Nevada, Reno (United States); Alvo Aabloo, Univ. of Tartu (Estonia) . [7978-26]</p> <p>4:30 pm: Unusual light-induced viscoelasticity of azobenzene liquid crystal elastomers, Hongbo Wang, William S. Oates, The Florida State Univ. (United States) [7978-27]</p> <p>4:45 pm: Efficient electro-chemo-mechanical finite element model for the simulation of patterned high surface area electrode in ionic polymer transducers, Joseph Najem, Virginia Polytechnic Institute and State Univ. (United States); Barbar J. Akle, Wassim Habchi, Lebanese American Univ. (Lebanon); Thomas Wallmersperger, Technische Univ. Dresden (Germany); Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) [7978-28]</p> <p>5:00 pm: Optomechanical behavior of photochromic liquid crystal polymer film composites, Yue You, Changwei Xu, Binglian Wang, Yongzhong Huo, Fudan Univ. (China) [7978-29]</p> <p>5:15 pm: Self-sensing of DEAP actuators: capacitive and resistive experimental analysis, Alexander York, Stefan S. Seelecke, North Carolina State Univ. (United States) [7978-30]</p> <p>5:30 pm: Mechanics of light-activated network polymers, Kevin N. Long, H. Jerry Qi, Martin L. Dunn, Univ. of Colorado at Boulder (United States) [7978-31]</p>	<p>SESSION 3</p> <p>Room: Towne Mon. 3:30 to 5:30 pm</p> <p>Smart Materials and Devices for Vehicle Applications <i>Session Chairs: Marcelo J. Dapino, The Ohio State Univ.; Diann E. Brei, Univ. of Michigan</i></p> <p>3:30 pm: Active materials for automotive adaptive forward lighting Part I: system requirements vs. material properties, Alan L. Browne, Nancy L. Johnson, General Motors Corp. (United States); Andrew C. Keefe, HRL Labs., LLC (United States) [7979-10]</p> <p>3:50 pm: A magnetorheological fluid locking device, Barkan M. Kavicoglu, Yanming Liu, Advanced Materials and Devices, Inc. (United States) [7979-11]</p> <p>4:10 pm: Coupled axisymmetric finite element model for a magneto-hydraulic actuator for active engine mounts, Suryarghya Chakrabarti, Marcelo J. Dapino, The Ohio State Univ. (United States)[7979-12]</p> <p>4:30 pm: An improvement method of charge capability on a flexible electrostatic actuator and its applications, Hsu-Ching Liao, Han-Long Chen, Lin-Yu Weng, Yu-Hao Su, Yu-Chi Chen, Wen-Ching Ko, Wen-Jong Wu, National Taiwan Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan) and Institute for Information Industry (Taiwan) [7979-13]</p> <p>4:50 pm: High-frequency valve development for smart material electro-hydraulic actuators, John P. Larson, Marcelo J. Dapino, The Ohio State Univ. (United States) [7979-14]</p> <p>5:10 pm: Integrated piezoelectric actuators in deep drawing tools, Patrick Mainda, Reimund Neugebauer, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany); Matthias Kerschner, Audi AG (Germany); Klaus Wolf, Welf-Guntram Drossel, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany) [7979-15]</p>	<p>SESSION 5</p> <p>Room: Royal Palm III Mon. 3:40 to 5:00 pm</p> <p>Nano Devices and Sensors I <i>Session Chair: Aswini K. Pradhan, Norfolk State Univ.</i></p> <p>3:40 pm: Biosensor made with organic-inorganic hybrid composite: cellulose-tin oxide, Suresha K. Mahadeva, Jyoti Nayak, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-09]</p> <p>4:00 pm: Graphene nano composite strain sensor, Jong Min Kim, Pukyong National Univ. (Korea, Republic of) [7980-12]</p> <p>4:20 pm: Printable low-cost sensor systems for healthcare smart textiles, Pratyush Rai, Prashanth S. Shyamkumar, Sechang Oh, Hyeokjun Kwon, Gyanesh N. Mathur, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-13]</p> <p>4:40 pm: BioEncapsulation and biocatalysis with protein nanoCages, Richard K. Watt, Brigham Young Univ. (United States) [7980-55]</p>

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Monday · 7 March

Conference 7981

Concurrent Sessions

SESSION 3a

**Room: Pacific Salon IV-V
Mon. 3:30 to 5:30 pm**

Emerging Sensing Systems for SHM II

Session Chairs: Kenneth J. Loh, Univ. of California, Davis; Yang Wang, Georgia Institute of Technology

3:30 pm: **A structural health monitoring system with ultrasonic MEMS transducers**, Rasim O. Guldiken, Onursal Onen, Univ. of South Florida (United States); Mustafa Gul, F. Necati Catbas, Univ. of Central Florida (United States) [7981-13]

3:50 pm: *** Photocurrent generation and characterization of a photoelectric nanocomposite sensor**, Donghyeon Ryu, Kenneth J. Loh, Univ. of California, Davis (United States) [7981-14]

4:10 pm: **Field investigation of a vibration monitoring wireless sensor network on a huge cantilever structure**, Huafei Zhou, The Hong Kong Polytechnic Univ. (Hong Kong, China); Junlei Liu, The Hong Kong Polytechnic Univ. Shenzhen Research Institute (China); Yiqing Ni, The Hong Kong Polytechnic Univ. (Hong Kong, China); Dapeng Zhu, Georgia Institute of Technology (United States) [7981-15]

4:30 pm: **A wireless sensor node for high-frequency active-sensing SHM of wind turbine blades**, Stuart Taylor, Eric Raby, Kevin Farinholt, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (United States); Michael D. Todd, Univ. of California, San Diego (United States) [7981-16]

4:50 pm: *** Toward triboluminescent sensor realization for SHM**, Tarik J. Dickens, The Florida State Univ. (United States); Okenwa O. Okoli, High Performance Materials Institute (United States) [7981-17]

5:10 pm: **A wireless multifunctional radar-based displacement sensor for structural health monitoring**, Jennifer A. Rice, Changzhi Li, Texas Tech Univ. (United States) . . [7981-18]

SESSION 3b

**Room: Pacific Salon VI-VII
Mon. 3:30 to 5:10 pm**

Ultrasonics Methods

Session Chairs: Henrique L. Reis, Univ. of Illinois at Urbana-Champaign; Francesco Lanza di Scalea, Univ. of California, San Diego

3:30 pm: **Nonlinear ultrasonic guided waves for prestress level monitoring in prestressing strands for post-tensioned concrete structures**, Claudio Nucera, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) [7981-19]

3:50 pm: **Enabling dissimilar fibre embedding and explicit fibre layout in ultrasonic consolidation**, Simona Masurtschak, Loughborough Univ. (United Kingdom) and Solidica, Inc. (United States); Russell A. Harris, Loughborough Univ. (United Kingdom) [7981-20]

4:10 pm: **Effect of decay on ultrasonic velocity and attenuation measurements in wood**, Megan McGovern, Adam Senalik, Univ. of Illinois at Urbana-Champaign (United States); George Chen, USDA Forest Products Lab. (United States); Frank C. Beall, Univ. of California, Berkeley (United States); Henrique L. Reis, Univ. of Illinois at Urbana-Champaign (United States) [7981-21]

4:30 pm: **Planar rotary motor using ultrasonic horns**, Stewart Sherrit, Xiaoqi Bao, Mircea Badescu, Jet Propulsion Lab. (United States); Daniel Geiyer, Rochester Institute of Technology (United States); Phillip Allen, California State Polytechnic Univ., Pomona (United States); Patrick Ostlund, Yoseph Bar-Cohen, Jet Propulsion Lab. (United States) [7981-22]

4:50 pm: **Structural health monitoring using flexible ultrasonic transducer arrays on an aircraft component**, Wei-Lin Liu, McGill Univ. (Canada); Cheng-Kuei Jen, National Research Council Canada (Canada); Makiko Kobayashi, McGill Univ. (Canada); Nezhir Mrad, Defence Research and Development Canada (Canada) [7981-23]

Conference 7982

SESSION 3

**Room: Royal Palm IV
Mon. 3:30 to 5:50 pm**

Fiber Bragg Grating Sensors II

Session Chair: Theodore E. Matikas, Univ. of Ioannina (Greece)

3:30 pm: **Analysis of fiber Bragg grating spectral features for in-situ assessment of composites** (*Invited Paper*), Kara J. Peters, North Carolina State Univ. (United States) [7982-09]

4:00 pm: **Noise propagation in a 3x3 optical demodulation scheme used for fiber Bragg grating interrogation** (*Invited Paper*), Michael D. Todd, Univ. of California, San Diego (United States) [7982-10]

4:30 pm: **Evaluation of the internal strains and stresses produced in a plate by propagating Lamb waves through the use of fibre optic sensors**, Graham J. Thursby, Brian Culshaw, Univ. of Strathclyde (United Kingdom) [7982-11]

4:50 pm: **Full-spectral interrogation of fiber Bragg grating sensors for damage identification**, Sean C. Webb, Kara J. Peters, Mohammed Zirky, North Carolina State Univ. (United States); Spencer L. Chadderdon, Tyrie Vella, Richard H. Selfridge, Stephen M. Schultz, Brigham Young Univ. (United States) [7982-12]

5:10 pm: **Multi-signal integrated optical fiber sensors based on ROTDR and FBG**, Jianping He, Zhi Zhou, Dalian Univ. of Technology (China); Minghua Huang, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) [7982-13]

5:30 pm: **Damage detection in FRP structures using fiber Bragg grating dynamic strain sensing systems**, Yan-Jin Zhu, Yinian Zhu, Northwestern Univ. (United States); Hui Li, Harbin Institute of Technology (China); Sridhar Krishnaswamy, Northwestern Univ. (United States) [7982-14]

Conference 7983

Concurrent Sessions

SESSION 3A

Room: Royal Palm V · Mon. 3:30 to 4:50 pm

NASA-based NDE/SHM Activities

Session Chairs: Adam Wroblewski, NASA Glenn Research Ctr.; Craig Smith, NASA Glenn Research Ctr.

3:30 pm: **Health monitoring of cracked rotor systems using external excitation techniques**, Adam Wroblewski, Cleveland State Univ. (United States) and NASA Glenn Research Ctr. (United States); Jerzy T. Sawicki, Alex Pesch, Cleveland State Univ. (United States) [7983-19]

3:50 pm: **Improved software algorithm development of self diagnostic accelerometer system**, Roger P. Tokars, Jr., John D. Lekki, NASA Glenn Research Ctr. (United States) [7983-20]

4:10 pm: **Detecting damage in ceramic matrix composites by electrical resistance**, Craig Smith, Ohio Aerospace Institute (United States) [7983-21]

4:30 pm: **Nondestructive evaluation techniques for the assessment of braided polymer composite materials subjected to accelerated aging conditions**, Richard E. Martin, Cleveland State Univ. (United States) [7983-22]

SESSION 4

**Room: Royal Palm V
Mon. 4:50 to 5:50 pm**

PNNL-based NDE in Homeland Security Applications

Session Chairs: Juan D. Valencia, Pacific Northwest National Lab.; Ryan M. Meyer, Pacific Northwest National Lab.

4:50 pm: **X-ray scan detection for cargo integrity**, Juan D. Valencia, Pacific Northwest National Lab. (United States) [7983-30]

5:10 pm: **A wireless sensor tag platform for container security and integrity**, Ivan Amaya, Pacific Northwest National Lab. (United States) [7983-31]

5:30 pm: **Application and assessment of ultrasonic inspection methods for flaw detection and characterization of manganese steel frogs**, Anthony D. Cinson, Aaron A. Diaz, Pacific Northwest National Lab. (United States) [7983-32]

SESSION 3B

Room: Sunset · Mon. 3:30 to 5:50 pm

NDE in Composites

Session Chairs: Aditi Chattopadhyay, Arizona State Univ.; Lingyu Yu, Univ. of South Carolina

3:30 pm: **Carbon nanotube yarns sensors for structural health monitoring of composites**, Haibo Zhao, Fuh-Gwo Yuan, North Carolina State Univ. (United States) [7983-23]

3:50 pm: **Interaction of surface waves induced by IDT sensors with flaws in fiberglass composite panels**, Jeong-Kwan Na, Edison Welding Institute (United States) [7983-24]

4:10 pm: **Non-invasive damage detection in composite beams using marker extraction and wavelets**, Yi-Zhe Song, Chris R. Bowen, Alicia H. Kim, Aydin Nassehi, Julian Padgett, Univ. of Bath (United Kingdom) [7983-25]

4:30 pm: **Structural health monitoring of woven composites under biaxial loading**, Masoud Yekani Fard, Yingtao Liu, Aditi Chattopadhyay, Arizona State Univ. (United States) [7983-26]

4:50 pm: **Coupled attenuation and multiscale damage model for composite structures**, Albert M. Moncada, Aditi Chattopadhyay, Arizona State Univ. (United States); Brett Bednarczyk, Steven M. Arnold, NASA Glenn Research Ctr. (United States) . . [7983-27]

5:10 pm: **Effect of fiber surface conditioning on the acoustic emission behaviour of steel fiber reinforced concrete**, Dimitra V. Soulioti, Elena Gatselou, Nektaria-Marianthi Barkoula, Alkiviades Paipetis, Theodore E. Matikas, Dimitrios G. Aggelis, Univ. of Ioannina (Greece) [7983-28]

5:30 pm: **Inspection for kissing bonds in composite materials using vibration reciprocity measurements**, Nathan D. Sharp, Noah Myrent, Douglas E. Adams, Purdue Univ. (United States) [7983-29]

Conference 7984

SESSION 3

**Room: Royal Palm I
Mon. 3:30 to 5:50 pm**

Guided Waves for Large Structure Monitoring: Pipe, Rail, Ship, etc.

Session Chairs: Francesco Lanza di Scalea, Univ. of California, San Diego; Hoon Sohn, KAIST (Korea, Republic of)

3:30 pm: **Time reversal data communications on pipes using guided elastic waves Part I: basic principles**, Yuanwei Jin, Univ. of Maryland Eastern Shore (United States); Deshuang Zhao, Univ. of Electronic Science and Technology of China (China); Yujie Ying, Carnegie Mellon Univ. (United States) . . . [7984-10]

3:50 pm: **Time reversal data communications on pipes using guided elastic waves Part II: experimental studies**, Yuanwei Jin, Univ. of Maryland Eastern Shore (United States); Yujie Ying, Carnegie Mellon Univ. (United States); Deshuang Zhao, Univ. of Electronic Science and Technology of China (China) [7984-11]

4:10 pm: **Simulation and control system of a power harvesting device for railroad track health monitoring**, Kyle Phillips, Carl A. Nelson, Abolfazl Pourghodrat, Univ. of Nebraska-Lincoln (United States) [7984-12]

4:30 pm: **Guided ultrasonic waves for the health monitoring of existing sign support structures**, Xuan Zhu, Piervincenzo Rizzo, Univ. of Pittsburgh (United States) [7984-13]

4:50 pm: **A comparison of impedance and Lamb wave SHM techniques for monitoring structural integrity of and through welded joints**, Benjamin L. Grisso, Naval Surface Warfare Ctr. Carderock Div. (United States); Ibrahim N. Tansel, Gurjivan Singh, Gurjashan Singh, Florida International Univ. (United States); Liming W. Salvino, Naval Surface Warfare Ctr. Carderock Div. (United States) . [7984-14]

5:10 pm: **Torsional guided waves for monitoring cylindrical structures using piezoelectric macro-fiber composite**, Lin Cui, Yu Liu, Chee Kiong Soh, Nanyang Technological Univ. (Singapore) [7984-15]

5:30 pm: **Pipeline health monitoring using a multi-scale actuated sensing system**, Chang-Gil Lee, Seunhee Park, Sungkyunkwan Univ. (Korea, Republic of) [7984-16]

Conference 7975

Conference 7976

Conference 7977

Conference 7978

Conference 7979

Tuesday Announcements, Awards, Funding and Plenary Presentation

8:00 to 8:05 am

ASME Gary Anderson Early Achievement Award
Smart Structures Product Implementation Award

8:05 to 8:20 am

AFRL Funding Agency Talk: Future Research Needs and Challenges in NDE/in situ NDE

Eric Lindgren, Air Force Research Lab. (United States)



Plenary Presentation · 8:20 to 9:05 am

Structural Magnetostrictive Alloys: An Introduction to a New Class of Transducer Materials

Alison Flatau, Univ. of Maryland, College Park (United States)

SESSION 4

Room: Royal Palm VI
Mon. 9:10 to 10:40 am

Optics

Session Chair: **H. Donald Wolpert**, Bio-Optics

9:10 am: **Structural color mixing through vertically stacked heterogeneous photonic bandgap structures using magnetically tunable and photochemically fixable photonic crystal** (*Invited Paper*), Hyoki Kim, Howon Lee, Junhoi Kim, EunGeun Kim, Jiyun Kim, Sunghoon Kwon, Seoul National Univ. (Korea, Republic of). [7975-16]

9:40 am: **The optics of spider orb webs**, Deb M. Kane, Gregory R. Staib, Nishen Naidoo, Douglas J. Little, Macquarie Univ. (Australia). [7975-17]

10:00 am: **Prismatic bioinspired compound lenses for solar cells**, Francesco Chiadini, Univ. degli Studi di Salerno (Italy); Vincenzo Fiumara, Univ. degli Studi della Basilicata (Italy); Antonio Scaglione, Univ. degli Studi di Salerno (Italy); Akhlesh Lakhtakia, The Pennsylvania State Univ. (United States). . . [7975-18]

10:20 am: **Self-assembled biomimetic antireflection coatings for highly efficient photovoltaics**, Peng Jiang, Univ. of Florida (United States) [7975-19]

Coffee Break. 10:40 to 11:00 am

SESSION 4

Room: Pacific Salon I-III
Tues. 9:10 to 11:40 am

Energy Harvesting Special Session: Part II

Session Chairs: **Thomas G. Sugar**, Arizona State Univ.; **Zhigang Suo**, Harvard Univ.

9:10 am: **Maximal energy that can be converted by a dielectric elastomer generator** (*Invited Paper*), Zhigang Suo, Harvard Univ. (United States)[7976-08]

9:50 am: **Conducting polymers, carbon nanotubes, and other low voltage ion based actuators as mechanical energy harvesters**, John D. W. Madden, The Univ. of British Columbia (Canada); Tisaphern Mirfakhrai, Stanford Univ. (United States); Tina Shoa, The Univ. of British Columbia (Canada). . . [7976-09]

Coffee Break. 10:10 to 10:40 am

SESSION 4

Room: Sunrise
Tues. 9:10 am to 12:00 pm

Energy Harvesting and Scavenging I: Piezoelectric and Synchronization

9:10 am: **A study of several vortex-induced vibration techniques for piezoelectric wind energy harvesting**, Vishak Sivasadas, Adam M. Wickenheiser, The George Washington Univ. (United States) [7977-14]

9:30 am: **Use of a piezocomposite generating element in harvesting wind energy in urban regions**, Cam Minh Tri Tien, Hung Truyen Luong, Nam-Seo Goo, Konkuk Univ. (Korea, Republic of) [7977-15]

9:50 am: **Piezoelectric tire based power generation**, Noaman Makki, Univ. of Ontario Institute of Technology (Canada) [7977-17]

Coffee Break. 10:10 to 10:40 am

SESSION 4

Room: Royal Palm II
Tues. 9:10 to 10:10 am

Modeling of Piezoelectric Ceramics

Session Chairs: **Marc Kamlah**, Karlsruhe Institut für Technologie (Germany); **Kwang J. Kim**, Univ. of Nevada, Reno

9:10 am: **Adaptive control design for hysteretic smart systems**, Jerry McMahan, Ralph C. Smith, North Carolina State Univ. (United States) [7978-32]

9:30 am: **Some new aspects of electroelastic tractions at crack faces in piezoelectrics**, Andreas Ricoeur, Roman Gellmann, Univ. Kassel (Germany) [7978-33]

9:50 am: **Effects of polarization switching and dielectric breakdown on the mode I energy release rate in rectangular piezoelectric ceramics with a single-edge crack** (*Presentation Only*), Takuya Matsuda, Yasuhide Shindo, Fumio Narita, Tohoku Univ. (Japan) [7978-34]

Coffee Break. 10:10 to 10:40 am

SESSION 4

Room: Towne
Tues. 9:10 to 10:10 am

Active Materials in Wind Applications I

Session Chairs: **Kevin Farinholt**, Los Alamos National Lab.; **Gyuhae Park**, Los Alamos National Lab.

9:10 am: **An evaluation of sensing technologies in a wind turbine blade**, Mark A. Rumsey, Sandia National Labs. (United States) [7979-16]

9:30 am: **A shape adaptive airfoil for a wind turbine blade**, Stephen Daynes, Paul M. Weaver, Univ. of Bristol (United Kingdom) [7979-17]

9:50 am: **Metallic wear debris sensors: promising developments in failure prevention for wind turbine gearsets**, Jack Poley, Kittiwake Americas (United States) [7979-18]

Coffee Break. 10:10 to 10:40 am

SPIE Smart Structures/NDE is a leading conference on green photonics technology such as energy harvesting, non-destructive evaluation, wind energy, and bio-inspired engineering.

Innovative ways to help our planet.



Tuesday Announcements, Awards, Funding and Plenary Presentation

8:00 to 8:05 am
ASME Gary Anderson Early Achievement Award
Smart Structures Product Implementation Award

8:05 to 8:20 am
AFRL Funding Agency Talk: Future Research Needs and Challenges in NDE/in situ NDE

Eric Lindgren, Air Force Research Lab. (United States)



Plenary Presentation · 8:20 to 9:05 am
Structural Magnetostrictive Alloys: An Introduction to a New Class of Transducer Materials

Alison Flatau, Univ. of Maryland, College Park (United States)

Concurrent Sessions

SESSION 4a

Room: Pacific Salon IV-V
Tues. 9:10 to 10:10 am

MEMS and Nanotechnology I

Session Chairs: **Hui Li**, Harbin Institute of Technology (China); **Ming L. Wang**, Northeastern Univ.

9:10 am: **New materials for isolators in civil infrastructures: stainless steel-metallic pseudo rubber and SMA-metallic pseudo rubber**, Chenxi Mao, China Earthquake Administration (China); Suchao Li, Harbin Institute of Technology (China); Yagebai Zhao, Northeast Forestry Univ. (China); Hui Li, Harbin Institute of Technology (China). . . . [7981-24]

9:30 am: **Design of the thermal insulating test system for doors and windows of buildings**, Yan Yu, Jinqing Qi, Hao Wu, Jinping Ou, Dalian Univ. of Technology (China) [7981-25]

9:50 am: **Experiments on the focusing and use of acoustic energy to enhance the rate of polymer healing**, Alexander J. Cushman, Brian C. Fehrman, Umesh A. Korde, South Dakota School of Mines and Technology (United States) [7981-26]

Coffee Break 10:10 to 10:40 am

SESSION 4b

Room: Pacific Salon VI-VII
Tues. 9:10 to 10:10 am

Impact Damage Detection

Session Chairs: **Tribikram Kundu**, The Univ. of Arizona; **Francesco Lanza di Scalea**, Univ. of California, San Diego

9:10 am: **Impact damage detection in composites using an active nonlinear acousto-ultrasonic piezoceramic sensor**, Nikolaos A. Chrysochoidis, Dimitris A. Saravanos, Univ. of Patras (Greece) . . . [7981-27]

9:30 am: **Detecting the point of impact on a cylindrical surface by the acoustic emission technique**, Talieh Hajzargarbashi, Tribikram Kundu, The Univ. of Arizona (United States) [7981-28]

9:50 am: **Automated detection and quantification of impact damages in composite structures using pulsed thermography**, Arun Manohar, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) [7981-29]

Coffee Break 10:10 to 10:40 am

SESSION 4

Room: Royal Palm IV
Tues. 9:10 to 10:20 am

Sensors for SHM I

Session Chair: **Kerop D. Janoyan**, Clarkson Univ.

9:10 am: **Twenty five years of structural health monitoring using fiber optic sensors** (*Invited Paper*), Eric Udd, Columbia Gorge Research (United States) [7982-15]

9:40 am: **Condition assessment of a bridge superstructure using diagnostic performance indicators**, Michael V. Gangone, Clarkson Univ. (United States); Matthew J. Whelan, The Univ. of North Carolina at Charlotte (United States); Kerop D. Janoyan, Clarkson Univ. (United States) [7982-16]

10:00 am: **Printed resistive strain sensors for monitoring of light-weight structures**, Jacqueline Rausch, Larisa Salun, Stefan Griesheimer, Mesut Ibis, Roland Werthschützky, Technische Univ. Darmstadt (Germany) [7982-17]

Coffee Break 10:20 to 10:50 am

Concurrent Sessions

SESSION 5A

Room: Royal Palm V
Tues. 9:10 am to 12:10 pm

NIST Technology Innovation Program on Civil Infrastructure Critical National Need: Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems I

Session Chairs: **H. Felix Wu**, National Institute of Standards and Technology; **Maria Q. Feng**, Univ. of California, Irvine

9:10 am: **Advanced sensing technologies and advanced repair materials for the infrastructure: research funding**, Thomas Wiggins, H. Felix Wu, National Institute of Standards and Technology (United States) [7983-33]

9:30 am: **Intelligent renewal of aging civil infrastructure** (*Invited Paper*), Maria Q. Feng, Univ. of California, Irvine (United States) [7983-34]

10:00 am: **Long-term assessment of autonomous wireless structural health monitoring system at the new Carqueinez Suspension Bridge**, Masahiro Kurata, Jerome P. Lynch, Univ. of Michigan (United States); Gwendolyn W. van der Linden, Vince Jacob, SC Solutions, Inc. (United States); Yilan Zhang, Univ. of Michigan (United States); Edward J. Thometz, Patrick K. Hipley, Li-Hong Sheng, California Dept. of Transportation (United States) [7983-35]

Coffee Break 10:20 to 10:50 am

SESSION 5B

Room: Sunset
Tues. 9:10 am to 12:00 pm

Fiber Optics Sensors Technologies

Session Chairs: **Fu-Kuo Chang**, Stanford Univ.; **Shenen Chen**, The Univ. of North Carolina at Charlotte

9:10 am: **A quasi-distributed optical fiber sensor network for large strain and high-temperature measurements of structures**, Ying Huang, Zhi Zhou, Yinan Zhang, Hai Xiao, Genda Chen, Missouri Univ. of Science and Technology (United States) [7983-40]

9:30 am: **Highly dense strain measurement of concrete retrofitted with smart fabric**, Michio Imai, Hajime Suzuki, Kajima Technical Research Institute (Japan) [7983-41]

9:50 am: **Stability and reliability of fiber optic measurement systems: basic conditions for successful long term structural health monitoring**, Yaowen Yang, Pravin S. Muley, Wai Lun Sham, Nanyang Technological Univ. (Singapore) [7983-42]

Coffee Break 10:10 to 10:40 am

SESSION 4

Room: Royal Palm I
Tues. 9:10 to 10:10 am

Guided Waves with Distributed Sensors I

Session Chairs: **Hoon Sohn**, KAIST (Korea, Republic of); **Francesco Lanza di Scalea**, Univ. of California, San Diego

9:10 am: **Multi-mode and multi-frequency guided wave imaging via chirp excitations**, Jennifer E. Michaels, Sang Jun Lee, James S. Hall, Thomas E. Michaels, Georgia Institute of Technology (United States) [7984-17]

9:30 am: **Chirp generated acoustic wavefield images**, Thomas E. Michaels, Jennifer E. Michaels, Sang Jun Lee, Xin Chen, Georgia Institute of Technology (United States) [7984-18]

9:50 am: **Defect detection using time reversal imaging technique**, Shuntao Liu, Fuh-Gwo Yuan, North Carolina State Univ. (United States) [7984-19]

Coffee Break 10:10 to 10:40 am

Keynote Session

Session Chair: **Sang H. Choi**, NASA Langley Research Ctr.

