



2012 Smart Structures/NDE

Technical Program

spie.org/ss12

Conference and Course

11–15 March 2012

Exhibition

13–14 March 2012

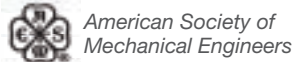
Location

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

Sponsored by



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Cooperating Organizations

Intelligent Materials Forum (Japan)

Jet Propulsion Lab.

National Science Foundation



Conference and Course dates:

11–15 March 2012

Exhibition dates: 13–14 March 2012

Town & Country Resort and

Convention Center

San Diego, California, USA

SPIE is the international society for optics and photonics founded in 1955 to advance light-based technologies. Serving more than 188,000 constituents from 138 countries, the Society advances emerging technologies through interdisciplinary information exchange, continuing education, publications, patent precedent, and career and professional growth.

Welcome

The Organizing Committee of the SPIE 19th Annual International Symposium on 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 technical event. The symposium is organized in ten parallel conferences and a full suite of special events and plenary presentations. We hope that you enjoy this opportunity to explore the state of the art in Smart Systems and NDE and collaborate with your colleagues on future projects.

Symposium Chairs



Norbert Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) and Univ. of Dayton (United States)



Norman Wereley, Univ. of Maryland, College Park (United States)

Symposium Cochairs



Victor Giurgiutiu, Univ. of South Carolina (United States)



Christopher S. Lynch, Univ. of California, Los Angeles (United States)



Photos Courtesy of Ken Hanson

Executive Committee

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Jet Propulsion Lab.

Sang H. Choi,
NASA Langley Research Ctr.

Aaron A. Diaz,
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Wolfgang Ecke,
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Los Alamos National Lab.

Nakhiah C. Goulbourne,
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Wolfgang Grill,
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Andrew Gyekenyesi,
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Keiichi Kaneto,
Kyushu Institute of Technology

Jaehwan Kim,
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Tribikram Kundu,
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The Pennsylvania State Univ.

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Los Alamos National Lab.

Kara J. Peters,
North Carolina State Univ.

Yongrae Roh,
Kyungpook National Univ.

Peter J. Shull,
The Pennsylvania State Univ.

Henry A. Sodano,
Univ. of Florida

Kyo D. Song,
Norfolk State Univ.

Masayoshi Tomizuka,
Univ. of California, Berkeley

Vijay K. Varadan,
Univ. of Arkansas

H. Felix Wu,
National Institute of Standards
and Technology

Tzu-Yang Yu,
Univ. of Massachusetts Lowell

Chung-Bang Yun,
KAIST

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Technical Conferences

8339 Bioinspiration, Biomimetics, and Bioreplication II <i>(Lakhtakia)</i>	14-38
8340 Electroactive Polymer Actuators and Devices (EAPAD) XIV <i>(Bar-Cohen)</i>	14-46
8341 Active and Passive Smart Structures and Integrated Systems VI <i>(Sodano)</i>	14-48
8342 Behavior and Mechanics of Multifunctional Materials and Composites VI <i>(Goulbourne)</i>	14-48
8343 Industrial and Commercial Applications of Smart Structures Technologies VI <i>(Farinholt)</i>	14-26
8344 Nano-, Bio-, Info-Tech Sensors and Systems <i>(Varadan)</i>	15-45
8345 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems <i>(Tomizuka)</i>	15-48
8346 Smart Sensor Phenomena, Technology, Networks, and Systems Integration V <i>(Matikas)</i>	15-41