9:10 am: **Design and performance evaluation of sensors and actuators for advanced optical systems** (*Keynote Presentation*), Natalie Clark, NASA Langley Research Ctr. (United States). . . [7980-14]

9:50 am: **Optical performance of circular Fresnel spectrometer**, Yeonjoon Park, Sang H. Choi, Hyun-Jung Kim, NASA Langley Research Ctr. (United States); Uhn Lee M.D., Gachon Univ. Gil Medical Ctr. (Korea, Republic of); Kunik Lee, Turner-Fairbank Highway Research Ctr. (United States); Glen C. King, NASA Langley Research Ctr. (United States) [7980-15]

Coffee Break. 10:10 to 10:30 am

Tuesday · 8 March

Conference 7975	Conference 7976	Conference 7977	Conference 7978	Conference 7979	Conference 7980
<p>SESSION 5</p> <p>Room: Royal Palm VI Mon. 11:00 am to 12:40 pm</p> <p>Flight <i>Session Chair: Sunghoon Kwon, Seoul National Univ. (Korea, Republic of)</i></p> <p>11:00 am: Take-off of a beetle-mimicking flapping-wing system, Quoc-Viet Nguyen, Hoang-Vu Phan, Hoon Cheol Park, Nam-Seo Goo, Doyoung Byun, Konkuk Univ. (Korea, Republic of) [7975-20]</p> <p>11:20 am: Closed loop heading control in the Tobacco Hawkmoth, Manduca sexta, Michael W. Shafer, Cornell Univ. (United States); Rashi Tiwari, The Boyce Thompson Institute for Plant Research (United States) and Cornell Univ. (United States); Ephrahim Garcia, Cornell Univ. (United States) [7975-21]</p> <p>11:40 am: Two-dimensional localized flow control using distributed, biomimetic feather structures: a comparative study, Christopher J. Blower, Adam M. Wickenheiser, The George Washington Univ. (United States) [7975-22]</p> <p>12:00 pm: Estimation of force generated by a beetle-mimicking flapping-wing system by using the blade element theory, Quang-Tri Truong, Quoc Viet Nguyen, Hoon Cheol Park, Doyoung Byun, Nam Seo Goo, Konkuk Univ. (Korea, Republic of) [7975-23]</p> <p>12:20 pm: The barn owl wing: An inspiration for silent flight in the avian industry?, Thomas Bachmann, Technische Univ. Darmstadt (Germany); Hermann Wagner, Georg Mühlenbruch, RWTH Aachen (Germany) [7975-24]</p> <p>Lunch/Exhibition Break . . 12:40 to 2:00 pm</p>	<p>10:40 am: Realizing the potential of dielectric elastomer generator systems, Thomas G. McKay, Benjamin M. O'Brien, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) [7976-10]</p> <p>11:00 am: Regulation of self-priming dielectric elastomer generators, Ho Cheong A. Lo, Thomas G. McKay, Benjamin M. O'Brien, Auckland Bioengineering Institute (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, Auckland Bioengineering Institute (New Zealand) [7976-11]</p> <p>11:20 am: Battery modeling for energy harvesting system, Rashi Tiwari, Ephrahim Garcia, Cornell Univ. (United States) [7976-12]</p> <p>SESSION 5</p> <p>Room: Pacific Salon I-III Tues. 11:40 am to 2:30 pm</p> <p>European Scientific Network for Artificial Muscle (ESNAM) Special Session: Energy Harvesting <i>Session Chairs: Hans-Erik Kiil, Danfos Power A/S (Denmark); Frederic Vidal, Univ. de Cergy-Pontoise (France)</i></p> <p>11:40 am: Electromechanical charge pumps based on dielectric elastomer membranes: maximal energy of conversion for energy harvesting applications, Christoph Keplinger, Johannes Kepler Univ. Linz (Austria) and Harvard Univ. (United States); Richard Baumgartner, Johannes Kepler Univ. Linz (Austria); Tiefeng Li, Harvard School of Engineering and Applied Sciences (United States); Martin Kaltenbrunner, Reinhard Schwödäuer, Johannes Kepler Univ. Linz (Austria); Zhigang Suo, Harvard Univ. (United States); Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria) [7976-13]</p> <p>12:00 pm: Inflation of dielectric elastomer membranes for energy harvesting: prestretch, rupture, dielectric breakdown, and the electromechanical instability, Richard Baumgartner, Johannes Kepler Univ. Linz (Austria); Christoph Keplinger, Johannes Kepler Univ. Linz (Austria) and Harvard Univ. (United States); Tiefeng Li, Harvard School of Engineering and Applied Sciences (United States); Martin Kaltenbrunner, Reinhard Schwödäuer, Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria); Zhigang Suo, Harvard Univ. (United States) [7976-14]</p> <p>Lunch/Exhibition Break 12:20 to 1:30 pm</p>	<p>10:40 am: Applicability of synchronized charge extraction technique for piezoelectric energy harvesting, Lihua Tang, Yaowen Yang, Nanyang Technological Univ. (Singapore); Yen Kheng Tan, Sanjib Kumar Panda, National Univ. of Singapore (Singapore) [7977-16]</p> <p>11:00 am: Multi-source energy harvester power management, Alexander D. Schlichting, Rashi Tiwari, Ephrahim Garcia, Cornell Univ. (United States) [7977-18]</p> <p>11:20 am: Array of piezoelectric energy harvesters, I-Ching Lien, Yi-Chung Shu, National Taiwan Univ. (Taiwan) . . [7977-19]</p> <p>11:40 am: An improved self-powered velocity control synchronized switching piezoelectric energy harvesting device, Yuyin Chen, National Taiwan Univ. (Taiwan); Dejan Vasic, François Costa, Ecole Normale Supérieure de Cachan (France); Wen-Jong Wu, National Taiwan Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan) and Institute for Information Industry (Taiwan) [7977-20]</p> <p>Lunch/Exhibition Break . . 12:00 to 1:30 pm</p>	<p>SESSION 5</p> <p>Room: Royal Palm II Tues. 10:40 to 11:40 am</p> <p>Carbon Nanotube-based Multifunctional Materials <i>Session Chairs: Jonghwan Suhr, Univ. of Nevada, Reno; Stefan S. Seelcke, Saarland Univ. (Germany)</i></p> <p>10:40 am: Correlation between the thermal and mechanical responses and the percolation threshold in an epoxy SMP/nanotube system, Maria del Mar Salinas-Ruiz, Marcus P. J. Walls-Bruck, Ian P. Bond, Univ. of Bristol (United Kingdom) [7978-35]</p> <p>11:00 am: Fundamental investigations of carbon nanotubes working as actuators, Sebastian M. Geier, Thorsten Mahrholz, Johannes Riemenschneider, Peter Wierach, Michael Sinapius, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [7978-36]</p> <p>11:20 am: Damping of multi-scale fiber reinforced polymer-based composites, Huigang Xiao, Hui Li, Qichao Cui, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) [7978-37]</p> <p>Lunch/Exhibition Break 11:40 am to 1:20 pm</p>	<p>SESSION 5</p> <p>Room: Towne Tues. 10:40 to 11:40 am</p> <p>Active Materials in Wind Applications II <i>Session Chair: Christopher Niezrecki, Univ. of Massachusetts Lowell</i></p> <p>10:40 am: Structural health monitoring of wind turbine blades using fiber optic Bragg grating sensors, Alan Turner, Tom W. Graver, Micron Optics, Inc. (United States); Mark A. Rumsey, Jonathan R. White, Sandia National Labs. (United States); Alexis Mendez, MCH Engineering LLC (United States) [7979-19]</p> <p>11:00 am: Piezoelectric active sensing techniques for damage detection on wind turbine blades, Gyuhae Park, Kevin M. Farinholt, Stuart G. Taylor, Charles R. Farrar, Los Alamos National Lab. (United States) [7979-20]</p> <p>11:20 am: Full field inspection of a wind turbine blade using 3D digital image correlation, Bruce LeBlanc, Christopher Niezrecki, Univ. of Massachusetts Lowell (United States); Scott Hughes, National Renewable Energy Lab. (United States); Peter Avitabile, Julie Chen, James A. Sherwood, Univ. of Massachusetts Lowell (United States) [7979-22]</p> <p>Conference End.</p>	<p>SESSION 7</p> <p>Room: Royal Palm III Tues. 10:30 to 11:50 am</p> <p>Nano Devices and Sensors II <i>Session Chair: Christina Brantley, U.S. Army Research, Development and Engineering Command</i></p> <p>10:30 am: Paper transistor made with regenerated cellulose and covalently bonded single-walled carbon nanotubes, Sungryul Yun, Hyun-U Ko, Inha Univ. (Korea, Republic of); Joo-Hyung Kim, Byungwook Lim, Chosun Univ. (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-17]</p> <p>11:10 am: 2-2 mode piezocomposites made of PMN-PT single crystals for high-frequency medical ultrasonic transducers, Hoseop Shin, Yongrae Roh, Kyungpook National Univ. (Korea, Republic of) [7980-18]</p> <p>11:30 am: Investigation of dipole antenna based sensor for passive wireless structural health monitoring, Sangdong Jang, Dong-Gu Kim, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-19]</p> <p>Lunch/Exhibition Break . . 11:50 to 1:40 pm</p>

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Conference 7981

Concurrent Sessions

SESSION 5a

Room: Pacific Salon IV-V
Tues. 10:40 am to 12:00 pm

MEMS and Nanotechnology II

Session Chairs: **Jian Zhang**, Drexel Univ.; **Steven D. Glaser**, Univ. of California, Berkeley

10:40 am: **Analysis of a micro piezoelectric unimorph power generator operating at d₃₃ mode**, Haifeng Zhang, Univ. of North Texas (United States) [7981-30]

11:00 am: **Evaluation of a micro-turbulence sensor fabricated by lithography**, Junliang Tao, Xiong Yu, Jim Berrila, Case Western Reserve Univ. (United States) [7981-31]

11:20 am: **Laboratory validation of MEMS-based sensors for post-earthquake damage assessment**, Matteo Pozzi, Daniele Zonta, Univ. degli Studi di Trento (Italy); Angelos Armditis, National Technical Univ. of Athens (Greece); Dimitris Bairaktaris, Bairaktaris and Associates Ltd. (Greece); Matthaios Bimpas, National Technical Univ. of Athens (Greece); Mikael Colin, MEMSCAP (France); Stamatiia Frondistou-Yannas, RISA GmbH (Germany); Vasilis Kalidromitis, TECNIC SpA (Italy); Nicolas Saillen, Thermo Fisher Scientific (Netherlands); Juan Santana, Interuniversity MicroElectronics Ctr. (Netherlands); Yorgo Stratakos, Advanced Microwave Systems, Ltd. (Greece); Tom Torf, IMEC (Belgium); Dumitru Ulteru, SITEX 45 SRL (Romania) [7981-32]

11:40 am: **On electrostatically actuated NEMS/MEMS circular plates**, Dumitru Caruntu, The Univ. of Texas-Pan American (United States) [7981-33]

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

SESSION 5b

Room: Pacific Salon VI-VII
Tues. 10:40 am to 12:00 pm

Fatigue Assement in Metallic Structures

Session Chairs: **Ser-Tong Quek**, National Univ. of Singapore (Singapore); **Xiaoyan Han**, Wayne State Univ.

10:40 am: **Detection of cracks on a plate by piezoelectric interdigital transducers**, Yongrae Roh, Junho Kim, Kyungpook National Univ. (Korea, Republic of) [7981-34]

11:00 am: **Measurement of fatigue damage progression in aluminum alloy lug joints using laser ultrasonic methods**, Lindsey Lindamood, James B. Spicer, Caroline McEnnis, The Johns Hopkins Univ. (United States) [7981-35]

11:20 am: **UCSD/FRA non-contact ultrasonic guided-wave system for rail inspection: an update**, Stefano Coccia, Robert Phillips, Univ. of California, San Diego (United States); Ivan Bartoli, Drexel Univ. (United States); Salvatore Salamone, Univ. at Buffalo (United States); Francesco Lanza di Scalea, Univ. of California, San Diego (United States); Mahmood Fateh, Gary Carr, Federal Railroad Administration (United States) [7981-36]

11:40 am: **Structural condition assessment based on factor analysis and sequential probability ratio test**, Zhihua Min, Tongji Univ. (China) [7981-37]

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

Conference 7982

SESSION 5

Room: Royal Palm IV
Tues. 10:50 am to 12:20 pm

Sensors for SHM II

Session Chair: **Eric Udd**, Columbia Gorge Research

10:50 am: **Overview of applications and industrial trends of fiber optic sensing in structural health monitoring** (*Invited Paper*), Alexis Mendez, MCH Engineering LLC (United States) [7982-18]

11:20 am: **Robust diagnostics for Bayesian compressive sensing with applications to structural health monitoring**, Yong Huang, Harbin Institute of Technology (China); James L. Beck, California Institute of Technology (United States); Hui Li, Harbin Institute of Technology (China); Stephen Wu, California Institute of Technology (United States) [7982-19]

11:40 am: **Monitoring dispersion, strain, and damage in multi-phase composite materials using electrical resistance methods**, Alkiviades Paipetis, Sotiris Grammatikos, Georgios Gkikas, Univ. of Ioannina (Greece) [7982-20]

Lunch/Exhibition Break .. 12:00 to 1:50 pm

Conference 7983

SESSION 5A continued

10:50 am: **Networked computing in wireless sensor networks for structural health monitoring**, Apoorva Jindal, Mingyan Liu, Univ. of Michigan (United States) [7983-36]

11:10 am: **Energy harvesting of radio frequency and vibration energy to enable wireless sensor monitoring of civil infrastructure**, Tzeno Galchev, James McCullagh, Rebecca L. Peterson, Khalil Najafi, Amir Mortazawi, Univ. of Michigan (United States) [7983-37]

11:30 am: **Nondestructive corrosion monitoring using miniaturized, planar carbon nanotube-based thin films**, Yang Liu, Univ. of Michigan (United States) [7983-38]

11:50 am: **Development of self-sensing carbon black ECC**, Victor C. Li, Jerome P. Lynch, Mo Li, Matthew Mockaitis, Univ. of Michigan (United States) [7983-39]

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

SESSION 5B continued

10:40 am: **Nanofilm-coated long-period grating refractive index sensors for corrosion detection in structural health monitoring**, Shijie Zheng, Yinian Zhu, Sridhar Krishnaswamy, Northwestern Univ. (United States) [7983-43]

11:00 am: **Condition monitoring and life-cycle cost analysis of stay cable by embedded OFBG sensors**, Chengming Lan, China Univ. of Mining and Technology (China) [7983-44]

11:20 am: **Stress monitoring in FRP externally wrapped wood cylinders subjected to freeze-thaw cycles with FBG sensors**, Guijun Xian, Hui Li, Bin Hong, Harbin Institute of Technology (China) [7983-45]

11:40 am: **Integrating single-point vibrometer and full-field electronic speckle pattern interferometer to evaluate micro-speaker performance**, Wen-Chi Chang, Yu-Chi Chen, Chih-Jen Chien, An-Bang Wang, National Taiwan Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan) and Institute for Information Industry (Taiwan) . . . [7983-46]

Lunch/Exhibition Break .. 12:00 to 1:40 pm

Conference 7984

SESSION 5

Room: Royal Palm I
Tues. 10:40 am to 12:00 pm
Nonlinear Acoustics for SHM

Session Chairs: **Sridhar Krishnaswamy**, Northwestern Univ.; **Andrei N. Zagrai**, New Mexico Institute of Mining and Technology

10:40 am: **Monitoring initial material damage of nuclear reactor steel using second harmonic generation**, Kathryn H. Matlack, Jin-Yeon Kim, Laurence J. Jacobs, Georgia Institute of Technology (United States); Jianmin Qu, Northwestern Univ. (United States) [7984-20]

11:00 am: **Integrated material state awareness system with self-learning symbiotic diagnostic algorithms and models**, Xinlin P. Qing, Acellent Technologies, Inc. (United States); Fuh-Gwo Yuan, North Carolina State Univ. (United States); Sourav Banerjee, Shawn J. Beard, Acellent Technologies, Inc. (United States) [7984-21]

11:20 am: **Diagnosis of space structures using embedded sensors and elastic waves**, Andrew Murray, Andrei N. Zagrai, New Mexico Institute of Mining and Technology (United States) [7984-22]

11:40 am: **Effects of experimental variation on nonlinear measurements**, Anthony J. Croxford, Simon Neild, Univ. of Bristol (United Kingdom) [7984-23]

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



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Conference 7975	Conference 7976	Conference 7977	Conference 7978	Conference 7980
<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm VI Tues. 2:00 to 3:20 pm</p> <p style="text-align: center;">Fabrication and Applications I <i>Session Chair: Mehmet Sarikaya, Univ. of Washington</i></p> <p>2:00 pm: Engineered biomimicry: polymeric replication of surface features found on insects, Drew P. Pulsifer, Akhlesh Lakhtakia, The Pennsylvania State Univ. (United States); Raul J. Martín-Palma, Univ. Autónoma de Madrid (Spain); Carlo G. Pantano, The Pennsylvania State Univ. (United States) [7975-25]</p> <p>2:20 pm: BOWOOSS: bionic optimized wood shells with sustainability, Göran Pohl, Hochschule für Technik und Wirtschaft des Saarlandes (Germany) [7975-26]</p> <p>2:40 pm: Modeling and optimization of IPMC actuator for autonomous jellyfish vehicle (AJV), Keyur Joshi, Virginia Polytechnic Institute and State Univ. (United States); Barbar J. Akle, Lebanese American Univ. (Lebanon) and Virginia Polytechnic Institute and State Univ. (United States); Donald J. Leo, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States) [7975-27]</p> <p>3:00 pm: Bio-inspired hovering and locomotion via wirelessly powered ionic polymer metal composites, Karl Abdelnour, Polytechnic Institute of NYU (United States); Adam Stinchcombe, New York Univ. (United States); Maurizio Porfiri, Polytechnic Institute of NYU (United States); Jun Zhang, Stephen Childress, New York Univ. (United States) [7975-28]</p> <p>Coffee Break. 3:20 to 3:50 pm</p>	<p style="text-align: center;">SESSION 5 continued</p> <p>1:30 pm: Dielectric elastomer materials for actuators and energy harvesting, Dorina M. Opris, Martin Molberg, Frank A. Nüesch, Christiane I. Löwe, Christian Walder, Beatrice Fischer, EMPA (Switzerland); Daniel Crespy, Max-Planck-Institut für Polymerforschung (Germany) [7976-15]</p> <p>1:50 pm: Evaluation and optimization of energy harvesting cycles using dielectric elastomers, Christian Graf, Juergen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) [7976-16]</p> <p>2:10 pm: Scaleable design of DEAP for energy harvesting utilizing PolyPower, Hans-Erik Kiil, Mohamed Benslimane, Michael J. Tryson, Jakob Oubak, Danfoss PolyPower A/S (Denmark) [7976-17]</p> <p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Pacific Salon I-III Tues. 2:30 to 6:10 pm</p> <p style="text-align: center;">ESNAM Special Session: Materials and Devices I</p> <p><i>Session Chairs: Peter Lotz, Technische Univ. Darmstadt (Germany); Guggi Kofod, Univ. Potsdam (Germany); Karl Kruusamäe, Univ. of Tartu (Estonia)</i></p> <p>2:30 pm: Molecular level materials design for improvements of actuation properties of dielectric elastomer actuators (Invited Paper), Guggi Kofod, Hristyan Stoyanov, Matthias Kolosche, Sebastian Risse, Hülya Ragusch, Denis N. McCarthy, Dmitry Rychkov, Mario Dansachmüller, Remi Waché, Univ. Potsdam (Germany) [7976-18]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Sunrise Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Energy Harvesting and Scavenging II: Piezoelectric and Magnetic Systems</p> <p>1:30 pm: Piezoelectric energy harvester under parquet floor, Enrico Bischur, Norbert Schwesinger, Technische Univ. München (Germany) ... [7977-21]</p> <p>1:50 pm: Analysis of magnetopiezoelectric energy harvesters under random excitations: an equivalent linearization approach, Faruque Ali, Sondipon Adhikari, Michael I. Friswell, Swansea Univ. (United Kingdom) [7977-22]</p> <p>2:10 pm: Design of linear electromagnetic transducer with both axial and radial magnets for vibration energy harvesting, Lei Zuo, Stony Brook Univ. (United States) [7977-23]</p> <p>2:30 pm: Design of electromagnetic energy harvesters for large-scale structural vibration applications, Jeffrey T. Scruggs, Ian L. Cassidy, Duke Univ. (United States); Sam Behrens, Commonwealth Scientific and Industrial Research Organisation (Australia) [7977-24]</p> <p>2:50 pm: Experimental implementation of a cantilevered piezoelectric energy harvester with a dynamic magnifier, Amr M. Baz, Univ. of Maryland, College Park (United States); Mustafa H. Arafa, The American Univ. in Cairo (Egypt); Abdelaziz Aladwani, Univ. of Maryland, College Park (United States); Osama J. Aldraihem, King Saud Univ. (Saudi Arabia) [7977-25]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm II Tues. 1:20 to 3:00 pm</p> <p style="text-align: center;">Nanocomposites</p> <p><i>Session Chairs: Hani E. Naguib, Univ. of Toronto (Canada); Zubeida Ounaies, The Pennsylvania State Univ.</i></p> <p>1:20 pm: Strain dependent visco-elastic response of CNFs reinforced epoxy composites, Joshua Varischetti, Jae-Soon Jang, Jonghwan Suhr, Univ. of Nevada, Reno (United States) and Univ. of Delaware (United States) [7978-38]</p> <p>1:40 pm: Study of the graphene/nanofiber nanopaper composite, Zhichun Zhang, Harbin Institute of Technology (China); Chunxia Wu, Haibao Lu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (United States) [7978-39]</p> <p>2:00 pm: Improved electromechanical property of nanocomposites with aligned PZT nanowires, Haixiong Tang, Yirong Lin, Henry A. Sodano, Arizona State Univ. (United States) [7978-40]</p> <p>2:20 pm: Solid and porous melt blended polylactide-chitin composites, Reza Rizvi, Brendan Cochrane, Hani E. Naguib, Univ. of Toronto (Canada); Patrick Lee, The Dow Chemical Co. (United States) [7978-41]</p> <p>2:40 pm: Spherically shaped micron-size particles reinforced PC and PMMA composites for improving energy absorption capability, Hyung-ick Kim, Univ. of Delaware (United States); Eung-Chun Kang, Sauer-Danfoss-Daikin Ltd. (Korea, Republic of); Jae-Soon Jang, Jonghwan Suhr, Univ. of Delaware (United States) [7978-42]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 8</p> <p style="text-align: center;">Room: Royal Palm III Tues. 1:40 to 3:00 pm</p> <p style="text-align: center;">Smart Electronics</p> <p><i>Session Chair: Prashanth S. Kumar, Univ. of Arkansas</i></p> <p>1:40 pm: A new architecture for designing noise-tolerant digital circuits, Jeremy M. Lakes, Samuel C. Lee, The Univ. of Oklahoma (United States) [7980-20]</p> <p>2:00 pm: Design of wireless electrocardiography measurement system with an algorithm to remove muscle noise, Hyeokjun Kwon, Sechang Oh, Prashanth S. Kumar, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-21]</p> <p>2:20 pm: Probabilistic analysis and simulation of 2D 2-dot quantum-dot cellular automata logic circuits, Samuel C. Lee, Loyd R. Hook IV, The Univ. of Oklahoma (United States) [7980-22]</p> <p>2:40 pm: Remotely driven electro-active paper actuator by modulated microwaves, Sang Yeol Yang, Suresha K. Mahadeva, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-23]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>



Tuesday · 8 March

Conference 7981	Conference 7982	Conference 7983	Conference 7984
<p style="text-align: center;">Concurrent Sessions</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 6a</p> <p>Room: Pacific Salon IV-V Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Nanostructures for Structuring</p> <p><i>Session Chairs: Hong Susan Zhou</i>, Worcester Polytechnic Institute; <i>Fuh-Gwo Yuan</i>, North Carolina State Univ.</p> <p>1:30 pm: Ultrasensitive low-power multifunctional spintronic nanowire sensors for magnetic field, pressure, and strain sensing, Jayasimha Atulasimha, Supriyo Bandyopadhyay, Virginia Commonwealth Univ. (United States) [7981-38]</p> <p>1:50 pm: On carbon nanotube resonators, Dumitru Caruntu, The Univ. of Texas-Pan American (United States) [7981-39]</p> <p>2:10 pm: Graphene-based ultrasensitive nanostructures enabled by morphologic instability, Teng Li, Zhao Zhang, Univ. of Maryland, College Park (United States) [7981-40]</p> <p>2:30 pm: Fiber optics photoacoustic generation using gold nanoparticles as target, Nan Wu, Kai Sun, Xingwei Wang, Univ. of Massachusetts Lowell (United States) [7981-41]</p> <p>2:50 pm: Magnetic nanoparticle (MNP)-based sensing for environmental applications, Hong Zhou, Worcester Polytechnic Institute (United States) [7981-42]</p> <p>Coffee Break. 3:10 to 3:40 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 6b</p> <p>Room: Pacific Salon VI-VII Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Piezoelectric Sensors for SHM</p> <p><i>Session Chairs: Victor Giurgiutiu</i>, Univ. of South Carolina; <i>Henrique L. Reis</i>, Univ. of Illinois at Urbana-Champaign</p> <p>1:30 pm: Development of a non-contact PZT excitation and sensing technology via laser, Hyun-Jun Park, Hoon Sohn, Chung-Bang Yun, KAIST (Korea, Republic of); Joseph Chung, Michael Lee, CyTroniQ Co., Ltd. (Korea, Republic of) . [7981-43]</p> <p>1:50 pm: Impedance-based non-destructive evaluation of the FRP adhesive joints in corrosive environment with re-usable technique, Sam Na, Rudy Tawie, Haeng-Ki Lee, KAIST (Korea, Republic of) [7981-44]</p> <p>2:10 pm: Impedance-based damage assessment using piezoelectric sensors, Mi-Sun Rim, Seung-Jae Yoo, In Lee, KAIST (Korea, Republic of) [7981-45]</p> <p>2:30 pm: Transient response of smart piezoelectric composite plate using NURBS-based isogeometric analysis, Hitesh Kapoor, Virginia Polytechnic Institute and State Univ. (United States) [7981-46]</p> <p>2:50 pm: Active carbon filter health condition detection with piezoelectric wafer active sensors, Jingjing Bao, Victor Giurgiutiu, Thomas M. Ball, Jr., Univ. of South Carolina (United States) . . [7981-47]</p> <p>Coffee Break. 3:10 to 3:40 pm</p> </div> </div>	<p style="text-align: center;">SESSION 6</p> <p>Room: Royal Palm IV Tues. 1:50 to 3:00 pm</p> <p style="text-align: center;">Wireless Sensors</p> <p><i>Session Chair: Alexis Mendez</i>, MCH Engineering LLC</p> <p>1:50 pm: Influence of sensor placement on operational modal analysis of steel girder bridges (Invited Paper), Matthew J. Whelan, The Univ. of North Carolina at Charlotte (United States); Michael V. Gangone, Kerop D. Janoyan, Clarkson Univ. (United States) [7982-22]</p> <p>2:20 pm: RFID-based displacement field monitoring system, Minghua Huang, Harbin Institute of Technology (China); Zhi Zhou, Dalian Univ. of Technology (China) and Harbin Institute of Technology (China); Jianping He, Dalian Univ. of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian University of Technology (China) [7982-23]</p> <p>2:40 pm: Node cooperation based support vector machine localization algorithm in mobile wireless sensor networks, Qing Guo, Tao Tang, Harbin Institute of Technology (China). [7982-24]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">Concurrent Sessions</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 6A</p> <p>Room: Royal Palm V Tues. 1:40 to 3:30 pm</p> <p style="text-align: center;">NIST Technology Innovation Program on Civil Infrastructure Critical National Need: Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems II</p> <p><i>Session Chairs: Nenad Gucunski</i>, Rutgers, The State Univ. of New Jersey; <i>Dryver R. Huston</i>, The Univ. of Vermont</p> <p>1:40 pm: A new fast inversion analysis algorithm for the spectral analysis of surface wave (SASW) method (Invited Paper), Yinghong Cao, Yifeng Lu, Yiyang Zhang, Northeastern Univ. (United States); J. Gregory McDaniel, Jr., Boston Univ. (United States); Ming L. Wang, Northeastern Univ. (United States) [7983-47]</p> <p>2:10 pm: Wave number estimation based method on in situ subsurface ground truth profiling with near source-receiver sensing, Yifeng Lu, Northeastern Univ. (United States); Gregory McDaniel, Jr., Boston Univ. (United States); Ming L. Wang, Northeastern Univ. (United States) [7983-48]</p> <p>2:30 pm: Compact, programmable, ground-penetrating radar system for roadway and bridge deck characterization, Tian Xia, Ken Ngai, Dryver R. Huston, The Univ. of Vermont (United States); Khabat Ebnabbasi, Ralf Birken, Northeastern Univ. (United States); Dan Busuioc, DBCGroup, Inc. (United States); Ming L. Wang, Northeastern Univ. (United States) [7983-49]</p> <p>2:50 pm: Novel, low-cost, millimeter-wave system for road surface characterization, Dan Busuioc, DBCGroup, Inc. (United States); Kyle Anstey, Carey M. Rappaport, Ralf Birken, Jeffrey Doughty, Ming L. Wang, Northeastern Univ. (United States) [7983-50]</p> <p>3:10 pm: Dielectric measurement and modeling of cementitious composite panels using a coaxial probe, Ibrahim C. Solak, Tzu-Yang Yu, Univ. of Massachusetts Lowell (United States) [7983-51]</p> <p>Coffee Break. 3:30 to 4:00 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 6B</p> <p>Room: Sunset Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Radar/Lidar NDE Technologies</p> <p><i>Session Chairs: Paul H. Ziehl</i>, Univ. of South Carolina; <i>Franklin L. Moon</i>, Drexel Univ.</p> <p>1:30 pm: Geometric analysis for the size estimation of subsurface delamination in transient electromagnetic response, Tzu-Yang Yu, Burak Boyaci, Univ. of Massachusetts Lowell (United States). [7983-52]</p> <p>1:50 pm: Development of a baseline model for a steel girder bridge using remote sensing and load tests, Kaoshan Dai, Shenen Chen, Jeremy Scott, The Univ. of North Carolina at Charlotte (United States); Marcus Schmieder, IE-Consulting (Canada); Wanqiu Liu, Dalian Univ. of Technology (China) [7983-53]</p> <p>2:10 pm: Bridge deck joints evaluation using lidar and aerial photography, Haitao Bian, Shenen Chen, The Univ. of North Carolina at Charlotte (United States) [7983-54]</p> <p>2:30 pm: 3D terrestrial lidar for bridge operation condition monitoring, Christopher Watson, Shenen Chen, Haitao Bian, Edd Hauser, The Univ. of North Carolina at Charlotte (United States) [7983-55]</p> <p>2:50 pm: Reliability analysis of 3D lidar bridge evaluation, Wanqiu Liu, Dalian Univ. of Technology (China); Shenen Chen, The Univ. of North Carolina at Charlotte (China). . . [7983-56]</p> <p>Coffee Break. . . 3:30 to 3:40 pm</p> </div> </div>	<p style="text-align: center;">Concurrent Sessions</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 6a</p> <p>Room: Royal Palm I Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Guided Waves with Distributed Sensors II</p> <p><i>Session Chairs: Paul D. Wilcox</i>, Univ. of Bristol (United Kingdom); <i>Paul Fromme</i>, Univ. College London (United Kingdom)</p> <p>1:30 pm: Autofocus for guided wave SHM in the presence of dispersion, Anthony J. Croxford, Alan J. Hunter, Univ. of Bristol (United Kingdom) [7984-24]</p> <p>1:50 pm: Structural health monitoring as a real-time thermal verification tool, Derek T. Doyle, Derek Hengeveld, Whitney D. Reynolds, Air Force Research Lab. (United States) [7984-25]</p> <p>2:10 pm: Phased annular array transducers for ultrasonic guided wave applications, Joseph L. Rose, The Pennsylvania State Univ. (United States); Fei Yan, FBS Inc. (United States); Cody Borigo, Yue Liang, Haraprasad Kannajosyula, Jaya P. Koduru, Cliff J. Lissenden, The Pennsylvania State Univ. (United States) [7984-26]</p> <p>2:30 pm: Hybrid model prediction of guided wave array system detection sensitivity for the SHM of fatigue cracks in large structures, Paul Fromme, Univ. College London (United Kingdom) [7984-27]</p> <p>2:50 pm: A novel imaging technique for structural health monitoring using sparse and compact arrays, Patrice Masson, Nicolas Quaegebeur, Dominique L. Demers, Univ. de Sherbrooke (Canada) . . . [7984-28]</p> <p>Coffee Break. 3:10 to 3:40 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 6b</p> <p>Room: Towne Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Biological and Medical Applications I</p> <p><i>Session Chairs: Wolfgang Grill</i>, Univ. Leipzig (Germany); <i>George Zentai</i>, Varian Medical Systems, Inc.</p> <p>1:30 pm: a novel hyper-elastic thin film nitinol covered stent significantly decreases intra-aneurysmal flow in vitro, Young-Jae Chun, Soojung C. Hur, Colin P. Kealey, Daniel S. Levi, K. P. Mohanchandra, Dino Di Carlo, Gregory P. Carman, Univ. of California, Los Angeles (United States) [7984-29]</p> <p>1:50 pm: Phononic crystal sensor and actuator for biomedical applications, Jinkyu Yang, California Institute of Technology (United States); Sophia Sangiorgio, Univ. of California, Los Angeles (United States); Claudio Silvestro, Politecnico di Milano (Italy); Sean Borkowski, Univ. of California, Los Angeles (United States); Luigi De Nardo, Politecnico di Milano (Italy); Edward Ebramzadeh, Univ. of California, Los Angeles (United States); Chiara Daraio, California Institute of Technology (United States) . [7984-30]</p> <p>2:10 pm: Online monitoring of cartilage tissue in a novel bioreactor, Erik von der Burg, Moritz von Buttlar, Wolfgang Grill, Univ. Leipzig (Germany) [7984-31]</p> <p>2:30 pm: Elastic characterization of swine aorta by scanning acoustic microscopy at 30 MHz, Amit Shelke, The Univ. of Arizona (United States); Christopher Blase, Johann Wolfgang Goethe-Universität Frankfurt am Main (Germany); Tribikram Kundu, The Univ. of Arizona (United States); Jürgen Bereiter-Hahn, Johann Wolfgang Goethe-Universität Frankfurt am Main (Germany) [7984-32]</p> <p>2:50 pm: A footsize fiber optic plantar pressure/shear sensor, Wei-Chih Wang, Univ. of Washington (United States) [7984-33]</p> <p>Coffee Break. 3:10 to 3:40 pm</p> </div> </div>

Conference 7975	Conference 7976	Conference 7977	Conference 7978	Conference 7980	Conference
<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Royal Palm VI</p> <p style="text-align: center;">Tues. 3:50 to 5:50 pm</p> <p style="text-align: center;">Biomedical Applications</p> <p><i>Session Chair: Akhlesh Lakhtakia, The Pennsylvania State Univ.</i></p> <p>3:50 pm: TBD (<i>Invited Paper</i>), Mehmet Sarikaya, Univ. of Washington (United States) [7975-29]</p> <p>4:20 pm: Physical and chemical influence from calcium phosphate coatings and its possible effect on enhanced bone engineering (<i>Invited Paper</i>), Dietmar W. Hutmacher, Queensland Univ. of Technology (Australia) [7975-30]</p> <p>4:50 pm: Acceleration of osteogenesis by using barium titanate piezoelectric ceramic as an implant material, Keiju Furuya, Yusuke Morita, Kazuto Tanaka, Tsutao Katayama, Eiji Nakamachi, Doshisha Univ. (Japan) [7975-31]</p> <p>5:10 pm: Single channel conductance modeling of the peptide alamethicin in synthetically formed bilayers, M. Austin Creasy, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) [7975-32]</p> <p>5:30 pm: Snake oil and venoms for medical research, H. Donald Wolpert, Bio-Optics (United States) [7975-33]</p>	<p style="text-align: center;">SESSION 6 continued</p> <p>3:40 pm: Conducting IPNs based electrochemical actuators: from chemistry towards devices (<i>Invited Paper</i>), Frederic Vidal, Cédric Plesse, Univ. de Cergy-Pontoise (France); Alexandre Khaldi, Univ. de Valenciennes et du Hainaut-Cambrésis (France); Nicolas Festin, Brain Vision Systems (France); Eric Cattani, Univ. de Valenciennes et du Hainaut-Cambrésis (France); Patrick Pirim, Brain Vision Systems (France); Dominique Teyssié, Claude Chevrot, Univ. de Cergy-Pontoise (France) [7976-19]</p> <p>4:10 pm: Electro-mechanical modeling of dielectric elastomer transducers with micro-structured electrodes, Arne Schmidt, EMPA (Switzerland) and ETH Zurich (Switzerland); Christa Jordi, EMPA (Switzerland); Edoardo Mazza, ETH Zurich (Switzerland) [7976-20]</p> <p>4:30 pm: Electroactive semi-interpenetrating polymer networks architecture with tunable IR reflectivity, Claude Chevrot, Dominique Teyssié, Univ. de Cergy-Pontoise (France); François Tran-Van, Univ. de Tours (France); Frederic Vidal, Pierre-Henri Aubert, Pierre Verge, Laurent Goujon, Univ. de Cergy-Pontoise (France) [7976-21]</p> <p>4:50 pm: DEA material enhancement with dipole grafted PDMS networks, Sebastian Risse, Univ. Potsdam (Germany); Björn Kussmaul, Hartmut Krüger, Fraunhofer-Institut für Angewandte Polymerforschung (Germany); Rémi Waché, Guggi Kofod, Univ. Potsdam (Germany) [7976-22]</p> <p>5:10 pm: Carbon aerogel based electrode material for EAP actuators, Friedrich Kaasik, Janno Torop, Univ. of Tartu (Estonia); Anna-Liisa Peikola, Mihkel Koel, Tallinn Univ. of Technology (Estonia); Alvo Aabloo, Univ. of Tartu (Estonia) [7976-23]</p> <p>5:30 pm: Lifetime of dielectric elastomer stack actuators, Peter Lotz, Marc Matysek, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7976-24]</p> <p>5:50 pm: Self-sensing properties of carbon-polymer composite (CPC) actuators, Karl Kruusamäe, Andres Punning, Alvo Aabloo, Univ. of Tartu (Estonia) [7976-25]</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Sunrise</p> <p style="text-align: center;">Tues. 3:40 to 5:40 pm</p> <p style="text-align: center;">Energy Harvesting and Scavenging III: General</p> <p>3:40 pm: Energy-harvesting from mortar tube firing impulse to supplement fire-control electronics battery, Jahangir S. Rastegar, Richard T. Murray, Omnitek Partners, LLC (United States); Carlos Pereira, Hai-Long Nguyen, Ralph Tillinghast, U.S. Army Armament Research, Development and Engineering Ctr. (United States) [7977-26]</p> <p>4:00 pm: Parametric design study of an aeroelastic flutter energy harvester, Matthew J. Bryant, Eric M. Wolf, Ephrahim Garcia, Cornell Univ. (United States) [7977-27]</p> <p>4:20 pm: Exploration of new cymbal design in energy harvesting, Changki Mo, Washington State Univ. (United States); Matt Paterson, William W. Clark, Univ. of Pittsburgh (United States) [7977-28]</p> <p>4:40 pm: Improving an energy harvesting device for railroad safety applications, Abolfazl Pourghodrat, Carl A. Nelson, Kyle Phillips, Univ. of Nebraska-Lincoln (United States); Mahmood Fateh, Federal Railroad Administration (United States) [7977-29]</p> <p>5:00 pm: A vibration energy harvester using a nonlinear oscillator with self-excitation capability, Arata Masuda, Atsuko Senda, Kyoto Institute of Technology (Japan) [7977-30]</p> <p>5:20 pm: Characterization of an active structural fiber for embedded energy harvesting, Yirong Lin, Henry A. Sodano, Arizona State Univ. (United States) [7977-31]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Royal Palm II</p> <p style="text-align: center;">Tues. 3:30 to 6:05 pm</p> <p style="text-align: center;">Multifunctional Composites and Metamaterials</p> <p><i>Session Chairs: Marcelo J. Dapino, The Ohio State Univ.; Vishnu Baba Sundaresan, Virginia Commonwealth Univ.</i></p> <p>3:30 pm: Enhanced thermally conductivity of novel multifunctional polyphenylene sulfide composites embedded with heat transfer networks of hybrid fillers, Siu Ning Leung, Muhammad O. Khan, Ellen Chan, Hani E. Naguib, Francis P. Dawson, Univ. of Toronto (Canada); Vincent Adinkrah, Laszlo Lakatos-Hayward, AEG Power Solutions (Canada) [7978-43]</p> <p>3:45 pm: Elastomeric composite materials for shock mitigation, Kristin L. Schaaf, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) [7978-44]</p> <p>4:00 pm: Development of a nonlinear acoustic metamaterial for impact mitigation, Jinkyu Yang, Sachith Dunatunga, Chiara Daraio, California Institute of Technology (United States) [7978-45]</p> <p>4:15 pm: Semi-active optimization of 2D wave's dispersion into mechanical systems by the mean of periodically distributed shunted piezoelectric patches: a new class of adaptive metamaterials, Manuel Collet, Morvan Ouisse, Univ. de Franche-Comté (France); Mohammed Ichchou, Ecole Centrale de Lyon (France); Massimo Ruzzene, Georgia Institute of Technology (United States) [7978-46]</p> <p>4:30 pm: Optimization of magnetoimpedance and stress-impedance effects in single-microwire polymer composites for stress monitoring, Faxiang Qin, Hua-Xin Peng, Univ. of Bristol (United Kingdom); Viacheslav Popov, Vernadskiy Tavricheskiy National Univ. (Ukraine); Manh-Huong Phan, Univ. of South Florida (United States) [7978-47]</p> <p>4:45 pm: Damping identification of viscoelastic composites using micromechanical approaches, Mohammad Bonakdar, Gary D. Seidel, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7978-48]</p> <p>5:00 pm: Design of phononic band gaps in functionally graded piezocomposite materials by using topology optimization, Sandro L. Vatanabe, Emílio C. N. Silva, Escola Politécnica da Univ. de São Paulo (Brazil) [7978-49]</p> <p>5:15 pm: Chiral braided and woven composites: design, fabrication, and electromagnetic characterization, Sara Wheeland, Farhad Bayatpur, Alireza V. Amirkhizi, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) [7978-50]</p> <p>5:30 pm: Self-actuating and self-diagnosing plastically deforming piezo-composite flapping wing MAV, Ajay B. Harish, Dineshkumar Harursampath, Indian Institute of Science (India) [7978-76]</p> <p>5:45 pm: Functionally graded smart materials by ultrasonic consolidation, Hannah C. Edmonds, Russell A. Harris, Loughborough Univ. (United Kingdom) [7978-69]</p>	<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Royal Palm III</p> <p style="text-align: center;">Tues. 3:30 to 5:30 pm</p> <p style="text-align: center;">Wireless Sensor System</p> <p><i>Session Chair: Eugene Edwards, U.S. Army Research, Development and Engineering Command</i></p> <p>3:30 pm: Wireless power feeding to a mobile object with strongly coupled resonance, Masayoshi Koizumi, Kimiya Komurasaki, Yoshihiro Mizuno, The Univ. of Tokyo (Japan); Kazuhiko Kano, Takayuki Shibata, DENSO Corp. (Japan) [7980-24]</p> <p>3:50 pm: Wirelessly powered RFID with sensor array, Vijay K. Varadan, Univ. of Arkansas (United States); Jaehwan Kim, Inha Univ. (Korea, Republic of); Jungmin Lee, Univ. of Arkansas (United States); Sang H. Choi, NASA Langley Research Ctr. (United States) [7980-25]</p> <p>4:10 pm: Design and implementation of a bluetooth-based band-aid pulse rate sensor, Prashanth S. Kumar, Sechang Oh, Pratyush Rai, Hyeokjun Kwon, Nilanjan Banerjee, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-26]</p> <p>4:30 pm: Wireless remote monitoring system for sleep apnea, Sechang Oh, Hyeokjun Kwon, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-27]</p> <p>4:50 pm: Closed loop cyber system for monitoring sleep apnea, Hyeokjun Kwon, Sechang Oh, Prashanth S. Kumar, Vijay K. Varadan, Univ. of Arkansas (United States) [7980-28]</p> <p>5:10 pm: Smart e-bra with nanosensors and smart electronics display and cell phone communications for heart rate monitoring, Vijay K. Varadan, Prashanth S. Kumar, Sechang Oh, Hyeokjun Kwon, Pratyush Rai, Gyanesh N. Mathur, Nilanjan Banerjee, Univ. of Arkansas (United States) [7980-29]</p>	<p style="text-align: center;">Concurrent</p> <p style="text-align: center;">SESSION 7a</p> <p style="text-align: center;">Room: Pacific Salon IV-V</p> <p style="text-align: center;">Tues. 3:40 to 5:20 pm</p> <p style="text-align: center;">Emerging Sensing Systems for SHM III</p> <p><i>Session Chairs: Kenneth J. Loh, Univ. of California, Davis; Yang Wang, Georgia Institute of Technology</i></p> <p>3:40 pm: Temperature and stiffness correction of saw devices for wireless strain sensing, Irving J. Oppenheim, Nicola S. Carey, Tao-Lun Chin, Peng Zheng, David W. Greve, Carnegie Mellon Univ. (United States) [7981-48]</p> <p>4:00 pm: Multidirectional circular microstrip patch antenna strain sensor, Ali Daliri, Amir Galehdar, Sabu J. John, Wayne Rowe, Kamran Ghorbani, RMIT Univ. (Australia) [7981-49]</p> <p>4:20 pm: * RFID-based passive wireless strain sensor, Xiaohua Yi, Terence Wu, Yang Wang, Roberto T. Leon, Manos M. Tentzeris, Georgia Institute of Technology (United States) [7981-50]</p> <p>4:40 pm: Carbon nanotube sensors integrated inside microfluidic channels for water quality monitoring, Yu Liu, Xinghui Li, Mehmet R. Dokmeci, Ming L. Wang, Northeastern Univ. (United States) [7981-51]</p> <p>5:00 pm: * Unified experimental observation of dynamic vehicle-bridge interactions by wireless telemetry, Junhee Kim, Jerome P. Lynch, Univ. of Michigan (United States); Jong-Jae Lee, Sejong Univ. (Korea, Republic of); Chang-Geun Lee, Korea Expressway Corp. (Korea, Republic of) [7981-52]</p>

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Sessions

SESSION 7b

Room: Pacific Salon VI-VII
Tues. 3:40 to 5:40 pm

Advance Sensors for Civil Structures

Session Chairs: Jennifer A. Rice, Texas Tech Univ.; **John S. Popovics**, Univ. of Illinois at Urbana-Champaign

3:40 pm: **Assessing corrosion rate in prestressed concrete with acoustic emission**, Jese D. Mangual, Mohamed K. ElBatanouny, Paul H. Ziehl, Fabio Matta, Univ. of South Carolina (United States); Miguel A. Gonzalez, MISTRAS Group, Inc. (United States) [7981-53]

4:00 pm: **Steel reinforcement corrosion detection with coaxial cable sensors**, Iana Muchaidze, Missouri Univ. of Science and Technology (United States) [7981-54]

4:20 pm: **Structural monitoring of a historic bell tower with synchronized wireless sensor networks**, Nicholas E. Wierschem, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States) [7981-55]

4:40 pm: **Development of fast wireless detection system for fixed offshore platform**, Yan Yu, Jie Wang, Zhirui Li, Jinping Ou, Dalian Univ. of Technology (China) [7981-56]

5:00 pm: **Wireless monitoring of the longitudinal displacement of a suspension bridge deck under changing environmental conditions**, Nicky de Battista, Robert Westgate, Ki Young Koo, James M. Brownjohn, The Univ. of Sheffield (United Kingdom) [7981-57]

5:20 pm: **Imote2-based multi-channel wireless impedance sensor nodes for local SHM of structural connections**, Khac Duy Nguyen, Jae-Hyung Park, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of) [7981-58]

Conference 7982

SESSION 7

Room: Royal Palm IV
Tues. 3:30 to 5:50 pm

Fiber Optic Sensors

Session Chair: Michael D. Todd, Univ. of California, San Diego

3:30 pm: **FOS standards and testing method to validate fibre optic strain measurements** (*Invited Paper*), Wolfgang R. Habel, Vivien G. Schukar, Bundesanstalt für Materialforschung und -prüfung (Germany) [7982-25]

4:00 pm: **Multi-use D-fiber sensors** (*Invited Paper*), Richard H. Selfridge, Brigham Young Univ. (United States) [7982-26]

4:30 pm: **Electro-optic polymer electric field sensor**, Daniel T. Perry, Spencer L. Chadderdon, Bryson Schreeve, Stephen M. Schultz, Richard H. Selfridge, Brigham Young Univ. (United States); Wen C. Wang, Richard A. Forber, IPITEK, Inc. (United States); Jingdong Luo, Univ. of Washington (United States) [7982-27]

4:50 pm: **Interrogation systems for slab coupled optical fiber sensors**, Jon Noren, Stephen M. Schultz, Richard H. Selfridge, Brigham Young Univ. (United States) [7982-28]

5:10 pm: **Experimental verification of a model describing the intensity distribution from a single mode optical fiber**, Erik A. Moro, Univ. of California, San Diego (United States) and Los Alamos National Lab. (United States); Michael D. Todd, Univ. of California, San Diego (United States); Anthony Puckett, Los Alamos National Lab. (United States) [7982-29]

5:30 pm: **Advanced image processing and artificial intelligence-based approaches to fiber optic statistical mode sensor design**, Hasan S. Efendioglu, Fatih Univ. (Turkey); Tulay Yildirim, Yildiz Teknik Univ. (Turkey); Onur Tokar, Fatih Univ. (Turkey) . . . [7982-30]

Conference 7983

Concurrent Sessions

SESSION 7A

Room: Royal Palm V
Tues. 4:00 to 6:00 pm

NIST Technology Innovation Program on Civil Infrastructure Critical National Need: Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems III

Session Chairs: Nenad Gucunski, Rutgers, The State Univ. of New Jersey; **Dryver R. Huston**, The Univ. of Vermont

4:00 pm: **Development of high-toughness, low-viscosity, nano-molecular resins for reinforcing pothole patching materials**, Jenn-Ming Yang, Univ. of California, Los Angeles (United States) [7983-57]

4:20 pm: **Development of a wireless monitoring system for fracture-critical bridges**, Jeremiah D. Fasi, Vasilis Samaras, Todd Helwig, Sharon L. Wood, The Univ. of Texas at Austin (United States); David Potter, National Instruments Corp. (United States); Richard Lindenberg, Wiss, Janney, Elstner Associates, Inc. (United States); Karl Frank, Hirschfeld Industries (United States) [7983-58]

4:40 pm: **Low-cost passive sensors for monitoring corrosion in concrete structures**, Ali E. Abu Yosef, Sharon L. Wood, Dean P. Neikirk, Praveenkumar Pasupathy, The Univ. of Texas at Austin (United States) [7983-59]

5:00 pm: **Corrosion detection in concrete member through integrated heat induction and IR thermography**, Seung-Jun Kwon, Univ. of California, Irvine (United States); Henry Xue, Newport Sensors, Inc. (United States); Maria Q. Feng, Seung Hoon Baek, Univ. of California, Irvine (United States) [7983-60]

5:20 pm: **Scalable cognitive autonomous nondestructive sensing network (SCANSn) for infrastructure health management in the United States**, Sourav Banerjee, Howard H. Chung, David Zhang, Shawn J. Beard, Xinlin P. Qing, Acellent Technologies, Inc. (United States); Fu-Kuo Chang, Stanford Univ. (United States) [7983-61]

5:40 pm: **On energy harvesting modules in scalable cognitive autonomous nondestructive sensing network (SCANSn) system for bridge health monitoring**, Justin Cartwright, Dong-Sam Ha, Virginia Polytechnic Institute and State Univ. (United States); David Zhang, Sourav Banerjee, Acellent Technologies, Inc. (United States) [7983-62]

SESSION 7B

Room: Sunset
Tues. 3:40 to 5:20 pm

Thermal, Infrared, and Radiographic NDE Technologies

Session Chairs: Theodore E. Matikas, Univ. of Ioannina (Greece); **Ryan M. Meyer**, Pacific Northwest National Lab.

3:40 pm: **In service damage assessment of bonded composite repairs with full field thermographic techniques**, Alkiviades Paipetis, Sotirios Grammatikos, Evaggelos Z. Kordatos, Nektaria-Marianthi Barkoula, Theodore E. Matikas, Univ. of Ioannina (Greece) [7983-63]

4:00 pm: **Detection of surface breaking cracks using thermographic and non-contact ultrasonic methods**, Stuart B. Palmer, Susan E. Burrows, Steven M. Dixon, The Univ. of Warwick (United Kingdom) [7983-64]

4:20 pm: **Feasibility of using line scanning thermography in NDE of wind turbine blades**, Abdullia Ley, Valery Godinez-Azcuaga, MISTRAS Group, Inc. (United States) . . [7983-65]

4:40 pm: **Compton imaging tomography technique for NDE of large nonuniform structures**, Volodymyr Romanov, Victor Grubsky, Tomasz P. Jansson, Physical Optics Corp. (United States) [7983-66]

5:00 pm: **Apodized aperture imaging optics for Compton scattered x-ray and gamma-ray imaging systems**, Victor Grubsky, Volodymyr Romanov, Tomasz P. Jansson, Physical Optics Corp. (United States) [7983-67]

Conference 7984

Concurrent Sessions

SESSION 7a

Room: Royal Palm I
Tues. 3:40 to 6:00 pm

Guided Waves: Novel Applications and Damage Detection

Session Chairs: Anthony J. Croxford, Univ. of Bristol (United Kingdom); **Guoliang Huang**, Univ. of Arkansas at Little Rock

3:40 pm: **Determination of the stress dependence of the velocity of Lamb waves in aluminum plates**, U. Amjad, Diwaker Jha, H. Klinghammer, Wolfgang Grill, Univ. Leipzig (Germany) [7984-34]

4:00 pm: **Multi-component mode coefficients for damage estimation using Lamb wave polarization from 1D laser vibrometry**, James T. Ayers III, U.S. Army Research Lab. (United States); Nicoleta Apetre, Massimo Ruzzene, Georgia Institute of Technology (United States) [7984-35]

4:20 pm: **High-resolution damage imaging in flat and bent plate-like structures through warped-basis pursuit**, Emanuele Baravelli, Univ. degli Studi di Bologna (Italy) and Georgia Institute of Technology (United States); Luca De Marchi, Univ. degli Studi di Bologna (Italy); Massimo Ruzzene, Georgia Institute of Technology (United States); Nicolo Speciale, Univ. degli Studi di Bologna (Italy) . . . [7984-36]

4:40 pm: **High-resolution imaging of acoustic waves in piezoelectric materials**, A. Abdelrahman, A. Kamanyi, K. S. Tarar, U. Amjad, W. Grill, Univ. Leipzig (Germany) [7984-37]

5:00 pm: **Investigating mode-converted Lamb wave signals induced by a notch on a beam in the frequency domain**, Eun Jin Kim, Hyun Woo Park, Dong-A Univ. (Korea, Republic of) [7984-38]

5:20 pm: **Metamorphosis of bulk waves to Lamb waves in anisotropic piezoelectric crystals**, A. Shelke, The Univ. of Arizona (United States); A. Habib, Univ. Siegen (Germany); U. Amjad, M. Pluta, Univ. Leipzig (Germany); T. Kundu, The Univ. of Arizona (United States); U. Pietsch, Univ. Siegen (Germany); W. Grill, Univ. Leipzig (Germany) [7984-39]

5:40 pm: **Acoustic emission source localization in anisotropic structures with diffuse field conditions using a time reversal approach**, F. Ciampa, M. Meo, Univ. of Bath (United Kingdom) [7984-40]

SESSION 7b

Room: Towne
Tues. 3:40 to 6:00 pm

Biological and Medical Applications II

Session Chairs: Wei-Chih Wang, Univ. of Washington; **Paul D. Panetta**, Applied Research Associates, Inc.

3:40 pm: **Study of thinly sectioned melanoma skin tissues with mechanical scanning acoustic reflection microscopy**, Bernhard R. Tittmann, Chiaki Miyaska, The Pennsylvania State Univ. (United States); Elena Maeva, Yihan Tian, Univ. of Windsor (Canada); David Shum, Windsor Regional Hospital (Canada) [7984-41]

4:00 pm: **K edge x-ray imaging**, George Zentai, Varian Medical Systems, Inc. (United States) [7984-42]

4:20 pm: **Synchronous monitoring of muscle dynamics and electromyogram**, Muhammad Zakir Hossain, Wolfgang Grill, Univ. Leipzig (Germany) [7984-43]

4:40 pm: **Adaptive sensor fusion algorithm for helmet structural health monitoring**, Xiaotian Zou, Kai Sun, Nan Wu, Ye Tian, Xingwei Wang, Univ. of Massachusetts Lowell (United States) [7984-44]

5:00 pm: **Determination of the mechanical properties of fixed red blood cells by phase-sensitive-acoustic microscopy**, Ahmed Mohamed T. Esam, Albert Kamanyi, Wolfgang Grill, Univ. Leipzig (Germany) [7984-45]

5:20 pm: **A reliable wireless monitoring network for healthcare applications**, Ali Abou-Elmour, Ammar Safi, Ahmad Nashed, Ajman Univ. of Science & Technology (United Arab Emirates) [7984-46]

5:40 pm: **Point measurement of water concentration using millimeter wave illumination**, Shijun Sung, Univ. of California, Los Angeles (United States) [7984-47]

Posters · Tuesday · 6:00 to 7:30 pm

Conference attendees are invited to attend the joint poster session/exhibition reception to network, enjoy light refreshments, and view the poster papers. Attendees are required to wear their conference registration badge. Authors of poster papers will be present to answer questions concerning their papers. Poster authors must set up their poster between 10:00 am and 4:00 pm on Tuesday 8 March.

Conference 7975

Inspection and analysis of the walls of fluid filled tubes by active electrolocation: a biomimetic approach. Martin G. Gottwald, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Herbert Bousack, Forschungszentrum Jülich GmbH (Germany); Kavita Mayekar, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Shubham Biswas, Forschungszentrum Jülich GmbH (Germany); Michael G. Metzgen, Gerhard von der Emde, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [7975-38]

Material properties of bird feathers. Anke Schmitz, Benjamin Honisch, Helmut Schmitz, Horst Bleckmann, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [7975-39]

Elastic honeycomb-patterned microporous substrate to mechanically regulate cellular functions. Takahito Kawano, Madoka Sato, Hiroshi Yabu, Tohoku Univ. (Japan); Masatsugu Shimomura, Tohoku Univ. (Japan) and Japan Science and Technology Agency (Japan) [7975-40]

The chameleon grip-frictional properties of subdigital setal pads in chameleons. Marlene Spinner, Guido Westhoff, Horst Bleckmann, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Stanislav N. Gorb, Christian-Albrechts-Univ. zu Kiel (Germany) [7975-41]

Spitting cobras: fluid jets in nature as models for technical applications. Alexander Balmert, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); David Hess, Christoph Brücker, Technische Univ. Freiberg (Germany); Horst Bleckmann, Guido Westhoff, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [7975-42]

Measurement of flow velocity of fluids and gases. Hendrik Herzog, Adrian T. Klein, Horst Bleckmann, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [7975-43]

Biomimetics on gecko locomotion: a force measuring array to measure 3D reaction forces and the inspiration obtained from the measurements. Zhendong Dai, Nanjing Univ. of Aeronautics and Astronautics (China) [7975-44]

Semiautomatic calibration and alignment of a low-cost, nine-sensor inertial magnetic measurement sensor. Akiko Mizutani, Odonatrix Pty Ltd. (Australia); Kent Rosser, Javaan S. Chahl, Defence Science and Technology Organisation (Australia) [7975-45]

Vertically displaced optical flow sensors to control the landing of a UAV. Javaan S. Chahl, Defence Science and Technology Organisation (Australia); Akiko Mizutani, Odonatrix Pty Ltd. (Australia); Kent Rosser, Defence Science and Technology Organisation (Australia) [7975-46]

Atomistic mechano-chemical modeling of kinesins. Simona Patriche, Univ. 'Dunărea de Jos' of Galați (Romania); Shinji Matsushita, Kyoto Univ. (Japan); Mihaela Banu, Univ 'Dunărea de Jos' of Galați (Romania); Bogdan I. Epureanu, Univ. of Michigan (United States); Taiji Adachi, Kyoto Univ. (Japan) [7975-47]

Biomimicry of the adhesive organs of stick insects (*Carausius morosus*). Michael Bennemann, RWTH Aachen (Germany); Ingo Scholz, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Werner Baumgartner, RWTH Aachen (Germany) . . [7975-48]

Sandfish inspired engineering. Konrad Staudt, Friederike Saxe, Agnes Weth, Werner Baumgartner, RWTH Aachen (Germany) [7975-49]

Conference 7976

Inkjet printing of electroactive polymer actuators on polymer substrates. Oliver Pabst, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Jolke Perelaer, Friedrich-Schiller-Univ. Jena (Germany); Erik Beckert, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Ulrich S. Schubert, Friedrich-Schiller-Univ. Jena (Germany); Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [7976-89]

Electroactive polymer devices for active vibration damping. Christian Graf, Juergen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) [7976-90]

Dielectric elastomer actuators with enhanced permittivity and strain. Holger Böse, Detlev Uhl, Fraunhofer-Institut für Silicatforschung (Germany); Klaus Flittner, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7976-91]

Photopatternable electrical conductive MWCNT-SU-8 nanocomposite for MEMS/MST. Ajit Khosla, Simon Fraser Univ. (Canada) [7976-92]

PWM drive of IPMC actuators with the consideration of the capacitive impedance. Kentaro Takagi, Naoya Yamaguchi, Nagoya Univ. (Japan); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan) [7976-93]

Active suspension with multilayer dielectric elastomer actuator. Roman Karsten, Peter Lotz, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7976-94]

Low voltage driven electroactive polymer actuator with integrated piezoelectric transformer based driver without magnetic components. Thomas Andersen, Martin S. Rødggaard, Technical Univ. of Denmark (Denmark) [7976-95]

Ion distribution in ionic electroactive polymer actuators and device design. Yang Liu, Caiyan Lu, The Pennsylvania State Univ. (United States); Stephen Twigg, Villanova Univ. (United States); Nicholas Winograd, Qiming M. Zhang, The Pennsylvania State Univ. (United States) . . [7976-96]

Fast and multi-level LC-SLM using AFLC. Mariko Kasai, Kayo Ogawa, Japan Women's Univ. (Japan); Yasushi Suzuki, LCA Inc. (Japan) [7976-97]

Electromechanical fatigue in IPMC under dynamic energy harvesting conditions. Arvind Krishnaswamy, D. Roy Mahapatra, Indian Institute of Science (India) [7976-98]

EAP based neonatal lung simulator. Samuel Schlatter, Robin Chang, Enrico Haemmerle, Iain A. Anderson, Benjamin M. O'Brien, The Univ. of Auckland (New Zealand) [7976-99]

Open-loop control of IPMC actuators under varying temperatures. Roy Dong, Xiaobo Tan, Michigan State Univ. (United States) . . . [7976-100]

Influence of different fabrication techniques on IPMCs electrode morphologies and mechano-electrical properties. Zicai Zhu, Hualing Chen, Longfei Chang, Bo Li, Yong-Quan Wang, Xi'an Jiaotong Univ. (China) [7976-101]

Small strains measurement, calibration, and solution for self temperature compensation in CFRP sensors. Huang Huang, Zhishen Wu, Ibaraki Univ. (Japan); Caiqian Yang, Southeast Univ. (China) [7976-102]

New elastomeric silicone based networks applicable as electro active systems. Anca Gabriela Bejenariu, Mailys Boitel, Anne Ladegaard Skov, Technical Univ. of Denmark (Denmark) [7976-104]

Induced interaction of NH₄NO₃ with poly(P-phenylene vinylene) by mean of zeolite Y. Jirarat Kamonsawats, Anuvat Sirivat, The Petroleum and Petrochemical College (Thailand) [7976-107]

Elliptical modelling of symmetric hysteresis in a dielectric elastomer actuator. Pengfei Tian, Richard W. Jones, Mads Clausen Institute (Denmark) [7976-108]

Disturbance observer-based compensation of hysteresis in a dielectric elastomer actuator. Richard W. Jones, Mads Clausen Institute (Denmark); Ming Tham, Newcastle Univ. (United Kingdom) [7976-109]

Biomimetic small scale variable focal length lens unit using electro-active polymer actuators. Baek-Chul Kim, Hyeok Yong Kwon, Kuang Jun An, Young Kwan Lee, Jae-Do Nam, Hyouk Ryeol Choi, Hyungpil Moon, Ja Choon Koo, Sungkyunkwan Univ. (Korea, Republic of) [7976-110]

Reduced graphene oxide electrodes for artificial muscles. Chong Min Koo, Kyoungso Min, Ji Young Jung, Korea Institute of Science and Technology (Korea, Republic of) [7976-111]

Electromechanical properties of P(VDF-TrFE)/CNT and P(VDF-TrFE)/Gr composites. Chong Min Koo, Soon Man Hong, Youn Duk Park, Jin Hong Lee, Korea Institute of Science and Technology (Korea, Republic of) [7976-112]

Electromechanical strain responses of SEBS/CB and SEBS/SWCNT composites. Seong Sang Hwang, Myeong Hee Kim, Soon Man Hong, Chong Min Koo, Korea Institute of Science and Technology (Korea, Republic of) [7976-113]

Constitutive behaviors of thermo-responsive shape memory polymer. Bo Zhou, Harbin Engineering Univ. (China) [7976-114]

Investigation on mechanical behaviors of shape memory alloy beam. Bo Zhou, Harbin Engineering Univ. (China) [7976-115]

Methacrylate-based triblock copolymer for elastomeric electroactive material. Kyung-Youl Baek, Korea Institute of Science and Technology (Korea, Republic of) [7976-117]

Silvered dielectric elastomer actuator with high actuation strain. Sze Hsien Low, Gih-Keong Lau, Nanyang Technological Univ. (Singapore) [7976-118]

Ionic polymer-metal composite enabled robotic manta ray. Zheng Chen, Tae I. Um, Hilary Bart-Smith, Univ. of Virginia (United States) . . [7976-119]

6:00 pm: Enhancement capacitive sensor using sensor fusion for accuracy and precision in force measurement. J. Chung, B. Kim, Y. K. Lee, J. Nam, H. R. Choi, H. Moon, J. C. Koo, Sungkyunkwan Univ. (Korea, Republic of) [7976-120]

Harnessing electromechanical instabilities in polymers at multiple length scales. X. Zhao, Duke Univ. (United States) [7976-121]

Experimental analysis of biasing elements for dielectric electro-active polymers. Micah Hodgins, Alexander York, Stefan S. Seelecke, North Carolina State Univ. (United States) [7976-122]

Dynamic window daylighting systems: electropolymeric technology for dynamic solar responsive building envelopes. E. Kriemeyer, A. Dyson, Rensselaer Polytechnic Institute (United States) [7976-123]

Conference 7977

Active vibration control of basic hull structures using macro fiber composite. Guo Yi, Liu Liu, Jinsong Leng, Harbin Institute of Technology (China) [7977-83]

Research on the comparison of performance-based concept and force-based concept. Zeyu Wu, North China Univ. of Water Conservancy and Electric Power (China); Fuming Wang, Dongwei Wang, Zhengzhou Univ. (China) [7977-86]

Research on the parameters of response spectrum about Clough-Penzien model. Zeyu Wu, North China Univ. of Water Conservancy and Electric Power (China); Fuming Wang, Dongwei Wang, Zhengzhou Univ. (China) [7977-87]

The seismic response of continuous beam bridge considering the spatial and time effect. Zeyu Wu, North China Univ. of Water Conservancy and Electric Power (China); Fuming Wang, Dongwei Wang, Zhengzhou Univ. (China) [7977-88]

The comparison of different coherence function and application. Zeyu Wu, Yuhe Li, North China Univ. of Water Conservancy and Electric Power (China); Fuming Wang, Zhengzhou Univ. (China) [7977-89]

Design and modeling of a self-sufficient shape-memory-actuator. André Bucht, Tom Junker, Kenny Pagel, Welf-Guntram Drossel, Reimund Neugebauer, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany) [7977-90]

Optimal placement of piezoelectric actuators based on dynamic sensitivity analysis. Fang Liu, Bo Fang, Wenhui Huang, Harbin Institute of Technology (China) [7977-91]

Cyclic behavior of confining RC short columns with superelastic shape memory alloy wires. Hui Qian, Zhengzhou Univ. (China); Hong-Nan Li, Dalian Univ. of Technology (China); Gangbing Song, Univ. of Houston (United States) [7977-93]

Mechanical deformation and tensile super-elastic behaviors of a Ti-Mo based shape memory alloy. Chaoying Xie, Shanghai Jiao Tong Univ. (China) [7977-94]

A new variable stiffness and damping isolator. Majid Behrooz, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) [7977-95]

Active vibration control using noncollocated piezoelectric film sensor/actuator. Tsutomu Nishigaki, Kinki Univ. (Japan) [7977-97]

Posters · Tuesday · 6:00 to 7:30 pm

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Conference 7978

Experimental, analytical, and computational analysis of fatigue crack growth of HPDC-AM60B magnesium alloy. Md. Nur Hossain, Dalhousie Univ. (Canada) [7978-59]

Sliding wear map for Al-Si alloy. Md. Aminul Islam, Md. Nur Hossain, Dalhousie Univ. (Canada) [7978-60]

Electromechanical field concentrations and polarization switching due to interdigitated electrodes in piezoelectric macro-fiber composites. Fumio Narita, Yasuhide Shindo, Koji Sato, Tomo Takeda, Tohoku Univ. (Japan) [7978-61]

Electromechanical field concentrations near electrodes in piezoelectric thick film mirror devices (Presentation Only). Koji Sato, Yasuhide Shindo, Fumio Narita, Tohoku Univ. (Japan) [7978-62]

Study on the graphene-based actuator. Liang Xu, Il Kwon Oh, KAIST (Korea, Republic of) [7978-63]

Electrical and mechanical properties of multi-phase systems under external impacts. Vladimir V. Shchennikov, Ivan Komarovskii, Igor V. Korobeynikov, Grigori V. Vorontsov, Institute of Metal Physics (Russian Federation); Vsevolod V. Shchennikov, Jr., Institute of Engineering Science (Russian Federation) [7978-64]

Overview on the feasibility of micro-rotors driven by momentum transfer, spin angular momentum transfer, and orbital angular momentum transfer from photons. Dennis Tierney, Dorothy Engle, Xavier Univ. (United States); Wolfgang Dultz, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany); Heidrun Schmitzer, Xavier Univ. (United States) [7978-65]

Experimental investigation on mechanical behavior of filament-wound CFRP tubes. Lianguan Zhang, China Earthquake Administration (China) and Northeast Forestry Univ. (China); Hui Li, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) [7978-66]

Buckling control of morphing composite airfoil structure using multi-stable laminate by piezoelectric sensors/actuators. Shahin Zareie, Abolghassem Zabihollah, Sharif Univ. of Technology (Iran, Islamic Republic of) [7978-67]

Electromagnetic radiation of polaritons in piezoelectric superlattices. Yuan-Fang Chou, National Taiwan Univ. (Taiwan) [7978-68]

Phase-field simulation and design of a ferroceramic nano-generator. Matthias Krauss, Ingo Muench, Karlsruhe Institut für Technologie (Germany) [7978-70]

Fabrication and properties of multiple oriented carbon nano tube paper. Zhichun Zhang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7978-72]

Fracture toughness characterization of nanoreinforced carbon-fiber composite materials for damage mitigation. Jennifer A. VanderVennet, NextGen Aeronautics, Inc. (United States); Chad Peterson, Yuris Dzenis, Univ. of Nebraska-Lincoln (United States); Charles E. Bakis, The Pennsylvania State Univ. (United States); Terrisa A. Duenas, NextGen Aeronautics, Inc. (United States); Daniel Carter, Keith Roberts, U.S. Army Research, Development and Engineering Command (United States) [7978-73]

A micropolar continuum model for large deformation caused by magnetic or electric fields. Ingo Muench, Karlsruhe Institut für Technologie (Germany) [7978-74]

Experimental investigation of road snow-melting based on CNFP self-heating concrete. Qiangqiang Zhang, Hui Li, Harbin Institute of Technology (China) [7978-75]

Equivalent properties of 1-3 piezocomposites made of PMN-PT single crystals for underwater SONAR transducers. Jinwook Kim, Yongrae Roh, Kyungpook National Univ. (Korea, Republic of) [7978-77]

Fabrication of fibrous composites with re-mendable polymer matrices. Christian Nielsen, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) [7978-78]

Overall dynamic constitutive relations for layered elastic composites. Ankit Srivastava, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) [7978-79]

Controlling wave propagation in solids using layered anisotropic materials. Aref Tehranian, Alireza V. Amirkhizi, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) . . . [7978-80]

Magnetic performance of Fe₃O₄/epoxy nanocomposites. Jianjun Li, Harbin Institute of Technology (China) [7978-81]

Fabrication of TiNi shape memory alloy thin films by current activated tip-based sintering (CATS). Kee S. Moon, Mehul Patel, Khaled Morsi, Samuel K. Kassegne, San Diego State Univ. (United States) . . . [7978-82]

Multi-scale modeling and optimization of coupled thermo-electro-magneto-mechanical behavior of load-bearing antenna structures. Sushma Santapuri, Stephen E. Bechtel, The Ohio State Univ. (United States) [7978-83]

An explicit formulation for the analysis of functionally graded plates subjected to mechanical and thermal loads. Robert G. Reid, Ratnam Paskaramoorthy, Univ. of the Witwatersrand (South Africa) [7978-84]

Conference 7979

Post-microbuckling mechanics of fiber-reinforced shape-memory polymer under flexure deformation. Xin Lan, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7979-07]

Design of a shape adaptive tail airfoil actuated by a shape memory alloy thin film. Rasoul Shirzadeh, Kamran Raissi Charmaani, Amirkabir Univ. of Technology (Iran, Islamic Republic of); Majid Tabesh, The Univ. of Toledo (United States) [7979-23]

Sensor self-diagnostics for piezoelectric transducers operating in harsh temperature environments. Yan Zheng, Stanford Univ. (United States); Christian Martinez, Rice Univ. (United States); Daniel Easton, Gyuhae Park, Kevin M. Farinholt, Los Alamos National Lab. (United States) [7979-24]

A study on real time monitoring system for railroad vehicle using energy harvesting. Jaehoon M. Kim, Korea Railroad Research Institute (Korea, Republic of); Jaeyoun Lee, Sogang Univ. (Korea, Republic of) [7979-25]

Conference 7980

The fabrication of glucose sensor by nanoporous silicon film and its switching characteristics on visible color light response. Jia-Chuan Lin, Meng-Kai Hsu, St. John's Univ. (Taiwan); Hsi-Ting Hou, Tamkang Univ. (Taiwan); Jhe-Yuan Wu, Chinese Culture Univ. (Taiwan) [7980-10]

Wireless brain machine interface systems: today and tomorrow. Vijay K. Varadan, Univ. of Arkansas (United States) [7980-47]

Low-cost methylene chloride assisted bonding of PMMA microfluidic chips. Daniel D. Hilbich, Ajit Khosla, Simon Fraser Univ. (Canada) [7980-48]

Effect of corona discharge surface treatments and soft bake on adhesion of SU-8 on a glass substrate for MEMS and microfluidic systems. Peter F. J. Hsiao, Ajit Khosla, Simon Fraser Univ. (Canada) [7980-49]

Graphene-based nano composite smart material. Ju-Young Cha, Pukyong National Univ. (Korea, Republic of) [7980-50]

Poly(methyl methacrylate) (PMMA) as a structural mold material for soft lithography. Ajit Khosla, Simon Fraser Univ. (Canada) [7980-51]

Thermal effect on the IV characteristics of TiO₂ and GaN sol-gel driven Schottky diode. Yi Chen, Mohammad Maniruzaman, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-52]

Study of a novel micro-fluidic-chip measurement system for red blood cell deformability. Yanjian Liao, Chongqing Univ. (China); Chang Liu, Chongqing Institute of Technology (China); Shengjie Zhai, Univ. of Nevada, Las Vegas (United States); Hongyan Luo, Xiaolin Zheng, Chongqing Univ. (China) . . . [7980-53]

Conference 7981

Smart and comprehensive structural health monitoring solution. Peter Kung, QPS Photonics Inc. (Canada) [7981-178]

Traffic monitoring and weight measurement using fiber optic microbend sensor. Nabila Naorin, North South Univ. (Bangladesh) [7981-179]

Relative-story displacement sensor for measuring five-degree-of-freedom movement of building layers. Iwao Matsuya, Waseda Univ. (Japan); Ryuta Katamura, Kajima Corp. (Japan); Maya Sato, Miroku Iba, Hideaki Kondo, Kiyoshi Kanekawa, Waseda Univ. (Japan); Motoichi Takahashi, Tomohiko Hatada, Kajima Corp. (Japan); Yoshihiro Nitta, Ashikaga Institute of Technology (Japan); Takashi Tani, Shuichi Shoji, Akira Nishitani, Iwao Ohtomari, Waseda Univ. (Japan) [7981-180]

Comparison of embedded, surface bonded, and reusable piezoelectric transducers for monitoring of concrete structures. Bahador Sabet Divsholi, Yaowen Yang, Nanyang Technological Univ. (Singapore) [7981-181]

Development of micro-pump for bio-MEMS by using new bio-compatible piezoelectric material MgSiO₃. Noriaki Okamoto, Hwisim Hwang, Yusuke Morita, Eiji Nakamachi, Doshisha Univ. (Japan) [7981-182]

Prediction of pavement friction with high definition CCD laser and genetic programming. Shih-Huang Chen, Jia-Hong Lin, Ching-Tseng Hung, Jin-Yuan Zheng, Wei-Hsuan Chao, Feng Chia Univ. (Taiwan) [7981-183]

Vibration-based structural health monitoring of harbor caisson structure. So Young Lee, So-Ra Lee, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of) [7981-184]

Mechanical monolithic tiltmeter for low frequency measurements. Fausto Acernese, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Silvia Vilasi, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [7981-185]

Mechanical monolithic sensors for mechanical damping of a suspended mass. Fausto Acernese, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Silvia Vilasi, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [7981-186]

Development of a tilt meter based on a hetero-core fiber optic sensor. Yuki Honda, Soka Univ. (Japan) [7981-187]

Development of an optical fiber sensor to monitoring the formation of cracks in concrete structures. Karina Rodríguez Carmona, Alfredo Márquez Lucero, Ctr. de Investigación en Materiales Avanzados, S.C. (Mexico) [7981-188]

Damage detection in prestressed pile to bent cap connections. Aaron K. Larosche, Univ. of South Carolina (United States) [7981-189]

Structural damage identification using adaptive immune clonal selection algorithm and acceleration data. Rongshuai Li, Akira Mita, Keio Univ. (Japan) [7981-191]

Hybrid structural health monitoring method for girder connections using wireless acceleration and impedance sensor nodes. Dong-Soo Hong, Po-Young Lee, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of) [7981-192]

Recognition of flow in everyday life using sensor agent robot with laser range finder. Misa Goshima, Akira Mita, Keio Univ. (Japan) [7981-194]

Recognition of human emotion using sensor agent robot for interactive and adaptive living spaces. Sozo Murata, Akira Mita, Keio Univ. (Japan) [7981-195]

Real-time soil deformation monitoring through laser-based deflection measurements. Rick Bearce, Colorado School of Mines (United States); Caleb Rudkin, U.S. Bureau of Reclamation (United States); Shawn Kimmel, Michael Mooney, Colorado School of Mines (United States) [7981-196]

Real-time soil compaction monitoring through integrated machine strain measurements: modelling to inform strain gage placement on machine. Shawn Kimmel, Michael Mooney, Colorado School of Mines (United States) [7981-197]

Effects of rolling-induced anisotropy and precipitate chemistry on fatigue crack initiation and short crack propagation in Al 2024-T351 under uniaxial state of stress. Admir Makas, Pedro Peralta, Arizona State Univ. (United States) [7981-198]

Posters · Tuesday · 6:00 to 7:30 pm

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Application of a decentralized damage detection method to large scale shake table tests, Zhenhua Xing, Akira Mita, Keio Univ. (Japan) [7981-199]

Asset health monitors-development, sustainment, advancement, Fred Mauss, Pacific Northwest National Lab. (United States) [7981-200]

The eigenvalue problem associated with the nonlinear buckling of a shear bending column, Isao Nishimura, Tokyo City Univ. (Japan) [7981-201]

Seismic performance of RC shear wall structure with novel shape memory alloy dampers in coupling beams, Chenxi Mao, China Earthquake Administration (China); Jinzhi Dong, Northeast Forestry Univ. (China); Hui Li, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) [7981-202]

Piezoelectric composite morphing control surfaces for unmanned aerial vehicles, Osgar J. Ohanian III, AVID LLC (United States) . . . [7981-203]

A basic approach for wing leading deicing by smart structures, Stephan Struggl, Johannes Korak, Harald Witschnig, PROFACTOR GmbH (Austria) [7981-204]

Enhancement of PV system output power using a computer based automatic sun tracker, Ali Abou-Elnoor, Ajman Univ. of Science & Technology (United Arab Emirates) [7981-205]

Structural health monitoring (SHM) needs S³ (sensor-structure-system) logic for efficient product development, Christian Peters, Faserinstitut Bremen e.V. (Germany); Pierre Zahlen, Clemens Bockenheimer, Airbus Deutschland GmbH (Germany); Axel S. Herrmann, Faserinstitut Bremen e.V. (Germany) [7981-206]

NSF Poster Session

This special poster collection features projects funded by the National Science Foundation.

** Indicates papers that will also be presented in oral sessions.*

NSF Project presentation, Shih-Chi Liu, National Science Foundation (United States) [7981-207]

Design, flexibility, and stress analysis of nano-skin, Yingzi Lin, Northeastern Univ. (United States) [7981-208]

Continuous piezoelectric health monitoring systems based on ultrasonic guided waves, Sheng Li, Cliff J. Lissenden, Joseph L. Rose, The Pennsylvania State Univ. (United States) [7981-209]

Subsurface geo-applications of wireless signal networks, Suk-Un Yoon, Ehsan Ghazanfari, Liang Cheng, Muhannad T. Suleiman, Sibel Pamukcu, Lehigh Univ. (United States) [7981-210]

Full-spectral interrogation of fiber Bragg grating sensors for damage identification, Sean Webb, Kara J. Peters, Mohammed Zirky, North Carolina State Univ. (United States); Spencer Chadderdon, Tyrie Vella, Stephen Schultz, Richard H. Selfridge, Brigham Young Univ. (United States) . . . [7981-211]

Enhancing the sensitivity of semiconductor-based gas sensors on nanostructured surfaces, Haibin Huo, Haizhou Ren, Cong Wang, Mengyan Shen, Univ. of Massachusetts Lowell (United States) [7981-212]

Advanced sensor-computer technology for urban runoff monitoring, Byunggu Yu, Pradeep K. Behera, Juan F. Ramirez Rochac, Univ. of the District of Columbia (United States) [7981-213]

Dynamic strain measurements with a luminescent photoelastic coating, James P. Hubner, Daniel R. Gerber, The Univ. of Alabama (United States) [7981-214]

*** Hybrid smart sensor network for full-scale structural health monitoring of a cable-stayed bridge**, Hongki Jo, Sung-Han Sim, Kirill A. Mechitov, Robin Kim, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States); JongWoong Park, Soojin Cho, Hyung-Jo Jung, Chung-Bang Yun, KAIST (Korea, Republic of); Jennifer A. Rice, Texas Tech Univ. (United States); Tomonori Nagayama, The Univ. of Tokyo (Japan) [7981-04]

*** Data transmission performance modeling for rotating wireless sensors using automatic repeat request**, Fan Yang, Lei Tang, Kuang-Ching Wang, Yong Huang, Clemson Univ. (United States) [7981-10]

*** Photocurrent generation and characterization of a photoelectric nanocomposite sensor**, Donghyeon Ryu, Kenneth J. Loh, Univ. of California, Davis (United States) [7981-14]

*** Toward triboluminescent sensor realization for SHM**, Tarik J. Dickens, The Florida State Univ. (United States); Okenwa O. Okoli, High Performance Materials Institute (United States) [7981-17]

*** RFID-based passive wireless strain sensor**, Xiaohua Yi, Terence Wu, Yang Wang, Roberto T. Leon, Manos M. Tentzeris, Georgia Institute of Technology (United States) [7981-50]

*** Unified experimental observation of dynamic vehicle-bridge interactions by wireless telemetry**, Junhee Kim, Jerome P. Lynch, Univ. of Michigan (United States); Jong-Jae Lee, Sejong Univ. (Korea, Republic of); Chang-Geun Lee, Korea Expressway Corp. (Korea, Republic of) [7981-52]

*** Damage classification using signal processing and machine learning in structural health monitoring**, Daewon Kim, Michael Philen, Virginia Polytechnic Institute and State Univ. (United States) [7981-79]

*** Simplified 2D modeling of power and energy transduction of piezoelectric wafer active sensors for structural health monitoring**, Bin Lin, Victor Giurgiutiu, Univ. of South Carolina (United States) [7981-96]

*** Investigation of miniature fiber optic surface-mountable Fabry-Perot pressure sensor built on 45° angled fiber**, Hyungdae Bae, Miao Yu, Univ. of Maryland, College Park (United States) . [7981-102]

*** Micro-machine high temperature sensors using polymer derived ceramics**, Jian Liu, Juan Li, Yingfeng Ji, Chengying Xu, Univ. of Central Florida (United States) [7981-107]

*** A PZT nanoscale active fiber composites acoustic emission sensor for structure health monitoring**, Xi Chen, Yong Shi, Stevens Institute of Technology (United States) [7981-111]

*** Frequency steerable acoustic sensors for SHM**, Matteo Senesi, Massimo Ruzzene, Georgia Institute of Technology (United States) [7981-112]

*** Multi-functional self-powered sensor for long-term ambient vibration monitoring**, Chenling Huang, Shantanu Chakrabarty, Michigan State Univ. (United States) [7981-115]

*** Localized damage detection in a large-scale moment connection using a strain gauge sensor network**, Elizabeth L. Labuz, Shamim N. Pakzad, Lehigh Univ. (United States); Diane Wurst, Rowan Univ. (United States) [7981-131]

*** High-sensitivity fiber loop ringdown evanescent-field sensors**, Chuji Wang, Chamini Herath, Mississippi State Univ. (United States) . . [7981-138]

*** Detecting crack orientation using antenna sensor**, Irshad Mohammad, Haiying Huang, The Univ. of Texas at Arlington (United States) [7981-146]

*** A tele-gait monitoring system with an inertial measurement unit and smart shoes**, Joonbum Bae, Kyoungchul Kong, Masayoshi Tomizuka, Univ. of California, Berkeley (United States) [7981-162]

*** Bio-inspired passive control for civil infrastructures**, Chun-Hung Lin, Henry T. Yang, Paul K. Hansma, Univ. of California, Santa Barbara (United States) [7981-167]

*** Bio-inspired somatosensor with modeling of viscoelastic responses**, Imin Kao, Dylan Tsai, Jun Nishiyama, Stony Brook Univ. (United States); Makoto Kaneko, Mitsuru Higashimori, Osaka Univ. (Japan) [7981-217]

*** Full-spectral interrogation of fiber Bragg grating sensors for damage identification**, Sean Webb, Kara J. Peters, Mohammed Zirky, North Carolina State Univ. (United States); Spencer Chadderdon, Tyrie Vella, Stephen Schultz, Richard H. Selfridge, Brigham Young Univ. (United States) . . . [7981-211]

*** Enhancing the sensitivity of semiconductor-based gas sensors on nanostructured surfaces**, Haibin Huo, Haizhou Ren, Cong Wang, Mengyan Shen, Univ. of Massachusetts Lowell (United States) [7981-212]

*** Advanced sensor-computer technology for urban runoff monitoring**, Byunggu Yu, Pradeep K. Behera, Juan F. Ramirez Rochac, Univ. of the District of Columbia (United States) [7981-213]

*** Dynamic strain measurements with a luminescent photoelastic coating**, James P. Hubner, Daniel R. Gerber, The Univ. of Alabama (United States) [7981-214]

*** Bio-inspired somatosensor with modeling of viscoelastic responses**, Imin Kao, Dylan Tsai, Jun Nishiyama, Stony Brook Univ. (United States); Makoto Kaneko, Mitsuru Higashimori, Osaka Univ. (Japan) [7981-217]

Conference 7982

Characterization and compaction of Lamb wave data using a combination of S and wavelet transformations, Ibrahim N. Tansel, Gurjivan Singh, Gurjashan Singh, Florida International Univ. (United States); Benjamin L. Grisso, Liming W. Salvino, Naval Surface Warfare Ctr. Carderock Div. (United States) [7982-42]

Study on theoretic model of shape memory alloy metallic rubber based on contacted micro-beams theory and finite element simulation, Suchao Li, Hui Li, Harbin Institute of Technology (China); Chenxi Mao, China Earthquake Administration (China); Wentao Wang, Harbin Institute of Technology (China); Yagebai Zhao, Jilin Univ. (China) [7982-43]

Linear phased array of piezoelectric transducers for monitoring damage in composite panel using ultrasonic Lamb waves, Vivek T. Rathod, Nibir Chakraborty, D. Roy Mahapatra, Indian Institute of Science (India) [7982-44]

Displacement field monitoring in real-time with the magnetic survey technique, Minghua Huang, Harbin Institute of Technology (China); Zhi Zhou, Dalian Univ. of Technology (China) and Harbin Institute of Technology (China); Jianping He, Dalian Univ. of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) [7982-45]

An algorithm for a crack evaluation using the linearly integrated hall sensor array, Soon Geul Lee, Kyung Hee Univ. (Korea, Republic of) [7982-46]

Design of hetero-core microbend stress sensors and comparative analysis of various hetero-core sensor architectures, Ali K. Sahin, Univ. of Missouri-Columbia (Turkey); Hasan S. Efendioglu, Kemal Fidanboyul, Fatih Univ. (Turkey) [7982-47]

Conference 7983

6:00 pm: The challenge of next-generation construction materials and processes in sustainability and structural systems, H. Felix Wu, National Institute of Standards and Technology (United States) [7983-102]

Health monitoring of composites using magnetostrictive actuation and sensing, Anand Kumar, Harcourt Butler Technological Institute (India); Bishakh Bhattacharya, Indian Institute of Technology Kanpur (India) [7983-103]

Estimating the kernel mass in edible nuts nondestructively using a low-cost impedance meter, Chari V. Kandala, Jaya Sundaram, Agricultural Research Service (United States) [7983-104]

Utilization of ultrasonic guided waves to detect delamination in composite plates in aviation industries, Mohammad Riahi, Iran Univ. of Science and Technology (Iran, Islamic Republic of) [7983-105]

Analysis of stiffener impact on back wall effect in acoustic emission by using simulation test, Mohammad Riahi, Iran Univ. of Science and Technology (Iran, Islamic Republic of) . . [7983-106]

NDE of immersed metallic plates by guided and interface ultrasonic waves, Paul Wernitges, Elisabetta Pistone, Piervincenzo Rizzo, Univ. of Pittsburgh (United States); Jian-Gang Han, Hainan Univ. (China) [7983-107]

Posters · Tuesday · 6:00 to 7:30 pm

Conference attendees are invited to attend the joint poster session/exhibition reception to network, enjoy light refreshments, and view the poster papers. Attendees are required to wear their conference registration badge. Authors of poster papers will be present to answer questions concerning their papers. Poster authors must set up their poster between 10:00 am and 4:00 pm on Tuesday 8 March.

Long-term monitoring and field testing of an innovative multi-storey timber building. Piotr Omenzetter, Hugh Morris, Margaret Worth, The Univ. of Auckland (New Zealand); Varun Kohli, Univ. of California, Berkeley (United States); S. R. Uma, GNS Science (New Zealand) [7983-108]

Galloping comparative analysis for transient main cables of suspension bridge during construction. Shengli Li, Zhengzhou Univ. (China) [7983-109]

Continuous acoustic emission monitoring during an accelerated corrosion test. Matteo Di Benedetti, Univ. of Miami (United States); Giovanni Loreto, Univ. degli Studi di Napoli Federico II (Italy); Antonio Nanni, Fabio Matta, Univ. of Miami (United States); Miguel A. Gonzalez-Nunez, MISTRAS Group, Inc. (United States) [7983-110]

Pipe performance analysis with nonparametric regression. Zheng Liu, National Research Council Canada (Canada); Wei Wu, Sichuan Univ. (China); Yafei Hu, National Research Council Canada (Canada) [7983-111]

MIMO imaging for ultrasonic nondestructive testing. Ramazan Demirli, Villanova Univ. (United States); Xavier Rivencq, Institut National Polytechnique de Grenoble (France); Yimin D. Zhang, Villanova Univ. (United States); Cornel Ioana, Institut National Polytechnique de Grenoble (France); Moeness G. Amin, Villanova Univ. (United States) [7983-112]

Nondestructive image-based approaches for condition assessment of structures. Mohammad Reza Jahanshahi, Sami F. Masri, Gaurav S. Sukhatme, The Univ. of Southern California (United States) [7983-113]

Damage detection of structures using Bayesian support vector machine. Shumei Zhou, Hui Li, Harbin Institute of Technology (China) [7983-114]

Detection of inner and surface crack in railway wheel using a new sensing system. Seok-Jin Kwon, Korea Railroad Research Institute (Korea, Republic of) [7983-115]

Inspection of corrosion in carbody and under frame for rolling stocks using pulsed eddy current testing. Chan-woo Lee, Jong-duk Chung, Korea Railroad Research Institute (Korea, Republic of) [7983-116]

Study on fatigue damage mechanisms of BFRP using acoustic emission and scanning electron microscope. Wensong Zhou, Luyao Cai, Zhi QU, Hui Li, Harbin Institute of Technology (China) [7983-117]

Mechanical degradation of cross-ply laminates monitored by acoustic emission. Alkiviades Paipetis, Mary Xyrafa, Nektaria-Marianthi Barkoula, Theodore E. Matikas, Dimitrios G. Aggelis, Univ. of Ioannina (Greece) [7983-118]

Development of a C-Scan phased array ultrasonic imaging system using a 64-element 35MHz transducer. Fan Zheng, Changhong Hu, Lequan Zhang, Kirk K. Shung, The Univ. of Southern California (United States); Kevin A. Snook, Yu Liang, Wesley S. Hackenberger, TRS Technologies, Inc. (United States); Ruibin Liu, Xuecang Geng, Blatek, Inc. (United States); Xiaoning Jiang, North Carolina State Univ. (United States) [7983-119]

Model updating and prognosis of acoustic emission data in compact test specimens under cyclic loading. Boris A. Zarate, Juan M. Caicedo, Paul H. Ziehl, Jianguo Yu, Univ. of South Carolina (United States) [7983-121]

Static test of the embedded fiber bragg grating composite wind turbine blades. Zhong Huang, Zhichun Zhang, yanju liu, Jinsong Leng, Harbin Institute of Technology (China) [7983-122]

Assessment of PZT transducer bonding techniques under drop-weight impact loading in composites. Kyle R. Mulligan, Pierre-Claude Ostiguy, Patrice Masson, Said Elkoun, Nicolas Quaegebeur, Univ. de Sherbrooke (Canada) [7983-123]

Physics based classification of acoustic emission waveforms. Duwaraan Rajendra, Travis Knighton, Albert Esterline, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7983-124]

Characterization of heterogeneities using a numerical model of ultrasonic wave propagation in random polycrystalline microstructure. Arash Noshadravan, Roger G. Ghanem, The Univ. of Southern California (United States) [7983-125]

Estimation of post-earthquake capacity of bridges using vibration data. Reza Baghaei-Naeini, Marco Torbol, Maria Q. Feng, Univ. of California, Irvine (United States) [7983-126]

Laser ultrasound technique for material characterization of Zircaloy cladding tubes in elevated temperature environment. Cheng-Hung Yeh, Che-Hua Yang, National Taipei Univ. of Technology (Taiwan) [7983-127]

Software for comprehensive damage assessment of short-span bridges. Reza Baghaei-Naeini, Marco Torbol, Joosung Kang, Maria Q. Feng, Univ. of California, Irvine (United States) [7983-128]

Laser ultrasound technique for ray tracing investigation of Lamb wave tomography. Chia Han Wu, Che-Hua Yang, National Taipei Univ. of Technology (Taiwan) [7983-129]

Fabrication and characterization of PZT micro/nano-composites for strain sensors. Caifeng Chen, Jun Liu, Jiangsu Univ. (China); Xiaoning Jiang, North Carolina State Univ. (United States); Ying Luo, Jiangsu Univ. (China); Fuh-Gwo Yuan, North Carolina State Univ. (United States) [7983-130]

Application of anti-symmetric flexural modes for the detection of moisture. Po-Hsien Tung, Yang Che-Hua, National Taipei Univ. of Technology (Taiwan) [7983-131]

A novel fatigue meter based on annual ring mechanism. Shi Bai, Harbin Institute of Technology (China); Zhi Zhou, Dalian Univ. of Technology (China); Jinping Ou, Harbin Institute of Technology (China) [7983-134]

Thermal protection system (TPS) monitoring using acoustic emission. David A. Hurley, Dryver R. Huston, Douglas G. Fletcher, Walten Owens, The Univ. of Vermont (United States) [7983-135]

Combination of a GMR sensor and reconstruction algorithm: a novel magnetic sensing system. Akira Sasamoto, Takayuki Suzuki, National Institute of Advanced Industrial Science and Technology (Japan) [7983-136]

Live feed and variable snapshot recording of embedded magnetostrictive particulate sensors. Dustin L. Spayde, Oliver J. Myers, Jonathan Rudd, Mississippi State Univ. (United States) [7983-137]

Research status on aerodynamic interference effects of wind-resistant performance of pylon. Shengli Li, Zhengzhou Univ. (China) [7983-138]

Feasibility of villa constructed of glass fiber reinforced concrete. Shengli Li, Yu Lu, Dongwei Wang, Zhengzhou Univ. (China) [7983-139]

Conference 7984

A no-calorimetric method for measuring SAR in MRI. Fausto Acemese, Rocco Romano, Silvia Vilasi, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [7984-106]

MATCAKE: a flexible toolbox for 2D NMR spectra integration by CAKE algorithm. Fausto Acemese, Gerardo Giordano, Debora Paris, Rocco Romano, Silvia Vilasi, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [7984-107]

Intelligent monitoring of seismic damage identification using wireless smart sensors: design and validation. Jinho Kim, Korea Railroad Research Institute (Korea, Republic of); Young-Du Jang, Won-rak Jang, Seoul Metro (Korea, Republic of) [7984-108]

Reflective measurement of water concentration using millimeter wave illumination. Shijun Sung, David Bennett, Zach Taylor, Neha Bajwa, Priyamvada Tewari, Ashkan Maccabi, Martin Culjat, Rahul Singh, Warren Grundfest, Univ. of California, Los Angeles (United States) [7984-109]

Nonstationary thermal wave imaging techniques for nondestructive testing. Ravibabu Mulaveesala, Subbarao V. Ghali, M. Amamath, Vijay K. Gupta, Indian Institute of Information Technology (India); Masahiro Takei, Nihon Univ. (Japan) [7984-111]

Research progress of microbial corrosion of reinforced concrete structure. Shengli Li, Nan Jiang, Dongwei Wang, Zhengzhou Univ. (China); Jinping Ou, Dalian Univ. of Technology (China) [7984-112]

Microorganism index, physical, and chemical property of silt around pier in the typical area of yellow river. Shengli Li, Nai Jiang, Zhengzhou Univ. (China) [7984-113]

Wednesday · 9 March

Conference 7975

Conference 7976

Conference 7977

Conference 7978

Conference 7980

Wednesday Plenary Session

Wednesday 9 March 8:20 to 9:05 am

Pacific Salon I-III

Micro-computed Tomography: Towards Nanoscale Imaging

Randolf Hanke, Univ. Würzburg (Germany)



SESSION 8

Room: Royal Palm VI
Wed. 9:10 to 10:10 am

Fabrication and Applications II

Session Chair: **Akhlesh Lakhtakia**, The Pennsylvania State Univ.

9:10 am: **Control valve with the ability to 'dangle'**, Michael A. Meller, Rashi Tiwari, Ephraim Garcia, Cornell Univ. (United States) [7975-34]

9:30 am: **Biomimetic super-hydrophobic surfaces for use in enhanced dropwise condensation**, Sunwoo Kim, Univ. of Alaska Fairbanks (United States); Kwang J. Kim, Chiyoung Lee, Kuok Cheng, Mike Kennedy, Bong June Zhang, Hyungkee Yoon, Univ. of Nevada, Reno (United States); Jiong Liu, Ganesh Skandan, NEI Corp. (United States) [7975-35]

9:50 am: **Tunable ultrahydrophobic/phobic multiple roughness for heat transfer applications**, Bong J. Zhang, Chiyoung Lee, Jiyeon J. Park, Kwang J. Kim, Univ. of Nevada, Reno (United States) . . . [7975-37]
Coffee Break. 10:10 am

Concurrent Sessions

SESSION 7a

Room: Pacific Salon I-III
Wed. 9:10 to 10:10 am

ESNAM Special Session: Materials and Devices II

Session Chairs: **Herbert R. Shea**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Qibing Pei**, Univ. of California, Los Angeles

9:10 am: **Miniaturized EAPs with compliant electrodes fabricated by ion implantation (Invited Paper)**, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [7976-26]

9:50 am: **Model study on the parameter dependence of an electro-mechanical breakdown model for insulating elastomeric films**, Matthias Kollosche, Hristijan Stoyanov, Hülya Ragusch, Stefan Best, Guggi Kofod, Univ. Potsdam (Germany) [7976-27]
Coffee Break. 10:10 to 10:40 am

SESSION 7b

Room: Towne
Wed. 9:10 to 10:10 am

Field Activated EAP

Session Chairs: **Roy D. Kornbluh**, SRI International; **Jinsong Leng**, Harbin Institute of Technology (China)

9:10 am: **Transparent active skin**, Hyeok Yong Kwon, Hyeok Ryeol Choi, Kuang Jun An, Vuong Hong Phuc, Nguyen Canh Toan, Nguyen Huu Chuc, Ja Choon Koo, Hyungpil Moon, Jae-Do Nam, Young Kwan Lee, Sungkyunkwan Univ. (Korea, Republic of) [7976-77]

9:30 am: **Multilayer dielectric elastomer actuators with ion implanted electrodes**, Andres Punning, Samin Akbari, Muhamed Niklaus, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [7976-29]

9:50 am: **Multi-walled carbon nanotube (MWCNT) filled silicone as compliant electrodes for dielectric elastomer actuator**, Gih-Keong Lau, Xin Hui Neo, Soo Lim Chua, Nanyang Technological Univ. (Singapore) [7976-30]
Coffee Break. 10:10 to 10:40 am

SESSION 7

Room: Sunrise
Wed. 9:10 am to 12:00 pm

Passive and Active Vibration Isolation Systems III: Magnetorheological Systems

9:10 am: **Semi-active magnetorheological refueling probe systems for aerial refueling events**, Young-Tai Choi, Norman M. Wereley, Univ. of Maryland, College Park (United States) [7977-32]

9:30 am: **Magnetorheological elastomer mount for shock and vibration isolation**, Barkan M. Kavlicoglu, Bryce Wallis, Huseyin Sahin, Yanming Liu, Advanced Materials and Devices, Inc. (United States) [7977-33]

9:50 am: **Dynamic behavior of thick magnetorheological elastomers**, Norman Johnson, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) [7977-34]
Coffee Break. 10:10 to 10:40 am

SESSION 8

Room: Royal Palm II
Wed. 9:10 to 10:10 am

SMPs

Session Chairs: **Barbar J. Akle**, Lebanese American Univ. (Lebanon); **Thomas Wallmersperger**, Technische Univ. Dresden (Germany)

9:10 am: **Compressive response of epoxy-based shape memory polymers**, Haluk E. Karaca, Burak Basaran, Mohammad Souri, Kevin Wieman, Univ. of Kentucky (United States) [7978-51]

9:30 am: **On a novel self regulating shape memory polymer composite**, Seyul Son, Virginia Polytechnic Institute and State Univ. (United States); Kyungmook Park, Univ. of Michigan (United States); Eric M. Mockensturm, The Pennsylvania State Univ. (United States); Nakhlah C. Goulbourne, Univ. of Michigan (United States) [7978-52]

9:50 am: **Three-dimensional numerical implementation of a thermoelastic, finite deformation constitutive model for shape memory polymers**, Brent L. Volk, Dimitris C. Lagoudas, Duncan J. Maitland, Texas A&M Univ. (United States) [7978-53]
Coffee Break. 10:10 to 10:40 am

SESSION 10

Room: Royal Palm III
Wed. 9:10 to 10:00 am

Fabrication and Characterization I

Session Chair: **Sungryul Yun**, Inha Univ. (Korea, Republic of)

9:10 am: **X-ray diffraction wafer mapping method for SiGe twin defects control**, Yeonjoon Park, Hyun-Jung Kim, Glen C. King, NASA Langley Research Ctr. (United States); Kunik Lee, Turner-Fairbank Highway Research Ctr. (United States); Sang H. Choi, NASA Langley Research Ctr. (United States) [7980-30]

9:30 am: **Micropatternable nanocomposite polymers for MEMS: process technology and applications (Invited Paper)**, Ajit Khosla, Simon Fraser Univ. (Canada) [7980-31]
Coffee Break. 10:00 to 10:30 am

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Wednesday · 9 March

Conference 7981

Conference 7982

Conference 7983

Conference 7984

Wednesday Plenary Session

Wednesday 9 March 8:20 to 9:05 am

Pacific Salon I-III

Micro-computed Tomography: Towards Nanoscale Imaging

Randolf Hanke, Univ. Würzburg (Germany)



Concurrent Sessions

SESSION 8a

Room: Pacific Salon IV-VWed. 9:10 to 10:10 am

Modeling of Guided Waves

Session Chairs: Kumar V. Jata, Asian Office of Aerospace Research and Development; **Victor Giurgiutiu**, Univ. of South Carolina

9:10 am: **Integrated impedance and guided wave based damage detection under temperature variation**, Yunkyu An, Hoon Sohn, KAIST (Korea, Republic of) [7981-59]

9:30 am: **Damage detection using time reversal imaging technique**, Shuntao Liu, Fuh-Gwo Yuan, North Carolina State Univ. (United States) [7981-60]

9:50 am: **Singularity analysis using continuous wavelet transform for EMAT ultrasonic measurement of lubricant film thickness**, Jingpin Jiao, Zhang Qiang, W. H. Liu, Cunfu He, Bin Wu, Beijing Univ. of Technology (China) [7981-61]

Coffee Break 10:10 to 10:40 am

SESSION 8b

Room: Pacific Salon VI-VII Wed. 9:10 to 10:10 am

Bio-inspired Sensors I

Session Chairs: Akira Mita, Keio Univ. (Japan); **Jin-Song Pei**, The Univ. of Oklahoma

9:10 am: **Biofied building: interactive and adaptive building using sensor agent robots**, Akira Mita, Keio Univ. (Japan) [7981-62]

9:30 am: **Distributed neural computations for embedded sensor networks**, Courtney Peckens, Jerome P. Lynch, Univ. of Michigan (United States); Jin-song Pei, The Univ. of Oklahoma (United States) [7981-63]

9:50 am: **Fly-ear inspired directional microphone: effects of air cavity**, Haijun Liu, Miao Yu, Univ. of Maryland, College Park (United States) [7981-64]

Coffee Break 10:10 to 10:40 am

SESSION 8c

Room: Sunset Wed. 9:10 to 10:10 am

Finite Element Updating for SHM

Session Chair: Xingwei Wang, Univ. of Massachusetts Lowell

9:10 am: **Finite element modeling of an optical fiber photoacoustic generator performance**, Kai Sun, Nan Wu, Xingwei Wang, Univ. of Massachusetts Lowell (United States) [7981-65]

9:30 am: **Long term seismic response monitoring, finite element modeling and model updating of a concrete building**, Piotr Omenzetter, Faheem Butt, The Univ. of Auckland (New Zealand) [7981-66]

9:50 am: **Study on finite element model updating of distributed structural health monitoring system**, Yuxin Zhang, Shanghai Normal Univ. (China); B. F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States); Haishan Wu, East China Jiaotong Univ. (China) [7981-67]

Coffee Break 10:10 to 10:40 am

SESSION 8

Room: Royal Palm IV Wed. 9:10 to 10:10 am

Thermography Sensors

Session Chair: Jinsong Leng, Harbin Institute of Technology (China)

9:10 am: **Developing damage metrics for metallic structures undergoing fatigue using real-time thermographic evaluation**, Evangelos Z. Kordatos, Theodore E. Matikas, Univ. of Ioannina (Greece) [7982-31]

9:30 am: **Monitoring of fatigue damage in metal plates by acoustic emission and thermography**, Evangelos Z. Kordatos, Dimitrios G. Aggelis, Theodore E. Matikas, Univ. of Ioannina (Greece) [7982-32]

9:50 am: **Combined NDT methods for characterization of subsurface cracks in concrete**, Maria Strantz, Evangelos Z. Kordatos, Dimitra V. Soulioti, Theodore E. Matikas, Dimitrios G. Aggelis, Univ. of Ioannina (Greece) [7982-33]

Coffee Break 10:10 to 10:30 am

SESSION 8

Room: Royal Palm V Wed. 9:10 am to 12:10 pm

NIST Technology Innovation Program on Civil Infrastructure Critical National Need: Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems III

Session Chairs: Ming L. Wang, Northeastern Univ.; **Valery Franciscio Godinez-Azuaga**, MISTRAS Group, Inc.

9:10 am: **ANDERS: future of concrete bridge deck evaluation and rehabilitation (Invited Paper)**, Nenad Gucunski, Rutgers, The State Univ. of New Jersey (United States); Franklin L. Moon, Drexel Univ. (United States) [7983-68]

9:40 am: **Rapid impact testing for quantitative assessment of large populations of bridges**, Yun Zhou, Jian Zhang, John Prader, Franklin L. Moon, A. Emin Aktan, Drexel Univ. (United States) [7983-69]

10:00 am: **Air-coupled sensing to characterize delaminations in concrete**, Jinying Zhu, Xiaowei Dai, Yi-Te Tsai, Michael Haberman, The Univ. of Texas at Austin (United States) [7983-70]

Coffee Break 10:20 to 10:50 am

SESSION 8

Room: Royal Palm I Wed. 9:10 to 10:10 am

Guided Waves for Impact Monitoring

Session Chairs: Francesco Lanza di Scalea, Univ. of California, San Diego; **Hoon Sohn**, KAIST (Korea, Republic of)

9:10 am: **Validation of the piezoelectric rosette technique for locating impacts in complex aerospace panels**, Salvatore Salamone, Univ. at Buffalo (United States); Ivan Bartoli, Drexel Univ. (United States); Jennifer Rhymer, Francesco Lanza di Scalea, Hyonny Kim, Univ. of California, San Diego (United States) [7984-48]

9:30 am: **Impact force identification in aerospace panels by an inverse ultrasonic guided wave problem**, Ivan Bartoli, Drexel Univ. (United States); Salvatore Salamone, Univ. at Buffalo (United States); Jennifer Rhymer, Francesco Lanza di Scalea, Hyonny Kim, Univ. of California, San Diego (United States) [7984-49]

9:50 am: **Impact localization in an aircraft fuselage using laser based time reversal**, Hoon Sohn, KAIST (Korea, Republic of); Martin P. DeSimio, Sterven E. Olson, Univ. of Dayton Research Institute (United States); Mark Derriso, Air Force Research Lab. (United States) [7984-50]


Coffee Break 10:10 to 10:40 am

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Wednesday · 9 March

Conference 7976	Conference 7977	Conference 7978	Conference 7980
<p style="text-align: center;">Concurrent Sessions</p> <hr/> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 8a</p> <p style="text-align: center;">Room: Pacific Salon I-III Wed. 10:40 to 11:20 am</p> <p style="text-align: center;">ESNAM Special Session: Materials and Devices III</p> <p><i>Session Chairs: Edwin W. H. Jager, Linköping Univ. (Sweden); John David W. Madden, The Univ. of British Columbia (Canada)</i></p> <p>10:40 am: Superposition principle for analyzing the memory effect of conducting polymers, Hyacinthe Randriamahazaka, Cloteau Sylvain, Martin Pascal, Ghilane Jala, Trippé-Allard Gaelle, Jean-Christophe Lacroix, Univ. Paris 7-Denis Diderot (France)[7976-31]</p> <p>11:00 am: Dielectric elastomer actuators aith granular coupling, Federico Carpi, Gabriele Frediani, Massimo Nanni, Danilo De Rossi, Univ. of Pisa Italy) [7976-32]</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 8b</p> <p style="text-align: center;">Room: Towne Wed. 10:40 to 11:20 am</p> <p style="text-align: center;">Ionic EAP</p> <p><i>Session Chairs: Keiichi Kaneto, Kyushu Institute of Technology (Japan); Kwang J. Kim, Univ. of Nevada, Reno</i></p> <p>10:40 am: Learning and training effects in conducting polymer artificial muscles, Keiichi Kaneto, Masaki Ishii, Kazuo Tominaga, Kyushu Institute of Technology (Japan) [7976-33]</p> <p>11:00 am: Altering the structure of conjugated polymers and the impact on electrodynamic performance, Daniel S. Melling, Stephen A. Wilson, Cranfield Univ. (United Kingdom); Magnus Berggren, Edwin W. Jager, Linköping Univ. (Sweden)[7976-34]</p> </div> </div> <hr/> <p style="text-align: center;">Concurrent Sessions</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 9a</p> <p style="text-align: center;">Room: Pacific Salon I-III Wed. 11:20 am to 12:20 pm</p> <p style="text-align: center;">Haptic and Braille Displays I</p> <p><i>Session Chairs: Qiming M. Zhang, The Pennsylvania State Univ.; Tushar K. Ghosh, North Carolina State Univ.</i></p> <p>11:20 am: Refreshable tactile displays based on bistable electroactive polymer (BSEP), Xiaofan Niu, Brandon Salazar, Paul Brochu, Qibing Pei, Univ. of California, Los Angeles (United States) [7976-35]</p> <p>11:40 am: PVDF actuators for Braille displays: design, fabrication process, and testing, Thomas Levard, Paul J. Diglio, Lee J. Gorny, Christopher D. Rahn, Qiming M. Zhang, Minren Lin, The Pennsylvania State Univ. (United States) . . . [7976-36]</p> <p>12:00 pm: Combined driving and sensing circuitry for dielectric elastomer actuators in mobile applications, Marc Matysek, Philips Research Nederland B.V. (Netherlands); Henry Haus, Technische Univ. Darmstadt (Germany); Holger Moessinger, Dirk Brokken, Philips Research Nederland B.V. (Netherlands); Peter Lotz, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7976-37]</p> <p>Lunch/Exhibition Break 12:20 to 1:30 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 9b</p> <p style="text-align: center;">Room: Towne Wed. 11:20 am to 12:20 pm</p> <p style="text-align: center;">Ionic EAP (continued)</p> <p><i>Session Chairs: Keiichi Kaneto, Kyushu Institute of Technology (Japan); Kwang J. Kim, Univ. of Nevada, Reno</i></p> <p>11:20 am: Effects of TEOS concentration on the mechanical properties of ionic polymer metal composite, Qingsong He, Min Yu, Dongjie Guo, Zhendong Dai, Nanjing Univ. of Aeronautics and Astronautics (China) [7976-38]</p> <p>11:40 am: Frequency response of IPMC actuator with palladium electrode, Takuma Kobayashi, Masaki Omiya, Keio Univ. (Japan) [7976-39]</p> <p>12:00 pm: Millimeter thick ionic polymer membrane-based IPMCs with bimetallic Pd-Pt electrodes, Vijjar Palmre, Sungjun Kim, Kwang J. Kim, Univ. of Nevada, Reno (United States); Alvo Aabloo, Univ. of Tartu (Estonia) [7976-40]</p> <p>Lunch/Exhibition Break 12:20 to 1:30 pm</p> </div> </div>	<p>10:40 am: Electrical conductivity in magnetorheological elastomers, Praveen Mysore, Nima Ghaforianfar, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) [7977-35]</p> <p>11:00 am: Thick magnetorheological elastomers, Praveen Mysore, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) [7977-35]</p> <p>11:20 am: Effects of temperature on performance of a compressible magnetorheological fluid suspension system, Michael McKee, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) [7977-37]</p> <p>11:40 am: Design of a preview semi-active vehicle suspension with MR damper based on a PID control strategy with nonlinear differentiator, Xinzheng Huang, Zhengchao Xie, Univ. of Macau (Macao, China) [7977-38]</p> <p>Lunch/Exhibition Break 12:00 to 1:30 pm</p>	<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Royal Palm II Wed. 10:40 to 11:55 am</p> <p style="text-align: center;">Magneto-responsive Materials</p> <p><i>Session Chairs: LeAnn E. Faidley, Iowa State Univ.; Vishnu Baba Sundaresan, Virginia Commonwealth Univ.</i></p> <p>10:40 am: Giant electrical tuning of magnetic properties in magnetolectric heterostructures using (110) PMN-PT single crystal, Tao Wu, Alexandre Bur, Gregory P. Carman, Univ. of California, Los Angeles (United States) . . . [7978-54]</p> <p>10:55 am: Rate-dependent deformation of magneto active polymer, Yi Han, Wei Hong, LeAnn E. Faidley, Iowa State Univ. (United States)[7978-55]</p> <p>11:10 am: Design and fabrication of a micro-scale magnetolectric surgical tool, Joshua Clarke, Vishnu Baba Sundaresan, Virginia Commonwealth Univ. (United States) [7978-56]</p> <p>11:25 am: Preliminary model of a 3D dynamically loaded Galfenol based stress sensor using rate equations, Philip C. Weetman, George Akhras, Royal Military College of Canada (Canada) [7978-57]</p> <p>11:40 am: 3D dynamic finite element model for magnetostrictive Galfenol-based devices, Suryarghya Chakrabarti, Marcelo J. Dapino, The Ohio State Univ. (United States) [7978-58]</p> <p>Lunch/Exhibition Break 11:55 am to 1:25 pm</p>	<p style="text-align: center;">SESSION 11</p> <p style="text-align: center;">Room: Royal Palm III Wed. 10:30 am to 12:10 pm</p> <p style="text-align: center;">Fabrication and Characterization II</p> <p><i>Session Chair: Jin-Ho Kang, Inha Univ. (Korea, Republic of)</i></p> <p>10:30 am: Use of the electro-mechanical impedance method for the assessment of dental implant stability, Giovanni Boemio, Piervincenzo Rizzo, Univ. of Pittsburgh (United States); Luigi De Nardo, Politecnico di Milano (Italy) [7980-32]</p> <p>10:50 am: System-in-package LTCC platform for 3D RF to millimeter wave modules, Tauno Vaha-Heikkila, VTT Technical Research Ctr. of Finland (Finland); Markku Lahti, VTT Elektronikka (Finland) [7980-33]</p> <p>11:10 am: Preparation and characterization of fluorinated cellulose material, John Amalraj, Jin-Ho Kang, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-35]</p> <p>11:30 am: Roll-to-roll manufacturing and nanoimprint technology for flexible electronics and smart sensor systems in engineering and medicine, Vijay K. Varadan, Univ. of Arkansas (United States); Jaehwan Kim, Inha Univ. (Korea, Republic of); Sang H. Choi, NASA Langley Research Ctr. (United States) [7980-36]</p> <p>Lunch/Exhibition Break 11:50 am to 1:30 pm</p>
	<p style="text-align: center;">Room: Royal Palm VI Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Biomimicry, Bioinspiration, and the San Diego Zoo: The Zoo as a Living Library and Resource for Innovation</p> <p style="text-align: center;">Part of Conference 7975</p> <p>Nature has developed solutions to nearly every design problem found on this planet. Not only are these solutions innovative and elegant, they are also closed-loop and in harmony with the ecosystem. Biomimicry is the discipline of observing nature and applying nature's lessons to human design and innovation. If we can learn to design, manufacture, and live according to nature's principles, we can develop the tools needed to transform our world.</p> <p>The San Diego Zoo has developed biomimicry education workshops that bridge the connection between nature and innovation. By sharing our knowledge of the unique characteristics of the plants and animals we steward, we hope to inspire better and more efficient designs, systems, and processes.</p> <p>This session will include an introduction to biomimetic processing, interactive exercises to help stimulate creative thinking, and a discussion of new bio-inspired concepts. There will also be a special presentation by a San Diego Zoo "animal ambassador."</p>		 <p style="font-size: 1.2em; font-weight: bold;">Find the answer</p> <p style="font-size: 0.8em;">SPIEDigitalLibrary.org</p>

Wednesday · 9 March

Conference 7981	Conference 7982	Conference 7983	Conference 7984	
Concurrent Sessions				
SESSION 9a	SESSION 9b	SESSION 9c	SESSION 8	
<p style="text-align: center;">Room: Pacific Salon IV-V Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Bridge Monitoring Technologies I</p> <p><i>Session Chairs: Branko Glisic, Princeton Univ.; Lizhi Sun, Univ. of California, Irvine</i></p> <p>10:40 am: Data analysis for long-term structural health monitoring on a continuous rigid frame bridge, Lei Wang, Harbin Institute of Technology (China); Dongsheng Li, Jinping Ou, Dalian Univ. of Technology (China). [7981-68]</p> <p>11:00 am: Monitoring system for the bolt joints on steel bridges, Ki Tae Park, Hyunsup Shin, YoungJoon Yoo, Korea Institute of Construction Technology (Korea, Republic of) [7981-69]</p> <p>11:20 am: structural performance assessment of Hongxing Bridge based on distributed long-gage sensors under ambient vibration, Hong Wan, Zhishen Wu, Caiqian Yang, Southeast Univ. (China) [7981-70]</p> <p>11:40 am: Health monitoring of prestressing tendons in post-tensioned concrete structures, Salvatore Salamone, Univ. at Buffalo (United States); Ivan Bartoli, Drexel Intelligent Infrastructure Institute (United States); Robert Phillips, Claudio Nucera, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) [7981-71]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p style="text-align: center;">Room: Pacific Salon VI-VII Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Bio-inspired Sensors II</p> <p><i>Session Chairs: Akira Mita, Keio Univ. (Japan); Jin-Song Pei, The Univ. of Oklahoma</i></p> <p>10:40 am: Biomimetic ears for a sensor agent robot to localize sound sources, Daniel J. Marin, Akira Mita, Keio Univ. (Japan) [7981-72]</p> <p>11:00 am: Biofied room integrated with sensor agent robots to interact with residents and acquire environmental information, Fumi Sakurai, Akira Mita, Keio Univ. (Japan). [7981-73]</p> <p>11:20 am: Mimicking the human nervous system with a triboluminescence sensory receptor for the structural health monitoring of composite structures, David O. Olawale, William Sullivan, Tarik Dickens, Okenwa O. Okoli, Ben Wang, The Florida State Univ. (United States) [7981-74]</p> <p>11:40 am: Decentralized simultaneous localization and mapping for robotic networks, Rubyca Jaai, Nikhil Chopra, Balakumar Balachandran, Univ. of Maryland, College Park (United States); Hamad Karki, The Petroleum Institute (United Arab Emirates). [7981-75]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p style="text-align: center;">Room: Sunset Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Pattern Classification Methods in SHM</p> <p><i>Session Chairs: Michael K. Philen, Virginia Polytechnic Institute and State Univ.; Aditi Chattopadhyay, Arizona State Univ.</i></p> <p>10:40 am: Adaptive measurement selection for progressive damage estimation, Wenfan Zhou, Narayan Kovvali, Antonia Papandreou-Suppappola, Pedro Peralta, Aditi Chattopadhyay, Arizona State Univ. (United States). [7981-76]</p> <p>11:00 am: Damage detection for plate-like structure using matching pursuits with chirplet atom, Yongming Feng, Li Zhou, Zhen Li, Nanjing Univ. of Aeronautics and Astronautics (China) [7981-77]</p> <p>11:20 am: The use of matching pursuit decomposition for damage detection and localization in complex structures, Seung Bum Kim, Aditi Chattopadhyay, Arizona State Univ. (United States); An-Dien Nguyen, Los Gatos Research, Inc. (United States) [7981-78]</p> <p>11:40 am: * Damage classification using signal processing and machine learning in structural health monitoring, Daewon Kim, Michael Philen, Virginia Polytechnic Institute and State Univ. (United States) . [7981-79]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p style="text-align: center;">Room: Royal Palm IV Wed. 10:30 am to 1:10 pm</p> <p style="text-align: center;">Acoustics Sensors</p> <p><i>Session Chair: Norbert G. Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren</i></p> <p>10:30 am: Damage location using fiber optic acoustic emission sensors for structure health monitoring, Tao Fu, Zaiwen Lin, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China). [7982-34]</p> <p>10:50 am: Acoustic emission felicity ratio measurements in carbon composites laminates using fiber Bragg grating sensors, Nehemiah J. Mabry, The Univ. of Alabama in Huntsville (United States); Curtis E. Banks, NASA Marshall Space Flight Ctr. (United States); H. Toutanji, The Univ. of Alabama in Huntsville (United States) [7982-35]</p> <p>11:10 am: Structural health monitoring of shear waves in aluminum plates, Wesley B. Williams, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7982-36]</p> <p>11:30 am: Monitoring of a wind turbine rotor blade with acousto ultrasonics and acoustic emission techniques, Lars Schubert, Eberhard Schulze, Bernd Frankenstein, Daniel Fischer, Bianca Weinhacht, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany). [7982-48]</p> <p>11:50 am: Damage location in composite laminates with ultrasonic sensors and artificial neural networks, Zachary T. Kral, Walter Horn, James Steck, Wichita State Univ. (United States) [7982-37]</p> <p>12:10 pm: An evaluation of signal processing tools for improving phased array ultrasonic weld inspection, Pradeep Ramuhalli, Susan Crawford, Anthony D. Cinson, Aaron A. Diaz, Michael T. Anderson, Pacific Northwest National Lab. (United States) [7982-38]</p> <p>12:30 pm: Simulation on photoacoustic conversion efficiency of optical fiber-based ultrasound generator using different absorbing film materials, Kai Sun, Nan Wu, Xingwei Wang, Univ. of Massachusetts Lowell (United States) [7982-39]</p> <p>12:50 pm: Vibration suppression and damage detection in smart composite laminate using high precision finite element, Anand Kumar, Harcourt Butler Technological Institute (India); Bishakh Bhattacharya, Indian Institute of Technology Kanpur (India) [7982-41]</p>	<p style="text-align: center;">Room: Royal Palm I Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Vibration-Based SHM</p> <p><i>Session Chairs: George Zentai, Varian Medical Systems, Inc.; Sourav Banerjee, Acellent Technologies, Inc.</i></p> <p>10:40 am: Turbine engine disk health monitoring assessment using spin test data, Ali Abdul-Aziz, Mark R. Woike, John D. Lekki, George Y. Baaklini, NASA Glenn Research Ctr. (United States). . . [7984-51]</p> <p>11:00 am: Vibration characteristics of shear loaded postbuckled aluminum panels, Bashir M. Ali, Wesley B. Williams, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7984-52]</p> <p>11:20 am: Vibration-based detection of fatigue cracks in structures, Pejman Razi, Farid Taheri, Dalhousie Univ. (Canada) . . . [7984-53]</p> <p>11:40 am: Structural health monitoring by high-frequency vibration measurement with non-contact laser excitation, Itsuro Kajiwara, Daisuke Miyamoto, Hokkaido Univ. (Japan); Naoki Hosoya, Shibaura Institute of Technology (Japan); Chiaki Nishidome, Catec Inc. (Japan) [7984-54]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>

Wednesday · 9 March

Conference 7976

Concurrent Sessions

SESSION 10a

Room: Pacific Salon I-III
Wed. 1:30 to 2:30 pm

Haptic and Braille Displays II

Session Chairs: **Helmut F. Schlaak**, Technische Univ. Darmstadt (Germany); **Marc Matysek**, Philips Research Nederland B.V. (Netherlands)

1:30 pm: **Opportunities for micro-steerable catheters and tactile feedback technology with high performance electrostrictive EAPs**, Sheng Liu, Brian C. Zellers, Dean Anderson, Paul W. Rehrig, Strategic Polymer Sciences, Inc. (United States) . . . [7976-41]

1:50 pm: **Haptic device development based on electro static force of cellulose electro active paper**, Gyu-young Yun, Sungryul Yun, Sang-Dong Jang, Inha Univ. (Korea, Republic of); Sang Yeon Kim, Korea Univ. of Technology and Education (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) . . . [7976-42]

2:10 pm: **Opportunities of hydrostatically coupled dielectric elastomer actuators for haptic interfaces**, Federico Carpi, Gabriele Frediani, Danilo De Rossi, Univ. of Pisa (Italy) . . . [7976-43]

SESSION 11a

Room: Pacific Salon I-III
Wed. 2:30 to 6:00 pm

ESNAM Special Session: Applications and Controls

Session Chairs: **Iain A. Anderson**, The Univ. of Auckland (New Zealand); **Juergen Maas**, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany)

2:30 pm: **Actuators, biomedicine, and cellbiology (Invited Paper)**, Edwin W. H. Jager, Linköping Univ. (Sweden) . . . [7976-49]
Coffee Break. 3:10 to 3:40 pm

SESSION 10b

Room: Towne
Wed. 1:30 to 2:50 pm

Ionic EAP (continued)

Session Chairs: **Keiichi Kaneto**, Kyushu Institute of Technology (Japan); **Kwang J. Kim**, Univ. of Nevada, Reno

1:30 pm: **Multi-component single-substrate conducting polymer actuation systems and fabrication techniques**, Eli Paster, Bryan P. Ruddy, Ian W. Hunter, Massachusetts Institute of Technology (United States) . . . [7976-44]

1:50 pm: **TiO₂-doped ionic polymer-metal composite**, Youngsoo Jung, Sungjun Kim, Kwang J. Kim, Univ. of Nevada, Reno (United States) . . . [7976-45]

2:10 pm: **Ionic actuators derived from selectively solvated block copolymers**, Pruthesh H. Vargantwar, Tushar K. Ghosh, Richard J. Spontak, North Carolina State Univ. (United States) . . . [7976-46]

2:30 pm: **Multi-segment IPMC sensor-actuators**, Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Toshiharu Mukai, RIKEN (Japan) . . . [7976-47]

2:50 pm: **Development of high-performance electro-active polymer actuators via optimization of conductor network composite layer using self-assembled nanoparticles**, Reza Montazami, Dong Wang, Virginia Polytechnic Institute and State Univ. (United States); Sheng Liu, Yang Liu, Qiming M. Zhang, The Pennsylvania State Univ. (United States); James R. Heflin, Virginia Polytechnic Institute and State Univ. (United States) . [7976-48]
Coffee Break. 3:10 to 3:40 pm

Conference 7977

Concurrent Sessions

SESSION 8A

Room: Sunrise
Wed. 1:30 to 3:10 pm

Magnetorheological Systems

1:30 pm: **MRF-actuator concepts for HMI and industrial applications**, Jürgen Maas, Dirk Güth, Ansgar Wiehe, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) . . . [7977-98]

1:50 pm: **Elimination of spades in wheeled military vehicles using MR-fluid dampers**, Nader Vahdati, The Petroleum Institute (United Arab Emirates); Ashkan H. Hosseinloo, Nanyang Technological Univ. (Singapore) . . . [7977-40]

2:10 pm: **Design and analysis of a self-powered, self-sensing magnetorheological damper**, Chao Chen, Wei-Hsin Liao, The Chinese Univ. of Hong Kong (Hong Kong, China) . . . [7977-41]

2:30 pm: **Optimal design of a disc-type MR brake for motorcycle application**, Quoc-Hung Nguyen, Ho Chi Minh City Univ. of Technology (Viet Nam); Jun-Cheol Jeon, Seung-Bok Choi, Inha Univ. (Korea, Republic of) . . . [7977-42]

2:50 pm: **Optimal design of a hybrid MR brake for haptic wrist application**, Quoc Hung Nguyen, Ho Chi Minh City Univ. of Technology (Viet Nam); Phuong-Bac Nguyen, Seung-Bok Choi, Inha Univ. (Korea, Republic of) . . . [7977-43]
Coffee Break. 3:10 to 3:40 pm

SESSION 8B

Room: Royal Palm IV
Wed. 1:30 to 2:30 pm

SMA- and Piezo-Based Materials and Systems

1:30 pm: **Design of a controllable shape-memory-actuator with mechanical lock function**, Reimund Neugebauer, Wolf-Guntram Drossel, Kenny Pagel, André Bucht, Arne Zerneke, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany) . . . [7977-44]

1:50 pm: **Design of an antagonistic shape memory alloy actuator for flap type control surfaces**, Burcu Donmez, Bülent Ozkan, TÜBITAK SAGE (Turkey) . . . [7977-45]

2:10 pm: **Seismic retrofit of structures using super elastic behavior of shape memory alloys**, Mehdi Ghassemieh, Hossein Salahshoor, Hossein Honarvar Gheitanbaf, Univ. of Tehran (Iran, Islamic Republic of) . . . [7977-47]

SESSION 9B

Room: Royal Palm IV
Wed. 2:30 to 5:00 pm

Aircraft, MAV/UAV, and Morphing Systems

2:30 pm: **Performance modeling of unmanned aerial vehicles with on board energy harvesting**, Steven R. Anton, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) . . . [7977-53]

2:50 pm: **Equivalent models of corrugated laminates for morphing skins**, Yuying Xia, Michael I. Friswell, Swansea Univ. (United Kingdom) . . . [7977-54]
Coffee Break. 3:10 to 3:40 pm

Conference 7978

SESSION 10

Room: Royal Palm II
Wed. 1:25 to 3:05 pm

SMA's I

Session Chairs: **Darren John Hartl**, Texas A&M Univ.; **Manuel Collet**, Univ. de Franche-Comté (France)

1:25 pm: **FE modeling of multiple SMA wire actuated adaptive structures**, Nicole Lewis, Stefan S. Seelecke, North Carolina State Univ. (United States) . . . [7978-05]

1:45 pm: **The accumulation of retained martensite during thermomechanical cycling of NiTi shape memory alloys**, Parikshith K. Kumar, Texas A&M Univ. (United States); Celia Caer, Ecole Nationale Supérieure d'Ingénieurs (United States); Etienne Patoor, Ecole Nationale Supérieure d'Arts et Métiers (France); Dimitris C. Lagoudas, Texas A&M Univ. (United States) . . . [7978-06]

2:05 pm: **Two-way shape memory behaviour of Ni-Ti-Hf based high-temperature shape memory alloys**, Haluk E. Karaca, Burak Basaran, Gurdish S. Ded, Sayed Saghaian, Univ. of Kentucky (United States); Ronald D. Noebe, NASA Glenn Research Ctr. (United States); Hans J. Maier, Univ. Paderborn (Germany) . . . [7978-07]

2:25 pm: **A combined phase transformation-deformation mechanism map for Ti_{50.5}Pd₃₀Ni_{19.5} high temperature shape memory alloy**, Parikshith K. Kumar, Ibrahim Karaman, Dimitris C. Lagoudas, Texas A&M Univ. (United States); Ronald D. Noebe, NASA Glenn Research Ctr. (United States) . . . [7978-08]

2:45 pm: **A multi-block-spin-method based on statistical physics describing martensitic phase transformation**, Michael Fischlschweiger, Materials Ctr. Leoben Forschung GmbH (Austria); Eduard R. Oberaigner, Montan Univ. Leoben (Austria); Georges Cailletaud, Mines ParisTech (France); Thomas Antretter, Montan Univ. Leoben (Austria) . . . [7978-09]
Coffee Break. 3:05 to 3:35 pm

Conference 7980

SESSION 12

Room: Royal Palm III
Wed. 1:30 to 3:10 pm

Applications I

Session Chair: **Hargsoon Yoon**, Univ. of Arkansas

1:30 pm: **Logical and thermodynamic analysis of 2-dot quantum-dot cellular automata super cell**, Loyd R. Hook IV, Samuel C. Lee, The Univ. of Oklahoma (United States) . . . [7980-37]

1:50 pm: **Electrical and noise characteristics of graphene devices: prospects of electronic and sensor applications**, Alexander A. Balandin, Univ. of California, Riverside (United States) [7980-38]

2:10 pm: **Electrochemical investigation of nano-electrodes for biomedical sensing applications in the brain**, Courtney S. Smith, Christopher M. Bowie, Christopher E. Keyes, Kyo D. Song, Norfolk State Univ. (United States); Vijay K. Varadan, Univ. of Arkansas (United States); Woong-Ki Kim, Eastern Virginia Medical School (United States); Hargsoon Yoon, Norfolk State Univ. (United States) . . . [7980-39]

2:30 pm: **Near field effects of millimeter-wave power transmission for medical applications**, Kyo D. Song, Norfolk State Univ. (United States); Hargsoon Yoon, Univ. of Arkansas (United States); Sang H. Choi, NASA Langley Research Ctr. (United States) . . . [7980-40]

2:50 pm: **Nanotechnology based soldier portable power systems and management**, Vijay K. Varadan, Univ. of Arkansas (United States) . . . [7980-41]
Coffee Break. 3:10 to 3:40 pm

Wednesday · 9 March

Conference 7981

Concurrent Sessions

SESSION 10a

**Room: Pacific Salon IV-V
Wed. 1:30 to 3:10 pm**

Bridge Monitoring Technologies II

Session Chairs: **Branko Glisic**, Princeton Univ.; **Genda Chen**, Missouri Univ. of Science and Technology

1:30 pm: **Strecker Bridge: the impact of monitoring on decision making**, Daniele Zonta, Univ. degli Studi di Trento (Italy); Sigrid Adriaenssens, Branko Glisic, Princeton Univ. (United States). [7981-80]

1:50 pm: **Strecker Bridge: a comparison between Bragg-gratings long-gauge strain and temperature sensors and Brillouin scattering-based distributed strain and temperature sensors**, Branko Glisic, Jeremy Chen, Princeton Univ. (United States) [7981-81]

2:10 pm: **Development of structural health monitoring systems for railroad bridge testbeds**, Hyun-Jun Park, Jiyoung Min, Chung-Bang Yun, KAIST (Korea, Republic of); Min-Ho Shin, Korea Railroad Research Institute (Korea, Republic of); Yong-Su Kim, Korea Infrastructure Safety and Technology Corp. (Korea, Republic of); Su-Yeol Park, KM. Co. Ltd. (Korea, Republic of)[7981-82]

2:30 pm: **Bridge condition assessment based on long-term strain monitoring**, Li-Min Sun, Shouwang Sun, Tongji Univ. (China) [7981-83]

2:50 pm: **Field load testing of long-span suspension bridge**, Yunfeng Ji, Tongji Univ. (China) [7981-84]

Coffee Break. 3:10 to 3:40 pm

SESSION 10b

**Room: Pacific Salon VI-VII
Wed. 1:30 to 3:10 pm**

Fiber Optic Sensors I

Session Chairs: **Gangbing Song**, Univ. of Houston; **Hoon Sohn**, KAIST (Korea, Republic of)

1:30 pm: **Pipeline monitoring using an integrated MFC/FBG system**, Hyeonseok Lee, Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of); Hyun Woo Park, Dong-A Univ. (Korea, Republic of) [7981-85]

1:50 pm: **Structural health monitoring of wind turbine using fiber Bragg grating based sensing system**, Hyung-Joon Bang, Moon-suk Jang, Hyungki Shin, Korea Institute of Energy Research (Korea, Republic of) [7981-86]

2:10 pm: **Cable stretching construction monitoring based on FBG sensor**, Zi-guang Jia, Liang Ren, Dongsheng Li, Hong-Nan Li, Dalian Univ. of Technology (China)[7981-87]

2:30 pm: **Lamb wave detection in prepreg composite materials with fibre Bragg grating sensors**, Nick Miesen, National Aerospace Lab. NLR (Netherlands); Yoshihiro Mizutani, Tokyo Institute of Technology (Japan); Roger M. Groves, Optical Non-Destructive Testing Lab. (Netherlands); Jos Sinke, Rinze Benedictus, Technische Univ. Delft (Netherlands) [7981-88]

2:50 pm: **Life cycle strain mapping of composite airframe structures by using FBG sensors**, Kazushi Sekine, Ichiya Takahashi, Masami Kume, Hajime Takeya, Mitsubishi Electric Corp. (Japan); Yutaka Iwahori, Japan Aerospace Exploration Agency (Japan); Shu Minakuchi, Nobuo Takeda, The Univ. of Tokyo (Japan); Yasuhiro Koshioka, The Materials Process Technology Ctr. (Japan). [7981-89]

Coffee Break. 3:10 to 3:40 pm

SESSION 10c

**Room: Sunset
Wed. 1:30 to 3:10 pm**

Damage Detection in Concrete

Session Chairs: **Zhishen Wu**, Ibaraki Univ. (Japan); **Chin-Hsiung Loh**, National Taiwan Univ. (Taiwan)

1:30 pm: **Highly nonlinear solitary waves-based sensor for monitoring concrete curing**, Xianglei Ni, Somayeh Nassiri, Piervincenzo Rizzo, Julie Vandenbossche, Univ. of Pittsburgh (United States)[7981-90]

1:50 pm: **Damage identification under random dynamic loads based on long-gauge FBG sensors**, Yongsheng Tang, Zhishen Wu, Southeast Univ. (China); Caiqian Yang, Southeast Univ. (China); Gang Wu, Lei Huang, Southeast Univ. (China) [7981-91]

2:10 pm: **A distributed seismic damage sensing network using piezoceramic-based smart aggregates for RC building structures**, Shuang Hou, Dalian Univ. of Technology (China). [7981-92]

2:30 pm: **Detection of damages in nonlinear reinforced concrete frames**, Ai-Lun Wu, Jann N. Yang, Univ. of California, Irvine (United States); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) . [7981-93]

2:50 pm: **Experimental demonstration of a damage detection technique for nonlinear hysteretic structures**, Jann N. Yang, Ye Xia, Univ. of California, Irvine (United States); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) [7981-94]

Coffee Break. 3:10 to 3:40 pm

Conference 7983

SESSION 9

**Room: Royal Palm V
Wed. 1:40 to 6:00 pm**

NIST Technology Innovation Program on Civil Infrastructure Critical National Need: Advanced Sensing Technologies for the Infrastructure: Bridges, Roads, Highways, and Water Systems IV

Session Chairs: **Daniel J. Inman**, Virginia Polytechnic Institute and State Univ.; **Tzu-Yang Yu**, Univ. of Massachusetts Lowell

1:40 pm: **Lessons from two field tests on pipeline damage detection using acceleration measurement** (*Invited Paper*), Masanobu Shinozuka, Sungchil Lee, Sehwan Kim, Seung-Jun Kwon, Univ. of California, Irvine (United States) [7983-75]

2:10 pm: **Experimental and numerical study of water pipe's rupture for damage identification purposes**, Konstantinos Papakonstantinou, Masanobu Shinozuka, Sudib Mishra, Univ. of California, Irvine (United States) [7983-76]

2:30 pm: **Smart wireless sensor system for lifeline health monitoring under a disaster event**, Sehwan Kim, Univ. of California, Irvine (United States); Pai H. Chou, Univ. of California, Irvine (United States) and National Tsing Hua Univ. (Taiwan); Masanobu Shinozuka, Univ. of California, Irvine (United States) [7983-77]

2:50 pm: **Mitigation of the consequence of seismically induced damage on a utility water network by means of next generation SCADA**, Jamie Robertson, Masanobu Shinozuka, Univ. of California, Irvine (United States) [7983-78]

3:10 pm: **An automated repair method of water pipe infrastructure using carbon fiber bundles**, Ed Fyfe, Heath Carr, Sean Wisotzkey, Fyfe Co., LLC (United States) [7983-79]

Coffee Break. 3:30 to 4:00 pm

Conference 7984

Concurrent Sessions

SESSION 10a

**Room: Royal Palm I
Wed. 1:30 to 3:10 pm**

Novel Devices and Techniques

Session Chairs: **Paul D. Panetta**, Applied Research Associates, Inc.; **Michael D. Todd**, Univ. of California, San Diego

1:30 pm: **Energy harvesting in electroactive materials: a comparison between ferroelectrics and electrostrictive polymers**, Daniel Guyomar, Mickael Lallart, Pierre-Jean Cottinet, Institut National des Sciences Appliquées de Lyon (France) [7984-55]

1:50 pm: **Thickness effects in electroactive polymers actuators: a simple explanation and modeling**, Kaori Yuse, Daniel Guyomar, Masae Kanda, Institut National des Sciences Appliquées de Lyon (France) . . . [7984-56]

2:10 pm: **An improved control algorithm for an optical feedback reference tracking diamgnetically levitating motor system**, Wei-Chih Wang, Shrey Khanna, Univ. of Washington (United States) . . . [7984-57]

2:30 pm: **Focused GHz ultrasound as a tool for micro-displacement and cell manipulation**, Moritz von Buttler, Erik von der Burg, Albert Kamanyi, Esam Ahmed Mohamed, Mieczyslaw Pluta, Wolfgang Grill, Univ. Leipzig (Germany) [7984-58]

2:50 pm: **Development of a prototype self-configuring building block**, Wei-Chih Wang, Univ. of Washington (United States)[7984-59]

Coffee Break. 3:10 to 3:40 pm

SESSION 10b

**Room: Royal Palm VI
Wed. 1:30 to 2:50 pm**

Modeling and Simulation I

Session Chairs: **Jerome P. Lynch**, Univ. of Michigan; **Won-Bae Na**, Pukyong National Univ. (Korea, Republic of)

1:30 pm: **Breathing crack detection using bio-inspired combination tone**, Gi-Woo Kim, David R. Johnson, Fabio Semperlotti, Kon-Well Wang, Univ. of Michigan (United States) [7984-60]

1:50 pm: **Electrode mass influence on the broadening of the angular spectrum of waves generated by Coulomb coupling in piezoelectric crystals**, Mieczyslaw Pluta, Univ. Leipzig (Germany); Anowarul Habib, Univ. Siegen (Germany); Umar Amjad, Moritz von Buttler, Univ. Leipzig (Germany); Reinhold Wanemacher, Instituto Madrileño de Estudios Avanzados (Spain); Wolfgang Grill, Univ. Leipzig (Germany) [7984-61]

2:10 pm: **Wave propagation and vibration analysis in two-dimensional elastic chiral metamaterials**, Guoliang Huang, X. N. Liu, Univ. of Arkansas at Little Rock (United States); Michael Reynolds, Univ. of Arkansas at Fort Smith (United States) . . . [7984-62]

2:30 pm: **Introducing a user-friendly MATLAB-based interface for ultrasonic field modeling by DPSM**, Alain Rivollet, Dominique Placko, Ecole Normale Supérieure de Cachan (France); Tribikram Kundu, The Univ. of Arizona (United States) . [7984-63]

Coffee Break. 2:50 to 3:20 pm

Conference 7976	Conference 7977	Conference 7978	Conference 7980			
Concurrent Sessions		Concurrent Sessions				
<p style="text-align: center;">SESSION 11a continued</p> <p>3:40 pm: Accurate freeform surface actuation using a non-pre-stretched silicone dielectric polymer actuator, Dirk Brokken, Floris M. Crompvoets, Hendrik de Koning, Wendy Martam, Juergen Vogt, Philips Research Nederland B.V. (Netherlands) [7976-50]</p> <p>4:00 pm: A comparison of dielectric materials for the activation of a macro-scale hinge configuration, Christa Jordi, Arne Schmidt, Gabor M. Kovacs, EMPA (Switzerland) [7976-51]</p> <p>4:20 pm: Control concepts for dielectric elastomer actuators, Juergen Maas, Christian Graf, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) [7976-52]</p> <p>4:40 pm: Dielectric elastomers for active vibration control applications, Sven Herold, William Kaal, Tobias Melz, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) [7976-53]</p> <p>5:00 pm: Physical model-based internal model control of a DE actuator, Rahimullah Sarban, Danfoss PolyPower A/S (Denmark); Richard W. Jones, Univ. of Southern Denmark (Denmark) [7976-54]</p> <p>5:20 pm: Dielectric elastomer stack actuators for integrated gas valves, Klaus Flittner, Michael Schlosser, Helmut F. Schlaack, Technische Univ. Darmstadt (Germany) [7976-106]</p> <p>5:40 pm: Polypyrrol/chitosan hydrogel hybrid micro fiber as sensing artificial muscle, Yahya A. Ismail, Univ. of Niwza (Oman); Jose G. Martínez, Univ. Politécnica de Cartagena (Spain); Ahmad S. Al Harrasi, Univ. of Niwza (Oman); Seon-Jeong Kim, Hanyang Univ. (Korea, Republic of); Toribio Fernández Otero, Univ. Politécnica de Cartagena (Spain) [7976-56]</p>	<p style="text-align: center;">SESSION 11b</p> <p style="text-align: center;">Room: Towne Wed. 3:40 to 6:00 pm</p> <p style="text-align: center;">Modeling and Analysis of EAP</p> <p><i>Session Chairs:</i> Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Barbar J. Akle, Lebanese American Univ. (Lebanon)</p> <p>3:40 pm: Electromechanical instability and nonlinear dynamics of dielectric elastomers, Jian Zhu, Shengqiang Cai, Zhigang Suo, Harvard Univ. (United States) [7976-57]</p> <p>4:00 pm: Constitutive relation and electromechanical stability of compressible dielectric elastomer, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7976-58]</p> <p>4:20 pm: Chemo-electro-mechanical modeling of pH-sensitive hydrogels, Thomas Wallmersperger, Technische Univ. Dresden (Germany); Karsten Keller, Bernd H. Kröplin, Univ. Stuttgart (Germany); Margarita Guenther, Gerald U. Gerlach, Technische Univ. Dresden (Germany) [7976-59]</p> <p>4:40 pm: Charge modeling of ionic polymer-metal composites for dynamic curvature sensing, Yousef Bahramzadeh, Mohsen Shahinpoor, Univ. of Maine (United States) [7976-60]</p> <p>5:00 pm: A validated finite element model of a fully soft artificial muscle rotary motor, Tony C. H. Tse, Benjamin M. O'Brien, Thomas G. McKay, Iain A. Anderson, The Univ. of Auckland (New Zealand) [7976-61]</p> <p>5:20 pm: Finite element implementation of a viscoelastic model for dielectric elastomers based on a continuum mechanical formulation, Alexander Bueschel, Werner Wagner, Karlsruhe Institut für Technologie (Germany); Sven O. Klinkel, Technische Univ. Kaiserslautern (Germany) [7976-62]</p> <p>5:40 pm: Modeling and designing IPMCs for twisting transduction, David Pugal, Kwang J. Kim, Kam K. Leang, Viljar Palmre, Univ. of Nevada, Reno (United States) [7976-63]</p>	<p style="text-align: center;">SESSION 9A</p> <p style="text-align: center;">Room: Sunrise Wed. 3:40 to 5:20 pm</p> <p style="text-align: center;">Micro and Nano Integrated Systems</p> <p>3:40 pm: Electromechanical response of aligned carbon nanotube arrays, Gregory J. Ehlert, Arizona State Univ. (United States); Matthew R. Maschmann, Universal Technology Corp. (United States); Jeffery W. Baur, Air Force Research Lab. (United States) [7977-48]</p> <p>4:00 pm: Acoustic metamaterial with controllable directivity and dispersion characteristics, Amr M. Baz, Univ. of Maryland, College Park (United States); Wael N. Akl, Ain Shams Univ. (Egypt) . [7977-49]</p> <p>4:20 pm: Variable-focal lens using electroactive polymer actuator, Veiko Vunder, Andres Punning, Alvo Aabloo, Univ. of Tartu (Estonia) [7977-50]</p> <p>4:40 pm: Design, fabrication, and testing of contact-aided compliant cellular mechanisms with curved walls, Samantha A. Cirono, Gregory R. Hayes, Brian L. Babcox, Mary I. Frecker, James H. Adair, George A. Lesieutre, The Pennsylvania State Univ. (United States) [7977-51]</p> <p>5:00 pm: Damping behavior of polymer composites with high volume fraction of NiMnGa powders, Xiaogang Sun, Jie Song, Hong Jiang, Xiaoning Zhang, Chaoying Xie, Shanghai Jiao Tong Univ. (China)[7977-52]</p>	<p style="text-align: center;">SESSION 9B continued</p> <p>3:40 pm: Topology optimization of pressure adaptive honeycomb for a morphing flap, Roelof Vos, Technische Univ. Delft (Netherlands); Ronald M. Barrett, The Univ. of Kansas (United States); Jan Scheepstra, Technische Univ. Delft (Netherlands) [7977-55]</p> <p>4:00 pm: A composite structure aiming for its first large scale ground test in a smart and gapless wing leading edge, Olaf Heintze, Sebastian M. Geier, Daniel Hartung, Markus Kintscher, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)[7977-56]</p> <p>4:20 pm: Controller design for a morphing, perching aircraft, Allen Hurst, Ephraim Garcia, Cornell Univ. (United States) [7977-57]</p> <p>4:40 pm: Static aeroelastic deformation of flexible skin for continuous variable trailing-edge camber wing, Fuhong Dai, Weilong Yin, Libo Liu, Yinjin Chen, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7977-58]</p>	<p style="text-align: center;">SESSION 11</p> <p style="text-align: center;">Room: Royal Palm II · Wed. 3:35 to 4:35 pm</p> <p style="text-align: center;">SMA S II</p> <p><i>Session Chairs:</i> Karla M. Mossi, Virginia Commonwealth Univ.; Stefan S. Seelecke, Saarland Univ.</p> <p>3:35 pm: Highly anisotropic composite: shape memory alloy torsional actuator, Marcus P. J. Walls-Bruck, Ian P. Bond, Julie A. Etches, Hua-Xin Peng, Univ. of Bristol (United Kingdom) [7978-10]</p> <p>3:50 pm: Experimental validation of position control methods for a flexible nozzle using self-sensing SMA wire actuators, Stephen Furst, Stefan S. Seelecke, North Carolina State Univ. (United States) [7978-11]</p> <p>4:05 pm: Development of compressive stresses in hybrid SMA-ceramic composites via SMA transformation, B. Lester, Y. Chemisky, Texas A&M Univ. (United States); A. Geltmacher, S. Qidwei, U.S. Naval Research Lab. (United States); D. Lagoudas, Texas A&M Univ. (United States) [7978-12]</p> <p>4:20 pm: Phase transformations in NiCoMnIn and NiCoMnAl shape memory alloy thin films, S. Rios, N. Jetta, Ibrahim Karaman, Dimitris C. Lagoudas, Xinghang Zhang, Texas A&M Univ. (United States) [7978-14]</p>	<p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Royal Palm II · Wed. 4:35 to 5:35 pm</p> <p style="text-align: center;">MSMAs</p> <p><i>Session Chairs:</i> Constantin Ciocanel, Northern Arizona Univ.; Zoubaida Ouania, The Pennsylvania State Univ.</p> <p>4:35 pm: Model predictions of strain and magnetization responses under magneto-thermo-mechanical loading paths in magnetic shape memory alloys, Krishnendu Haldar, Dimitris C. Lagoudas, Texas A&M Univ. (United States) [7978-13]</p> <p>4:50 pm: Magneto-mechanical behavior of magnetic shape memory alloys under simultaneously variable magnetic and mechanical loading, Constantin Ciocanel, Alex Waldauer, Heidi P. Feigenbaum, Northern Arizona Univ. (United States) [7978-15]</p> <p>5:05 pm: Energy harvesting using NiMnGa martensitic reorientation process at high frequencies of excitation, Nick M. Bruno, Constantin Ciocanel, Northern Arizona Univ. (United States) [7978-16]</p> <p>5:20 pm: Investigation of Co-doped NiMnGa as a high-temperature metamagnetic shape memory alloy for actuator applications, Haluk E. Karaca, Burak Basaran, Univ. of Kentucky (United States); Arjun Pathak, Southern Illinois Univ. Carbondale (United States); Ali S. Turabi, Univ. of Kentucky (United States); Igor Dubenko, Naushad Ali, Southern Illinois Univ. Carbondale (United States); Yuriy I. Chumlyakov, Tomsk State Univ. (Russian Federation) [7978-17]</p> <p style="text-align: right;">Conference End.</p>	<p style="text-align: center;">SESSION 13</p> <p style="text-align: center;">Room: Royal Palm III Wed. 3:40 to 5:00 pm</p> <p style="text-align: center;">Applications II</p> <p><i>Session Chair:</i> Linfeng Chen, Univ. of Arkansas</p> <p>3:40 pm: Prediction of micromotion-induced strain in the brain cell around an implanted smart electrode, Keejoo Lee, Old Dominion Univ. (United States); Michael A. Polanco, NASA Langley Research Ctr. (United States); Hargsoon Yoon, Norfolk State Univ. (United States) [7980-43]</p> <p>4:00 pm: Metallic nanoparticles-decorated bismuth telluride/silver telluride as nano-bridges for thermoelectric application, Hyun-Jung Kim, Sang H. Choi, Glen C. King, Yeonjoon Park, NASA Langley Research Ctr. (United States); Kunik Lee, Turner-Fairbank Highway Research Ctr. (United States) [7980-44]</p> <p>4:20 pm: Nanostructured chalcopyrite CuIn_{1-x}Ga_xSe₂ thin films for high-performance solar cells, Aswini K. Pradhan, Norfolk State Univ. (United States) [7980-45]</p> <p>4:40 pm: Temperature dependent electrical behavior of cellulose based transistor, Joo-Hyung Kim, Byungwook Lim, Chosun Univ. (Korea, Republic of); Sungryul Yun, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7980-46]</p>

Wednesday · 9 March

Conference 7981

Concurrent Sessions

SESSION 11a

**Room: Pacific Salon IV-V
Wed. 3:40 to 5:20 pm**

Piezoelectric Sensors: Theory and Applications

Session Chairs: **Bin Lin**, Univ. of South Carolina; **Cliff J. Lissenden**, The Pennsylvania State Univ.

3:40 pm: **Structural integrity design for an active helicopter rotor blade with piezoelectric flap actuators**, Jaehwan Lee, SangJoon Shin, Seoul National Univ. (Korea, Republic of) [7981-95]

4:00 pm: * **Simplified 2D modeling of power and energy transduction of piezoelectric wafer active sensors for structural health monitoring**, Bin Lin, Victor Giurgiutiu, Univ. of South Carolina (United States) [7981-96]

4:20 pm: **Embedded piezoelectric sensor-based real-time strength development monitoring during curing process of concrete**, Dong Jin Kim, Chang-Gil Lee, Hajoo Chang, Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of) [7981-97]

4:40 pm: **Piezoelectric sensor for in-situ measurement of stress intensity factors**, Dennis Bäcker, Christoph Häusler, Meinhard Kuna, Technische Univ. Bergakademie Freiberg (Germany) [7981-98]

5:00 pm: **Development of a nano-textured nonporous Pt/Ti bottom electrode for sol-gel derived lead zirconate titanate (PZT) thin films**, Qing Guo, Guozhong Cao, I-Yeu Shen, Univ. of Washington (United States) [7981-99]

SESSION 11b

**Room: Pacific Salon VI-VII
Wed. 3:40 to 5:20 pm**

Fiber Optic Sensors II

Session Chairs: **Zhishen Wu**, Ibaraki Univ. (Japan); **Branko Glisic**, Princeton Univ.

3:40 pm: **Study on the temperature characteristics of distributed optical fiber sensors**, Shiwei Song, Zhishen Wu, Caiqian Yang, Gang Wu, Sheng Shen, Southeast Univ. (China) [7981-100]

4:00 pm: **A monitoring of breathing using a hetero-core optical fiber sensor**, Shohei Akita, Atsushi Seki, Kazuhiro Watanabe, Soka Univ. (Japan) [7981-101]

4:20 pm: * **Investigation of miniaturized fiber optic surface-mountable Fabry-Perot pressure sensor built on 45° angled fiber**, Hyungdae Bae, Miao Yu, Univ. of Maryland, College Park (United States) [7981-102]

4:40 pm: **Transformer winding temperature estimation based on tank surface temperature**, Wenyu Guo, Jaury Wijaya, Valery Davydov, Monash Univ. (Australia) [7981-103]

5:00 pm: **Measurement of a tree growth condition by the hetero-core optical fiber sensor**, Hoshito Uchida, Shohei Akita, Kazuhiro Watanabe, Soka Univ. (Japan) [7981-104]

SESSION 11c

**Room: Sunset
Wed. 3:40 to 5:20 pm**

Polymer Based Sensors

Session Chairs: **Sridhar Krishnaswamy**, Northwestern Univ.; **Satish Nagarajaiah**, Rice Univ.

3:40 pm: **Applications of embedded capacitance sensors in layered polymer structures**, Zita Holland, Gary Krutz, Alyssa Brune, Aaron Deckard, Purdue Univ. (United States); Timu Gallien, Univ. of California, Irvine (United States); Keith Harmeyer, Caterpillar Inc. (United States); Michael Holland, Purdue Univ. (United States) [7981-105]

4:00 pm: **Regularization of pattern formation in metal/SMP bi-layer structures**, Zhongbi Chen, Qiaoqian Huang, Yun Young Kim, Sridhar Krishnaswamy, Northwestern Univ. (United States)[7981-106]

4:40 pm: **Sensing performance of electrically conductive fabrics and dielectric electro-active polymers for parachutes**, Eric A. Favini, Christopher Niezrecki, Julie Chen, David Willis, Eugene E. Niemi, Sanjeev Manohar, Univ. of Massachusetts Lowell (United States); Kenneth Desabrais, U.S. Army Research Ctr. Natick (United States) [7981-108]

5:00 pm: **Unidirectional strain sensing properties of conductive composite with anisotropic piezoresistivity**, Huigang Xiao, Jinbao Jiang, Hui Li, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) [7981-109]

Conference 7983

SESSION 11a continued

4:00 pm: **Development frequency tunable optical phase lock loop (OPLL) for high resolution fiber optic distributed sensing**, Vladimir Kuperschmidt, Lew Stolpner, Peter Mols, Mazin R. Alalusi, Axel Mehner, Radu Barsan, Redfern Integrated Optics, Inc. (United States); Farhad Ansari, Univ. of Illinois at Chicago (United States)[7983-80]

4:20 pm: **High-resolution integrated sensing system based on stimulated Brillouin and coherent Rayleigh (SBCR) measurements for infrastructure integrity monitoring**, Jeff Bush, Optiphase, Inc. (United States); Lew Stolpner, Vladimir Kuperschmidt, Redfern Integrated Optics, Inc. (United States); Farhad Ansari, Univ. of Illinois at Chicago (United States)[7983-81]

4:40 pm: **High-resolution sensing of complex states of strain using pulse-pre-pump optical time**, M. Hosein Motamedi, Xiaotan Zhang, Jin Qiao, Farhad Ansari, Univ. of Illinois at Chicago (United States) [7983-82]

5:00 pm: **Fiber optic dynamic distributed sensor for identification of damage location in structures**, Xiaotan Zhang, Jin Qiao, M. Hosein Motamedi, Farhad Ansari, Univ. of Illinois at Chicago (United States); Radu Barsan, Redfern Integrated Optics, Inc. (United States) [7983-83]

5:20 pm: **Nondestructive evaluation and prognosis of fatigue cracking in steel bridges**, Jianguo Yu, Paul H. Ziehl, Univ. of South Carolina (United States); Adrian A. Pollock, MISTRAS Group, Inc. (United States) [7983-84]

5:40 pm: **Overview of NIST TIP: detection of active corrosion in RC and PS concrete**, Miguel A. Gonzalez-Nunez, MISTRAS Group, Inc. (United States); Antonio Nanni, Univ. of Miami (United States); Paul H. Ziehl, Fabio Matta, Univ. of South Carolina (United States) [7983-85]

Conference 7984

Concurrent Sessions

SESSION 11a

**Room: Royal Palm I
Wed. 3:40 to 6:00 pm**

Guided Waves: Modeling Aspects

Session Chairs: **Jennifer E. Michaels**, Georgia Institute of Technology; **Paul D. Wilcox**, Univ. of Bristol (United Kingdom)

3:40 pm: **Scattering of guided waves from straight features**, Paul D. Wilcox, Alexander Velichko, Univ. of Bristol (United Kingdom); Michael D. Todd, Univ. of California, San Diego (United States); Bruce W. Drinkwater, Anthony J. Croxford, Univ. of Bristol (United Kingdom) [7984-64]

4:00 pm: **Scattering of the lowest Lamb wave modes by a corrosion pit**, Brandon W. Strom, Northwestern Univ. (United States); Su Hao, ACIL, Inc. (United States) and Northwestern Univ. (United States); Sridhar Krishnaswamy, Jan D. Achenbach, Northwestern Univ. (United States) [7984-65]

4:20 pm: **Advanced DPSM approach for modeling ultrasonic wave scattering in an arbitrary geometry**, Susheel Kumar Yadav, The Univ. of Arizona (United States); Sourav Banerjee, Accellent Technologies, Inc. (United States); Tribikram Kundu, The Univ. of Arizona (United States) [7984-66]

4:40 pm: **Numerical simulation of guided-wave propagation in composite plates and sandwich structures**, Kalyan S. Nadella, Carlos E. S. Cesnik, Univ. of Michigan (United States) [7984-67]

5:00 pm: **A parametric study of piezoceramic thickness effect on the generation of fundamental Lamb modes**, Ramy A. Mohamed, Dominique L. Demers, Patrice Masson, Univ. de Sherbrooke (Canada) [7984-68]

5:20 pm: **Guided waves filtering with warped curvelets**, Luca De Marchi, Univ. degli Studi di Bologna (Italy); Emanuele Baravelli, Univ. degli Studi di Bologna (Italy) and Georgia Institute of Technology (United States); Massimo Ruzzene, Georgia Institute of Technology (United States); Nicolo Speciale, Univ. degli Studi di Bologna (Italy) [7984-69]

5:40 pm: **Modeling of transient Lamb wave propagation in a honeycomb composite sandwich structure**, Sauvik Banerjee, Indian Institute of Technology, Bombay (India); Ajit Mal, Univ. of California, Los Angeles (United States) [7984-70]

SESSION 11b

**Room: Royal Palm VI
Wed. 3:20 to 5:00 pm**

Civil Structures: Wind Turbine and Pipe

Session Chairs: **Henrique L. Reis**, Univ. of Illinois at Urbana-Champaign; **Christopher Niezrecki**, Univ. of Massachusetts Lowell

3:20 pm: **Model order identification techniques in wind turbine systems using wireless sensor networks**, Antonio Velazquez, Raymond A. Swartz, Michigan Technological Univ. (United States)[7984-71]

3:40 pm: **Wind rotor blade x-ray computed tomography (CT) for in line process control and NDE**, William K. McCroskey, FMI Technologies Inc. (United States); Joseph W. Haus, Univ. of Dayton (United States); Carl LaFrance, Molded Fiber Glass Companies (United States); Norbert G. Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Alan Carney, International Health Monitoring Systems (United States) [7984-72]

4:00 pm: **High-temperature monitoring of condensed water in steam pipes**, Yoseph Bar-Cohen, Shyh-Shiuh Iih, Mircea Badescu, Xiaoqi Bao, Stewart Sherrit, Scott Widholm, Julian Blossiu, Jet Propulsion Lab. (United States) [7984-73]

4:20 pm: **Combined acoustic emission and guided wave monitoring of fatigue crack growth on a full scale pipe specimen**, Ryan M. Meyer, Stephen Cumbilidge, Pradeep Ramuhalli, Bruce Watson, Steven R. Doctor, Leonard J. Bond, Pacific Northwest National Lab. (United States) [7984-74]

4:40 pm: **Investigating the use of advanced health monitoring systems in oil and gas pipelines infrastructures**, Mohammad Riahi, Iran Univ. of Science and Technology (Iran, Islamic Republic of) [7984-75]

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Thursday Announcements, Awards, and Plenary Presentation

8:10 to 8:20 am

ASME Best Paper Awards
SPIE/ASME Best Student Paper Awards



Plenary Presentation · 8:20 to 9:05 am
The European Project “Clean Sky” and an Insight into the Platform “Green Regional Aircraft”

Valerio Carli, Fraunhofer Gesellschaft (Germany)

Concurrent Sessions

SESSION 12a

Room: Pacific Salon I-III
Thurs. 9:10 to 10:10 am

Applications of EAP I: Field Activated

Session Chairs: **Emilio P. Calius**, Industrial Research Ltd. (New Zealand); **Tissaphern Mirfakhrai**, Stanford Univ.

9:10 am: **Flexi-drive: a soft artificial muscle motor** (*Invited Paper*), Iain A. Anderson, Tony C. Tse, Tokushu Inamura, Benjamin M. O'Brien, Auckland Bioengineering Institute (New Zealand); Thomas G. McKay, The Univ. of Auckland (New Zealand); Todd A. Gisby, Auckland Bioengineering Institute (New Zealand) [7976-64]

9:50 am: **In-plane DEAP stack actuators for optical MEMS applications**, Jens Brunne, Samar Kazan, Albert-Ludwigs-Univ. Freiburg (Germany); Ulrike Wallrabe, Albert-Ludwigs-Univ. Freiburg (Germany) and Freiburg Institute of Advanced Studies (Germany) [7976-65]

Coffee Break. 10:10 to 10:40 am

SESSION 12b

Room: Towne
Thurs. 9:10 to 10:10 am

Non-EAP Actuators I

Session Chairs: **Ravi Shankar**, Intel Corp.; **Andrew T. Conn**, Univ. of Bristol (United Kingdom)

9:10 am: **Determination of the sinking and terminating points of action unit on humanoid skull through GFEAD**, Yonas T. Tadesse, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States) [7976-66]

9:30 am: **Shape memory polymer composites: multifunction and nanotechnology**, Jinsong Leng, Harbin Institute of Technology (China) . . . [7976-67]

9:50 am: **Mechanical modeling of thermally actuated LCE-CNT composite**, Carlos Camargo, Humberto Campanella, Kirill E. Zinoviev, Núria Torras, Eva M. Campo, Instituto de Microelectrónica de Barcelona (Spain); Jean Comrie, Eugene B. Terentjev, Univ. of Cambridge (United Kingdom); Jaume Esteve, Instituto de Microelectrónica de Barcelona (Spain) [7976-68]

Coffee Break. 10:10 to 10:40 am

Concurrent Sessions

SESSION 10A

Room: Sunrise
Thurs. 9:10 to 11:40 am

Modeling, Simulations, Signal Processing, and Controls

9:10 am: **A computational inverse problem approach for the design of morphing processes in thermally activated smart structural materials (SMP SESSION)**, Shuang Wang, John C. Brigham, Univ. of Pittsburgh (United States) [7977-59]

9:30 am: **Energy-based comparison of various controllers for vibration suppression using piezoceramics**, Ya Wang, Alper Erturk, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7977-60]

9:50 am: **Degradation of embedded systems in multifunctional composites**, Mohammad Mehdi Zadeh, Sabu J. John, Chun Wang, RMIT Univ. (Australia) and DMTC Ltd. (Australia); Viktor Verjienko, DMTC Ltd. (Australia) [7977-61]

Coffee Break. 10:10 to 10:40 am

SESSION 10B

Room: Royal Palm IV
Thurs. 9:10 to 11:40 am

SMA- and Piezo-Based Materials and Systems II: Piezoelectrics

9:10 am: **Piezoelectric driven thermo-acoustic refrigerator**, Amr M. Baz, Daniel Chinn, Mostafa Nouh, Univ. of Maryland, College Park (United States); Osama J. Aldraihem, King Saud Univ. (Saudi Arabia) [7977-65]

9:30 am: **A honeycomb-based piezoelectric actuator for a flapping wing MAV**, Kingnide R. Olympio, Guylaine Poulin-Vittrant, Univ. de Tours (France). [7977-66]

9:50 am: **Pressure tracking control of vehicle ABS using piezo valve modulator**, Jun-Cheol Jeon, Seung-Bok Choi, Inha Univ. (Korea, Republic of) [7977-67]

Coffee Break. 10:10 to 10:40 am

SESSION 10C

Room: Royal Palm II
Thurs. 9:10 to 11:20 am

Combined Simulation of Electromechanical Systems

Session Chair: **Uwe Marschner**, Technische Univ. Dresden (Germany)

9:10 am: **Combining network models and FE-models for the simulation of electromechanical systems**, Uwe Marschner, Eric Starke, Günther Pfeifer, Wolf-Joachim Fischer, Technische Univ. Dresden (Germany); Alison B. Flatau, Univ. of Maryland, College Park (United States) [7977-71]

9:30 am: **Applying network models to improve FE-models**, Eric Starke, Günther Pfeifer, Wolf-Joachim Fischer, Technische Univ. Dresden (Germany) [7977-72]

Coffee Break. 9:50 to 10:20 am

SESSION 12a

Room: Pacific Salon IV-V
Thurs. 9:10 to 10:10 am

Acoustic and Ultrasonic Sensors

Session Chairs: **Massimo Ruzzene**, Georgia Institute of Technology; **Yong Shi**, Stevens Institute of Technology

9:10 am: **Characterising fatigue damage in train structures based on nonlinearity of acousto-ultrasonic signals**, Zhongqing Su, Chao Zhou, Li Cheng, The Hong Kong Polytechnic Univ. (Hong Kong, China) [7981-110]

9:30 am: *** A PZT nanoscale active fiber composites acoustic emission sensor for structure health monitoring**, Xi Chen, Yong Shi, Stevens Institute of Technology (United States) [7981-111]

9:50 am: *** Frequency steerable acoustic sensors for SHM**, Matteo Senesi, Massimo Ruzzene, Georgia Institute of Technology (United States) [7981-112]

Coffee Break. 10:10 to 10:40 am

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Thursday Announcements, Awards, and Plenary Presentation

8:10 to 8:20 am

ASME Best Paper Awards
SPIE/ASME Best Student Paper Awards



Plenary Presentation · 8:20 to 9:05 am
The European Project “Clean Sky” and an Insight into the Platform “Green Regional Aircraft”
Valerio Carli, Fraunhofer Gesellschaft (Germany)

Concurrent Sessions

Concurrent Sessions

SESSION 12b

Room: Pacific Salon VI-VII
Thurs. 9:10 to 10:10 am

Power Harvesting

Session Chairs: Jeffrey T. Scruggs, Duke Univ.; Shantanu Chakrabarty, Michigan State Univ.

9:10 am: **Ultra low-power corrosion-enabled sensor node**, Scott A. Ouellette, Michael D. Todd, Univ. of California, San Diego (United States) [7981-113]

9:30 am: **Temperature compensation of piezoelectric energy harvesters using shape memory alloys**, Mohamed Rhimi, Nizar Lajnef, Michigan State Univ. (United States) [7981-114]

9:50 am: * **Multi-functional self-powered sensor for long-term ambient vibration monitoring**, Chenling Huang, Shantanu Chakrabarty, Michigan State Univ. (United States) [7981-115]

Coffee Break. 10:10 to 10:40 am

SESSION 12c

Room: Sunset
Thurs. 9:30 to 10:30 am

Decentralized Algorithms

Session Chairs: Rahmat A. Shoureshi, Univ. of Denver; Chih-Chen Chang, Hong Kong Univ. of Science and Technology (Hong Kong, China)

9:30 am: **Decentralized SHM system based on substructure parameter identification**, Michihito Shiraishi, Shimizu Corp. (Japan); Akira Mita, Keio Univ. (Japan) [7981-116]

9:50 am: **An optimal sensor configuration strategy for decentralized structural damage detection**, Madhuka Jayawardhana, Xinqun Zhu, Ranjith Liyanapathirana, Univ. of Western Sydney (Australia) [7981-117]

Coffee Break. 10:10 to 10:40 am

SESSION 12d

Room: Royal Palm III
Thurs. 9:10 to 10:10 am

Wind Turbine Structures

Session Chairs: Fuh-Gwo Yuan, North Carolina State Univ.; Razvan Rusovici, Florida Institute of Technology

9:10 am: **Physics-based model for predicting the performance of a miniature wind turbine**, Fujun Xu, College of Textiles of Donghua Univ. (China) and North Carolina State Univ. (United States); Fuh-Gwo Yuan, Jingzhen Hu, North Carolina State Univ. (United States); Yiping Qiu, Donghua Univ. (China) [7981-119]

9:30 am: **Smart actuation of inlet guide vanes for miniature turbine engine**, Razvan Rusovici, Stephen T. C. Kwok Choon, Paavo Sepri, Florida Institute of Technology (United States) [7981-120]

9:50 am: **Wind turbine gearbox health monitoring using time-frequency features of signals**, Jiong Tang, Yi Lu, Univ. of Connecticut (United States) [7981-121]

Coffee Break. 10:10 to 10:40 am

SESSION 10

Room: Royal Palm V
Thurs. 9:10 to 11:00 am

Wireless Sensor Network and Energy Harvesting

Session Chairs: Yang Wang, Georgia Institute of Technology; Akira Sasamoto, National Institute of Advanced Industrial Science and Technology (Japan)

9:10 am: **Dynamic decision-making for sustainable infrastructure integrating life cycle assessment, wireless structural monitoring systems, and system optimization**, Michael D. Lepech, Stanford Univ. (United States); Mohammed M. Ettouney, Weidlinger Associates, Inc. (United States); Sharada Alampalli, Prospect Solutions, LLC (United States) [7983-86]

9:30 am: **Wireless energy harvesting system with extremely high permeability inductors for real-time tire pressure monitoring system**, Qi Wang, Xing Xing, Jason Durant, Yi Zhang, Nian Sun, Ming L. Wang, Northeastern Univ. (United States) [7983-87]

9:50 am: **Passive wireless sensors for monitoring conductivity of concrete**, Jin-Young Kim, Chih-Chieh Chou, Praveenkumar Pasupathy, Sharon L. Wood, Dean P. Neikirk, The Univ. of Texas at Austin (United States) [7983-88]

Coffee Break. 10:10 to 10:40 am

SESSION 12a

Room: Royal Palm I
Thurs. 9:10 to 10:10 am

Sensor Network

Session Chairs: Victor Giurgiutiu, Univ. of South Carolina; Olivier Giraud, ONERA (France)

9:10 am: **Resource-efficient wireless monitoring based on mobile agent migration**, Kay Smarsly, Kincho H. Law, Stanford Univ. (United States); Markus König, Ruhr-Univ. Bochum (Germany) [7984-76]

9:30 am: **Hierarchical fiber-optic-based sensing system for impact damage monitoring of large-scale CFRP structures**, Shu Minakuchi, Nobuo Takeda, Haruka Tsukamoto, Hidehiko Banshoya, The Univ. of Tokyo (Japan) [7984-77]

9:50 am: **Defect characterization using two-dimensional arrays**, Paul D. Wilcox, Alexander Velichko, Univ. of Bristol (United Kingdom) [7984-78]

Coffee Break. 10:10 to 10:40 am

SESSION 12b

Room: Royal Palm VI
Thurs. 9:10 to 10:10 am

SHM with Fiber Optics

Session Chairs: Nobuo Takeda, The Univ. of Tokyo (Japan); Shivan Haran, Arkansas State Univ.

9:10 am: **Development of a ferromagnetic polymeric metal detector system**, Wei-Chih Wang, Univ. of Washington (United States); Wei-Shu Hua, Wen-Jong Wu, National Taiwan Univ. (Taiwan) [7984-79]

9:30 am: **Customization and calibration of BOTDR sensors for underground structural health monitoring**, Yaowen Yang, Wai Lun Sham, Pravin S. Muley, Nanyang Technological Univ. (Singapore) [7984-80]

9:50 am: **Fiberoptic microphone using a polymeric cavity**, Wei-Chih Wang, Univ. of Washington (United States) [7984-81]

Coffee Break. 10:10 to 10:40 am

Conference 7976

Concurrent Sessions

SESSION 13a

Room: Pacific Salon I-III
Thurs. 10:40 am to 12:20 pm

Applications of EAP I: Field Activated (continued)

Session Chairs: **Emilio P. Calius**, Industrial Research Ltd. (New Zealand); **Tissaphern Mirfakhrai**, Stanford Univ.

10:40 am: **Multilayered relaxor ferroelectric poly (vinylidene fluoride-trifluoroethylene-chlorotrifluoroethylene) polymer actuators to operate a liquid-filled varifocal lens**, Seungtae Choi, Jong Oh Kwon, Jeong Yub Lee, Seung Wan Lee, Samsung Advanced Institute of Technology (Korea, Republic of); Kyu-Dong Jung, Woonbae Kim, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Francois Bauer, Piezotech S.A.S. (France). [7976-69]

11:00 am: **Antagonistic dielectric elastomer actuator for biologically inspired robotics**, Andrew T. Conn, Jonathan M. Rossiter, Univ. of Bristol (United Kingdom) [7976-70]

11:20 am: **Closed loop control of dielectric elastomer actuators**, Todd A. Gisby, Benjamin M. O'Brien, Iain A. Anderson, Sheng Quan Xie, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand) . . . [7976-71]

11:40 am: **Dielectric elastomer memory**, Benjamin M. O'Brien, Thomas G. McKay, Sheng Quan Xie, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) [7976-72]

12:00 pm: **Modeling approaches for a novel balloon-shape actuator made of electroactive polymers**, Maryam Soleimani, Jeydmer Aristizabal, Carlo Menon, Simon Fraser Univ. (Canada). [7976-73]

Lunch Break 12:20 to 1:30 pm

SESSION 13b

Room: Towne
Thurs. 10:40 am to 12:20 pm

Applications of EAP II: Ionic EAP

Session Chairs: **Thomas Wallmersperger**, Technische Univ. Dresden (Germany); **Hani E. Naguib**, Univ. of Toronto (Canada)

10:40 am: **An artificial eye actuated by IPMC actuator**, Yuxiu Li, Min Yu, Qingsong He, Linlin Song, Zhendong Dai, Nanjing Univ. of Aeronautics and Astronautics (China) [7976-74]

11:00 am: **Design and development of bio-inspired underwater jellyfish-like robot using ionic polymer metal composite (IPMC) actuators**, Barbar J. Akle, Lebanese American Univ. (Lebanon); Joseph Najem, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) . . . [7976-75]

11:20 am: **Multilayered polypyrrole-gold-polyvinylidene fluoride composite actuators for increased force generation in biomimetic jellyfish robot**, Colin F. Smith, Virginia Polytechnic Institute and State Univ. (United States) [7976-76]

11:40 am: **Cell-inspired electroactive polymer materials incorporating biomolecular materials**, Stephen A. Sarles, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) . [7976-78]

12:00 pm: **Localization of source with unknown amplitude using IPMC sensor arrays**, Ahmad T. Abdulsadda, Feitian Zhang, Xiaobo Tan, Michigan State Univ. (United States) [7976-88]

Lunch Break 12:20 to 1:30 pm

Conference 7977

Concurrent Sessions

SESSION 10A continued

10:40 am: **Sheet metal hydroforming of functional composite structures**, Mesut Ibis, Peter Groche, Stefan Griesheimer, Larisa Salun, Jacqueline Rausch, Technische Univ. Darmstadt (Germany) [7977-62]

11:00 am: **Adverse event detection (AED) integrated system for continuously monitoring and evaluating structural health status**, Jinsik Yun, Dong Sam Ha, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) . [7977-63]

11:20 am: **Piezoelectric actuation of a flapping wing accounting for nonlinear damping**, Kingnide R. Olympio, Guylaine Poulin-Vittrant, Univ. de Tours (France). [7977-64]

Lunch Break 11:40 am to 1:10 pm

SESSION 10B continued

10:40 am: **Modeling of a piezostack actuator considering dynamic hysteresis**, Phuong-Bac Nguyen, Inha Univ. (Korea, Republic of); Quoc-Hung Nguyen, Ho Chi Minh City Univ. of Technology (Viet Nam); Seung-Bok Choi, Inha Univ. (Korea, Republic of) [7977-68]

11:00 am: **Effect of equivalent constant and output power of concentric disk-type piezoelectric transformer on temperature**, I-Mu Chou, Yi-Ying Lai, Wen-Jong Wu, National Taiwan Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan) and Institute for Information Industry (Taiwan) [7977-70]

Lunch Break 11:20 am to 12:50 pm

SESSION 10C continued

10:20 am: **Magnetic transducer design using a combination of ODE and FEA modeling techniques**, S. C. Thompson, The Pennsylvania State Univ. (United States) [7977-73]

10:40 am: **Optimization of an electromagnetic linear actuator using a network and a finite element model**, H. Neubert, A. Kamusella, J. Lienig, Technische Univ. Dresden (Germany) [7977-74]

11:00 am: **Fast and efficient multidomain system simulation based on coupled heterogeneous model structures**, Marius Rosu, ANSYS, Inc. (United States); Jens Otto, CADFEEM GmbH (Germany); Dale Ostergaard, ANSYS Inc. (United States) [7977-75]

Lunch Break 11:40 am to 1:10 pm

SESSION 13a

Room: Pacific Salon IV-V
Thurs. 10:40 am to 12:00 pm

Vibration and Control

Session Chairs: **Hyung-Jo Jung**, KAIST (Korea, Republic of); **Bogdan I. Epureanu**, Univ. of Michigan

10:40 am: **Development of hybrid type pneumatic vibration isolation table by piezo-stack actuator and filtered-X LMS algorithm**, Yun-ho Shin, Seok Jun Moon, Korea Institute of Machinery & Materials (Korea, Republic of); Hyung-Jo Jung, Dong Doo Jang, KAIST (Korea, Republic of); Yeong Jong Moon, Samsung Electronics Co., Ltd. (Korea, Republic of) [7981-122]

11:00 am: **Semi hardening and snap-through mechanism system for smart vibration generators**, Jiwen Deng, Zhong You, Univ. of Oxford (United Kingdom) [7981-123]

11:20 am: **Sensitivity vector fields in embedded coordinates**, Andrew R. Sloboda, Bogdan I. Epureanu, Univ. of Michigan (United States) [7981-124]

11:40 am: **Bending vibration of simply supported beams with anchored constrained viscoelastic layers**, Kazi Karim, Kirkpatrick Forest Curtis PC (United States); Genda Chen, Missouri Univ. of Science and Technology (United States) . . . [7981-125]

Lunch Break 12:00 to 1:30 pm

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Concurrent Sessions

SESSION 13b

Room: Pacific Salon VI-VII
Thurs. 10:40 am to 12:00 pm

SHM of Composite Structures

Session Chair: **Aditi Chattopadhyay**, Arizona State Univ.

10:40 am: **A minimax optimal sensor placement approach for damage detection in composite structures**, Arda Vanli, Li-Jen L. Chen, Chuck Zhang, Ben Wang, The Florida State Univ. (United States)[7981-126]

11:00 am: **a nondestructive experimental study on damage progression in woven glass-epoxy composites**, Patrick Pollock, Univ. of South Carolina (United States) [7981-127]

11:20 am: **Condition-based prognosis of composite structures under multiaxial random loading**, Yingtao Liu, Arizona State Univ. (United States) [7981-128]

11:40 am: **Optimal sensor placement in a guided wave based active sensing framework for composite wing structures**, Clyde K. Coelho, Seung Bum Kim, John Rajadas, Aditi Chattopadhyay, Arizona State Univ. (United States) [7981-129]

Lunch Break 12:00 to 1:30 pm

SESSION 13c

Room: Sunset
Thurs. 10:40 am to 12:00 pm

Damage Detection Methods I

Session Chairs: **Douglas E. Adams**, Purdue Univ.; **Shamim N. Pakzad**, Lehigh Univ.

10:40 am: **Damage detection for health monitoring of ground vehicle through active probing of vehicle response**, Alan Meyer, Douglas E. Adams, Purdue Univ. (United States) [7981-130]

11:00 am: *** Localized damage detection in a large-scale moment connection using a strain gauge sensor network**, Elizabeth L. Labuz, Shamim N. Pakzad, Lehigh Univ. (United States); Diane Wurst, Rowan Univ. (United States) [7981-131]

11:20 am: **Comparative study of two element modal strain energy based damage identification methods**, Haishan Wu, Tongji Univ. (China) and East-China Jiaotong Univ. (China); Li-Min Sun, Tongji Univ. (China) [7981-132]

11:40 am: **The proposed damage model and mechanical behaviors of damaged short suspenders in arch bridges**, Yuanbing Li, Qiwei Zhang, Tongji Univ. (China) [7981-133]

Lunch Break 12:00 to 1:30 pm

SESSION 13d

Room: Royal Palm III
Thurs. 10:40 am to 12:00 pm

Ultrasonic Methods for Damage Detection

Session Chairs: **Ivan Bartoli**, Drexel Univ.; **Mircea Badescu**, Jet Propulsion Lab.

10:40 am: **Monitoring thermal stresses and incipient buckling of continuous-welded rails: results from the UCSD/BNSF/FRA large-scale laboratory test track**, Robert Phillips, Univ. of California, San Diego (United States); Ivan Bartoli, Drexel Univ. (United States); Claudio Nucera, Francesco Lanza di Scalea, Univ. of California, San Diego (United States); Mahmood Fateh, Gary Carr, Federal Railroad Administration (United States) [7981-134]

11:00 am: **Auto-Gopher: a wireline rotary-hammer ultrasonic drill**, Mircea Badescu, Stewart Sherrit, Xiaoqi Bao, Yoseph Bar-Cohen, Beck Chen, Jet Propulsion Lab. (United States) [7981-135]

11:20 am: **Experimental analysis of fretting related acoustic emission signals**, Kassahun M. Asamene, Wesley B. Williams, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7981-136]

11:40 am: **Modified Brinson model as an equivalent one-dimensional constitutive equation of SMA spring**, Junghyun Ryu, Sungmin Ahn, Je-sung Koh, Kyu-Jin Cho, Maenghyo Cho, Seoul National Univ. (Korea, Republic of) [7981-137]

Lunch Break 12:00 to 1:30 pm

Conference 7983

SESSION 10 continued

10:40 am: **Decentralized transmissibility function analysis for structural damage localization using mobile sensor networks**, Dapeng Zhu, Xiaohua Yi, Jiajie Guo, Yang Wang, Kok-Meng Lee, Georgia Institute of Technology (United States) [7983-89]

SESSION 11

Room: Royal Palm V
Thurs. 11:00 am to 2:30 pm

Vibration-Based NDE Technologies

Session Chairs: **Miguel A. Gonzalez-Nunez**, MISTRAS Group, Inc.; **Ying Zhang**, Georgia Institute of Technology

11:00 am: **Crack detection using the integrated signals from the dynamic responses of girder bridges**, Zuocai Wang, Genda Chen, Missouri Univ. of Science and Technology (United States) [7983-90]

11:20 am: **Rapid evaluation of structural condition using vibration measurements**, Jiong Tang, Ji Zhao, Univ. of Connecticut (United States) [7983-91]

11:40 am: **Structural damage assessment of bridges using non-stationary earthquake records**, Reza Baghaei-Naeini, Maria Q. Feng, Univ. of California, Irvine (United States) [7983-92]

Lunch Break 12:00 to 1:30 pm

Conference 7984

Concurrent Sessions

SESSION 13a

Room: Royal Palm I
Thurs. 10:40 am to 12:00 pm

Civil Engineering Applications: Concrete and Building Monitoring

Session Chairs: **Andrei N. Zagrai**, New Mexico Institute of Mining and Technology; **Perngin F. Pai**, Univ. of Missouri-Columbia

10:40 am: **Investigation of born approximation applied to non-destructive evaluation of concrete media**, Abhijit Ganguli, Carey M. Rappaport, Northeastern Univ. (United States); Eric L. Miller, Tufts Univ. (United States); Sara Wadia-Fascetti, Northeastern Univ. (United States)[7984-82]

11:00 am: **A comparison of data-driven methodologies for the detection of nonlinearities**, Miguel R. Hernandez-Garcia, Sami F. Masri, Roger G. Ghanem, The Univ. of Southern California (United States); Eloi F. Figueiredo, Univ. do Porto (Portugal); Charles R. Farrar, Los Alamos National Lab. (United States) [7984-83]

11:20 am: **Acoustic emission monitor and evaluation method of steel corrosion damage for reinforced concrete**, Dongsheng Li, Dalian Univ. of Technology (China) [7984-84]

11:40 am: **Monitoring the lifting construction of the steel roof of Tianjin Jinmen Hotel**, Ren Qing, Univ. of Shanghai for Science and Technology (China); Cheng-Bin Han, Chen Xing, China Construction 3rd Engineering Bureau (China) [7984-85]

Lunch Break 12:00 to 1:30 pm

SESSION 13b

Room: Royal Palm VI
Thurs. 10:40 am to 12:00 pm

Signal Processing

Session Chairs: **Paul Fromme**, Univ. College London (United Kingdom); **Wolfgang Grill**, Univ. Leipzig (Germany)

10:40 am: **Statistical quantification of the uncertainty in transmissibility-based features for satellite structural condition evaluation**, Zhu Mao, Michael D. Todd, Univ. of California, San Diego (United States) [7984-86]

11:00 am: **Characterization of satellite components assembly for responsive space applications**, David Mascarenas, David Macknelly, Josh Mullins, Heather Wiest, Gyuhae Park, Charles Farrar, Los Alamos National Lab. (United States) [7984-87]

11:20 am: **Time-frequency and space-wavenumber analysis for damage inspection of thin-walled structures**, Perngin F. Pai, Univ. of Missouri-Columbia (United States); Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7984-88]

11:40 am: **Likelihood tests for localizing damage using ultrasonic guided waves**, Eric B. Flynn, Michael D. Todd, Univ. of California, San Diego (United States) [7984-89]

Lunch Break 12:00 to 1:30 pm

Conference 7976

Concurrent Sessions

SESSION 14a

Room: Pacific Salon I-III
Thurs. 1:30 to 3:10 pm

Applications of EAP I: Field Activated (continued)

Session Chairs: **Emilio P. Calius**, Industrial Research Ltd. (New Zealand); **Tissaphern Mirfakhrai**, Stanford Univ.

1:30 pm: **A dual axis force film sensor for robotic tactile applications**, Baek-Chul Kim, Sung Moon Jin, Y. Lee, Jae-Do Nam, Hyouk Ryeol Choi, Hyungpil Moon, J. C. Koo, Sangkyunkwan Univ. (Korea, Republic of) [7976-79]

1:50 pm: **Dielectric elastomer tubular pump**, Amy Bowers, Univ. of Bristol (United Kingdom) and Bristol Robotics Lab. (United Kingdom); Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Peter Walters, Univ. of the West of England (United Kingdom); Ioannis Ieropoulos, Bristol Robotics Lab. (United Kingdom) [7976-80]

2:10 pm: **Interconnection concepts for rigid micro-electrodes of a dielectric elastomer bending tube actuator**, Frank Wehrheim, Richard Wolf GmbH (Germany); Helmut F. Schlaak, Technische Univ. Darmstadt (Germany); Jörg-Uwe Meyer, Richard Wolf GmbH (Germany) [7976-81]

2:30 pm: **Considerations for contractile electroactive polymer based materials and actuators**, Lenore Rasmussen, Ras Labs, LLC (United States); Lewis D. Meixler, Princeton Plasma Physics Lab. (United States); David Schramm, New Jersey Institute of Technology (United States); Daniel Pearlman, Vassar Univ. (United States); Kevin Mullally, Univ. of Delaware (United States); Paul Rasmussen, Virginia Polytechnic Institute and State Univ. (United States); Alice Kirk, New Renaissance Middle School (United States) [7976-82]

2:50 pm: **Design of a novel dielectric elastomer powered jet valve**, Sylvain Proulx, Patrick Chouinard, Jean-Sébastien Plante, Univ. de Sherbrooke (Canada) [7976-83]

SESSION 14b

Room: Towne
Thurs. 1:30 to 2:50 pm

Applications of EAP II: Ionic EAP (continued)

Session Chairs: **Thomas Wallmersperger**, Technische Univ. Dresden (Germany); **Hani E. Naguib**, Univ. of Toronto (Canada)

1:30 pm: **Biochemical microsensors on the basis of metabolically sensitive hydrogels**, Margarita Guenther, Gerald U. Gerlach, Thomas Wallmersperger, Technische Univ. Dresden (Germany); Florian Solzbacher, Jules J. Magda, Genyao Lin, Prashant Tathireddy, Michael P. Orthner, The Univ. of Utah (United States) [7976-84]

1:50 pm: **Cross-linking of super-growth carbon nanotubes improves linear and bimorph bucky gel actuators performance**, Maurizio Biso, Alberto Ansaldo, Istituto Italiano di Tecnologia (Italy); Don N. Futaba, Kenji Hata, National Institute of Advanced Industrial Science and Technology (Japan); Davide Ricci, Istituto Italiano di Tecnologia (Italy) . [7976-85]

2:10 pm: **Bio-derived ionic transistor framework for artificial muscles**, Vishnu Baba Sundaresan, Hao Zhang, Virginia Commonwealth Univ. (United States) [7976-86]

2:30 pm: **An automatic tuning method of the largest amplitude vibration of Au-nafion IPMC**, Akitoshi Itoh, Yoshiaki Mori, Tokyo Denki Univ. (Japan) [7976-87]

Conference End

Conference 7977

Concurrent Sessions

SESSION 11A

Room: Sunrise
Thurs. 1:10 to 2:50 pm

Optimization and Design of Integrated Systems

1:10 pm: **Preliminary design of a smart composite telescope for space laser communication on a satellite for the Geosynchronous orbit**, Mehrdad N. Ghasemi-Nejhad, Nicolas Antin, Univ. of Hawaii (United States) [7977-76]

1:30 pm: **Integration of pseudo negative stiffness control and structural health monitoring for large scale structural system**, Yong Ding, Siu-Seong Law, The Hong Kong Polytechnic Univ. (Hong Kong, China) [7977-77]

1:50 pm: **Actuator grouping optimization on flexible space reflectors**, Jeffrey R. Hill, Kon-Well Wang, Univ. of Michigan (United States) . [7977-78]

2:10 pm: **A genetic algorithms based optimization on active constrained layer damped rotating plate**, Zhengchao Xie, Pak Kin Wong, Ian Ian Chong, Univ. of Macau (Macao, China) [7977-79]

2:30 pm: **Modified approach for optimum position and sizing of piezoelectric actuator for steering of parabolic antenna**, Vijay K. Gupta, PDPM IIITDM Jabalpur (India); P. Seshu, Indian Institute of Technology, Bombay (India); K. Kurien Issac, Indian Institute of Space Science and Technology (India); Raghunath K. Shevgaonkar, Indian Institute of Technology, Bombay (India) [7977-80]

SESSION 11B

Room: Royal Palm IV
Thurs. 12:50 to 2:10 pm

Passive and Active Vibration Isolation Systems IV

12:50 pm: **A friction damper with continuously variable post-sliding stiffness**, Tao Wang, Xi Chen, Rui Teng, Chengshou Duan, China Earthquake Administration (China) [7977-81]

1:10 pm: **Nonlinear semi passive vibration control based on synchronized switch damping with energy transfer between two modes**, Kaixiang Li, Jean-Yves Gauthier, Daniel Guyomar, Institut National des Sciences Appliquées de Lyon (France) [7977-82]

1:30 pm: **Experiment research and nonlinear analysis to visco-elastic damping structure for whole-spacecraft passive vibration isolation system**, Lijun Tan, Bo Fang, Wenhui Huang, Harbin Institute of Technology (China) [7977-84]

1:50 pm: **Performance analysis for a new whole-spacecraft isolation using viscoelastic damping material**, Bo Fang, Song Li, Wenhui Huang, Harbin Institute of Technology (China) [7977-85]

Conference End

SESSION 14a

Room: Pacific Salon IV-V
Thurs. 1:30 to 3:10 pm

Novel Sensors I

Session Chairs: **Yingzi Lin**, Northeastern Univ.; **Hong Susan Zhou**, Worcester Polytechnic Institute

1:30 pm: *** High-sensitivity fiber loop ringdown evanescent-field sensors**, Chuji Wang, Chamini Herath, Mississippi State Univ. (United States) [7981-138]

1:50 pm: **Data acquisition and interpretation in order to anticipate the behavior of a resident for biofication of living spaces**, Kosuke Ohashi, Akira Mita, Keio Univ. (Japan) [7981-139]

2:10 pm: **Integrated casing and directional antenna: initial design and validation**, Rami A. Akkari, The Univ. of Oklahoma (United States); Tamer Ibrahim, Univ. of Pittsburgh (United States); Jin-Song Pei, Lin Tang, Musharraf M. Zaman, Peng Tang, Keith Hurdelbrink II, The Univ. of Oklahoma (United States) [7981-140]

2:30 pm: **Optimal design of MPD based fiber optic strain sensors and comparison of power-meter and CCD camera based architectures**, Onur Toker, Hasan S. Efendioglu, Mehmet E. Esen, Kemal Fidanboyly, Fatih Univ. (Turkey) [7981-141]

2:50 pm: **Design and construction of a novel bionic imaging polarization navigation sensor**, Kaichun Zhao, Zheng You, Tsinghua Univ. (China) [7981-142]

Coffee Break 3:10 to 3:40 pm

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Concurrent Sessions

SESSION 14b

Room: Pacific Salon VI-VII
Thurs. 1:30 to 3:10 pm

Crack Detection in Structures

Session Chairs: **Jerry Q. Huang**, The Boeing Co.; **Suryarghya Chakrabarti**, The Ohio State Univ.

1:30 pm: * **A miniature batteryless health and usage monitoring system based on hybrid energy harvesting**, Chenling Huang, Shantanu Chakrabarty, Michigan State Univ. (United States) [7981-143]

1:50 pm: **Monitoring fatigue crack growth in narrow structural component using Lamb wave technique**, Say Ian Lim, Chee Kiong Soh, Nanyang Technological Univ. (Singapore) [7981-144]

2:10 pm: **Multiplexing wireless antenna sensors for crack growth monitoring**, Xiang Xu, Haiying Huang, The Univ. of Texas at Arlington (United States) ... [7981-145]

2:30 pm: * **Detecting crack orientation using antenna sensor**, Irshad Mohammad, Haiying Huang, The Univ. of Texas at Arlington (United States) [7981-146]

2:50 pm: **The research on embedded shock signal storage measurement system**, Yi Zhang, Ying Chen, Chuan Shen, Jiajun Cheng, Chinese Academy of Engineering Physics (China) ... [7981-147]

Coffee Break. 3:10 to 3:40 pm

SESSION 14c

Room: Sunset
Thurs. 1:30 to 3:10 pm

Damage Detection Methods II

Session Chairs: **Gangbing Song**, Univ. of Houston; **Hoon Sohn**, KAIST (Korea, Republic of)

1:30 pm: **Structural damage detection with insufficient data using transfer learning techniques**, Debejiyo Chakraborty, Narayan Kovvali, Antonia Papandreou-Suppappola, Arizona State Univ. (United States); Aditi Chattopadhyay, Arizona State Univ. (United States) and AIMS Ctr. (United States) [7981-148]

1:50 pm: **Bayesian anomaly detection in monitoring data applying relevance vector machine**, Tomoo Saito, Shimizu Corp. (Japan) [7981-149]

2:10 pm: **Stochastic subspace identification for output-only modal analysis: accuracy and sensitivity on model parameter estimation**, Chin-Hsiung Loh, Yi-Cheng Liu, National Taiwan Univ. (Taiwan) [7981-150]

2:30 pm: **Damage identification of full scale four-story steel building using multi-input multi-output models**, Ho Thu Hien, Akira Mita, Keio Univ. (Japan) . [7981-151]

2:50 pm: **Probabilistic analysis of structural condition properties based on SHM**, Zhihua Min, Tongji Univ. (China)[7981-152]

Coffee Break. 3:10 to 3:40 pm

SESSION 14d

Room: Royal Palm III
Thurs. 1:30 to 3:10 pm

Control of Smart Systems

Session Chairs: **Irving J. Oppenheim**, Carnegie Mellon Univ.; **Genda Chen**, Missouri Univ. of Science and Technology

1:30 pm: **Adaptive backstepping based MR damper monitoring for structural applications**, Shaikh Faruque Ali, Sondipon Adhikari, Swansea Univ. (United Kingdom) [7981-153]

1:50 pm: **Estimation of dynamic characteristics of a medium-height office building with passive dampers considering vertical seismic response**, Misaki Ishikawa, Akira Mita, Keio Univ. (Japan) . [7981-154]

2:10 pm: **Design of modern monitoring systems for efficient control and management of technological processes**, Gulnara Abitova, L. N. Gumilev Eurasian National Univ. (Kazakhstan) and Binghamton Univ. (United States); Mamirbek Beisenbi, L. N. Gumilev Eurasian National Univ. (Kazakhstan); Vladimir V. Nikulin, Binghamton Univ. (United States)..... [7981-155]

2:30 pm: **Theoretical and experimental study of vibration suppression for stayed cable**, Shieh-Kung Huang, Pei-Yang Lin, National Ctr. for Research on Earthquake Engineering (Taiwan); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) [7981-157]

Coffee Break. 2:50 to 3:20 pm

Conference 7983

SESSION 11 continued

1:30 pm: **Modal parameter identification of civil engineering structures under operational conditions**, Hasan S. Ulusoy, Maria Q. Feng, Univ. of California, Irvine (United States) [7983-93]

1:50 pm: **Alternative determination of cable forces using flexural theory of axially loaded member**, Chih-Peng Yu, Chia-Chi Cheng, Chi-Hung Chiang, Chaoyang Univ. of Technology (Taiwan) [7983-94]

2:10 pm: **Monitoring vibration-based structural health using nonlinear approach**, Wonsiri Punurai, Mahidol Univ. (Thailand); Chanpheng Theeraphong, Kasetsart Univ. (Thailand); Sookjit Theeraphong, Mahidol Univ. (Thailand) [7983-95]

SESSION 12

Room: Royal Palm V
Thurs. 2:30 to 5:00 pm

Smart Materials Sensing Technologies

Session Chairs: **Sourav Banerjee**, Acellent Technologies, Inc.; **Adam Wroblewski**, NASA Glenn Research Ctr.

2:30 pm: **The improvement of accuracy of standalone GPS with an alternative positioning algorithm**, Jiaying Zhang, Yi Zhang, Ming L. Wang, Northeastern Univ. (United States) [7983-96]

2:50 pm: **On suitability of feature extraction techniques for local damage detection**, Susheel Yadav, The Univ. of Arizona (United States); Sourav Banerjee, Acellent Technologies, Inc. (United States); Tribikram Kundu, The Univ. of Arizona (United States) [7983-97]

Coffee Break. 3:10 to 3:40 pm

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Concurrent Sessions

SESSION 14a

Room: Royal Palm I
Thurs. 1:30 to 3:10 pm

Civil Engineering Applications: Bridge Monitoring

Session Chairs: **Won-Bae Na**, Pukyong National Univ. (Korea, Republic of); **Anthony J. Croxford**, Univ. of Bristol (United Kingdom)

1:30 pm: **Fatigue and fracture assessment of cracks in bridge elements using acoustic emission**, Navid Nemati, Univ. of Miami (United States); Brian Metrovich, Case Western Reserve Univ. (United States); Cathryn L. Schuster, Felipe Mejia, Univ. of Miami (United States) [7984-90]

1:50 pm: **Feasibility of self-powered wireless smart sensor network for a long-term structural health monitoring**, JongWoong Park, Hyung-Jo Jung, Chung-Bang Yun, KAIST (Korea, Republic of); Hongki Jo, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States)[7984-91]

2:10 pm: **Correlation between damage detection and observed damage for a full-scale four-story steel building during the collapse test**, Liu Mei, Akira Mita, Keio Univ. (Japan) [7984-92]

2:30 pm: **Variability in dynamic characteristics of the Sutong cable-stayed bridge under routine traffic conditions**, Jianfeng Liu, Qiwei Zhang, Tongji Univ. (China) [7984-93]

2:50 pm: **Moving forces identification based on structure health monitoring data for cable-stayed bridge with regularizations**, Fujian Zhang, Hui Li, Harbin Institute of Technology (China) . . [7984-94]

Coffee Break. 3:10 to 3:40 pm

SESSION 14b

Room: Royal Palm VI
Thurs. 1:30 to 3:10 pm

Modeling and Simulation II

Session Chairs: **Henrique L. Reis**, Univ. of Illinois at Urbana-Champaign; **Perngjin F. Pai**, Univ. of Missouri-Columbia

1:30 pm: **Application of the multi-scale finite element method to wave propagation problems in damaged structures**, Filippo Casadei, Massimo Ruzzene, Georgia Institute of Technology (United States) [7984-95]

1:50 pm: **Lattice dynamics approach to determine the dependence of the time-of-flight of transversal polarized acoustic waves on external stress**, Khurram S. Tarar, Wolfgang Grill, Univ. Leipzig (Germany) [7984-96]

2:30 pm: **Porosity estimation using wave propagation based methodology for structural health monitoring of a composite beam**, Ajith Vezhapparambu, Srinivasan Gopalakrishnan, Indian Institute of Science (India) [7984-97]

2:30 pm: **Health monitoring of composite structural components using frequency response function curvature method**, Sauvik Banerjee, Usharani Morabada, Indian Institute of Technology, Bombay (India) . . . [7984-98]

2:50 pm: **Elastic wave propagation based autonomic self-diagnosing for AFM with pyramidal indenter**, Ajay B. Harish, Indian Institute of Science (India) [7984-99]

Coffee Break. 3:10 to 3:40 pm

Conference 7981

Concurrent Sessions

SESSION 15a

Room: Pacific Salon IV-V
Thurs. 3:40 to 5:40 pm

Novel Sensors II

Session Chairs: **Haiying Huang**, The Univ. of Texas at Arlington; **Daniele Zonta**, Univ. degli Studi di Trento (Italy)

3:40 pm: **Sensor for direct measurement of the boundary shear stress in fluid flow**, Xiaoqi Bao, Mircea Badescu, Yoseph Bar-Cohen, Jet Propulsion Lab. (United States); Kornel Kerényi, Federal Highway Administration (United States); Shyh-Shiuh Lih, Stewart Sherrit, Zensheu Chang, Beck Chen, Scott Widholm, Patrick Ostlund, Jet Propulsion Lab. (United States) [7981-158]

4:00 pm: **A self-sensing structure with printed sensors**, Hwan-Sik Yoon, Tennessee Technological Univ. (United States) [7981-159]

4:20 pm: **Photonic crystal fiber heat sensors**, Rosalind M. Wynne, Jude Coompon, Anthony Colalillo, Stephen Twigg, Villanova Univ. (United States) [7981-160]

4:40 pm: **Low-frequency high-sensitive tunable mechanical monolithic horizontal sensors**, Fausto Acernese, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Silvia Vilasi, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [7981-161]

5:00 pm: *** A tele-gait monitoring system with an inertial measurement unit and smart shoes**, Joonbum Bae, Kyoungchul Kong, Masayoshi Tomizuka, Univ. of California, Berkeley (United States) [7981-162]

5:20 pm: **Multicore photonic crystal fiber force meters**, Rosalind M. Wynne, Villanova Univ. (United States) [7981-215]

SESSION 15b

Room: Pacific Salon VI-VII
Thurs. 3:40 to 5:00 pm

SHM of Civil Infrastructures

Session Chairs: **Richard Christenson**, Univ. of Connecticut; **Shirley J. Dyke**, Washington Univ. in St. Louis

3:40 pm: **Development of a multi-scale monitoring and health assessment framework for levees in New Orleans**, Tarek Abdoun, Victoria G. Bennett, Mourad Zeghal, Birsen Yazici, Rensselaer Polytechnic Institute (United States); Allen Marr, Geocomp Corp. (United States) [7981-163]

4:00 pm: **Verification of a multi-level damage detection approach using a full scale structure**, Sriram Krishnan, Zhuoxiong Sun, Purdue Univ. (United States); Guirong Yan, Univ. of Western Sydney (Australia); Ayhan Irfanoglu, Shirley J. Dyke, Purdue Univ. (United States) [7981-164]

4:20 pm: **Application of data compression method using K-SVD to experimental ambient vibration data**, Hae Young Noh, Anne S. Kiremidjian, Stanford Univ. (United States) [7981-165]

4:40 pm: **Analysis of high rise building lifespan monitoring data using Bayesian logic**, Daniele Zonta, Univ. degli Studi di Trento (Italy); Branko Glisic, Princeton Univ. (United States); Matteo Pozzi, Univ. degli Studi di Trento (Italy); Joo Ming Lau, Chor Cheong Fong, Housing & Development Board (Singapore) [7981-166]

SESSION 15c

Room: Sunset
Thurs. 3:40 to 5:20 pm

Vibration Control of Structures

Session Chairs: **Chin-Hsiung Loh**, National Taiwan Univ. (Taiwan); **Shirley J. Dyke**, Washington Univ. in St. Louis

3:40 pm: **Dynamic performance and fatigue properties of shear viscous damper for stay cable vibration control**, Min Liu, Guangqiao Zhang, Hui Li, Harbin Institute of Technology (China) . . . [7981-168]

4:00 pm: **Structural vibration control by tuned mass damper using central pattern generator**, Daisuke Iba, Junichi Hongu, Kyoto Institute of Technology (Japan) [7981-169]

4:20 pm: **Low-frequency seismic noise acquisition and analysis with tunable monolithic horizontal sensors**, Fausto Acernese, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Silvia Vilasi, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [7981-170]

4:40 pm: **Vibration control and motion control of a micro-actuator for the hard disk drive using self-sensing actuation**, Minoru Sasaki, Satoshi Ito, Hirohisa Tamagawa, Gifu Univ. (Japan) . . [7981-171]

5:00 pm: **A multi sensor based control system for self-preserving smart energy harvesting civil infrastructure system**, Rajib B. Mallick, Yeeseok Kim, Worcester Polytechnic Institute (United States); Sankha Bhowmick, Univ. of Massachusetts Dartmouth (United States) [7981-172]

SESSION 15d

Room: Royal Palm III
Thurs. 3:20 to 5:00 pm

Advances in SHM

Session Chairs: **Gun-Jin Yun**, The Univ. of Akron; **Shinae Jang**, Univ. of Connecticut

3:20 pm: **Model-free modal flexibility-based damage detection strategy for in-service highway bridges**, Adam Scianna, Shinae Jang, Richard Christenson, Univ. of Connecticut (United States) [7981-173]

3:40 pm: **Material property assessment and crack identification of recycled concrete with embedded smart cement modules**, Pizhong Qiao, Wei Fan, Fangliang Chen, Washington State Univ. (United States) [7981-174]

4:00 pm: **Full-scale decentralized bridge health monitoring using wireless smart sensors**, Shinae Jang, Univ. of Connecticut (United States); Sung-Han Sim, Hongki Jo, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States) . . . [7981-175]

4:20 pm: **Real-time health monitoring of bridge structures using a reference-free damage detection algorithm**, Soon-Gie Lee, Gun-Jin Yun, Shen Shang, The Univ. of Akron (United States) [7981-176]

4:40 pm: **Stochastic Galerkin model updating of randomly distributed parameters**, Gun-Jin Yun, Kamil Nizamiev, Kallol Sett, S. I. Hariharan, The Univ. of Akron (United States) [7981-177]

Conference End

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**SESSION 12
continued**

- 3:40 pm: **A high-temperature piezoelectric sensor for structure health monitoring**, Kyungrim Kim, Xiaoning Jiang, North Carolina State Univ. (United States); Shujun Zhang, The Pennsylvania State Univ. (United States) [7983-98]
- 4:00 pm: **Self-diagnosis of debonding conditions between CFRP and concrete surface using piezoelectric sensors**, Ju-Won Kim, Chang-Gil Lee, Taeheon Kim, Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of) [7983-99]
- 4:20 pm: **Investigation of active and passive vibration control with piezoelectric transducers**, Qingli Dai, Bo Chen, Michigan Technological Univ. (United States) [7983-100]
- 4:40 pm: **Fatigue crack detection in thick steel with piezoelectric wafer active sensors**, Matthieu Gresil, Univ. of South Carolina (United States) [7983-101]

Conference End

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SESSION 15

**Room: Royal Palm I
Thurs. 3:40 to 6:00 pm**

Guided Waves, Modeling, and Signal Processing

Session Chairs: Guoliang Huang, Univ. of Arkansas at Little Rock; Henrique L. Reis, Univ. of Illinois at Urbana-Champaign

- 3:40 pm: **Lamb wave interaction with aerospace aluminium stringer feet**, Keith Tiplady, Univ. of Bristol (United Kingdom); Christophe A. Paget, Airbus UK (United Kingdom); Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) [7984-100]
- 4:00 pm: **Assessing the value of information for long-term structural health monitoring**, Matteo Pozzi, Univ. degli Studi di Trento (Italy); Armen Der Kiureghian, Univ. of California, Berkeley (United States) [7984-101]
- 4:20 pm: **Lamb wave based detection of damage in a stiffener bonded to a plate**, Ganesh K. Geetha, Vivek T. Rathod, D. Roy Mahapatra, Srinivasan Gopalakrishnan, Indian Institute of Science (India) [7984-102]
- 4:40 pm: **Analysis of instantaneous phase of guided ultrasonic waves in metallic structures with composite repair patches**, S. Pavlopoulou, W. J. Staszewski, C. Soutis, G. Manson, The Univ. of Sheffield (United Kingdom) [7984-103]
- 5:00 pm: **CUDA technology for ultrasonic guided wave simulations**, T. Bielak, P. Packo, AGH Univ. of Science and Technology (Poland); A. Spencer, Wieslaw J. Staszewski, The Univ. of Sheffield (United Kingdom); Tadeusz Uhl, AGH Univ. of Science and Technology (Poland); Keith Worden, The Univ. of Sheffield (United Kingdom) [7984-104]
- 5:20 pm: **Utilization of wavelet analysis for determination of back wall effects in health monitoring of small coupons**, Mohammad Riahi, Iran Univ. of Science and Technology (Iran, Islamic Republic of) [7984-105]
- 5:40 pm: **The Smartbrick wireless sensor node for high-resolution structural health monitoring**, Arun Gunasekaran, Sahra Sedigh, Missouri Univ. of Science and Technology (United States) [7984-110]

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 spie.org/ssnde; customerservice@spie.org**

TOTAL

\$ _____ USD



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2012 Smart Structures/NDE

11–15 March 2012

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calendar**

Smart sensors, NDE and structural health, energy harvesting, civil infrastructure, aerospace systems, EAP, biomimetics, and multifunctional materials

Location

Town and Country Resort
and Convention Center
San Diego, California, USA

spie.org/ss

Conference dates

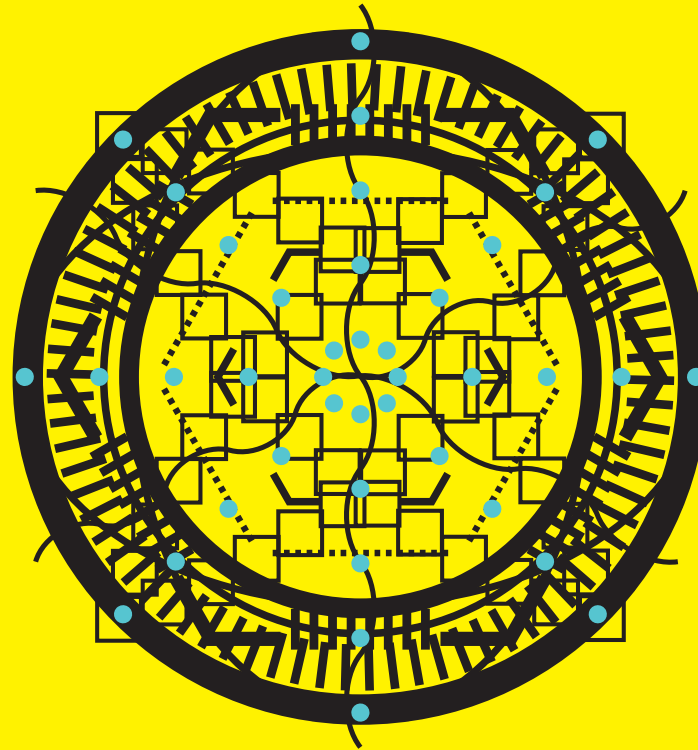
11–15 March 2012

Exhibition dates

13–14 March 2012

Technologies

- Energy Harvesting/Energy Systems
- Structural Health Monitoring
- Civil Infrastructure Systems
- Real-Time NDE
- Electroactive Polymers
- Wind Energy Applications
- Bio-inspired and Robotic Systems
- Automotive and Aerospace Applications
- Actuators and Damping
- Nanotechnology
- Modeling, Control, and Optimization
- Sensor Networks
- Shape Memory Alloys
- MR Fluids and Elastomers
- Piezoelectric Materials
- Embedded and Self-diagnostic Sensors
- Optical Fiber Sensors



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Sensors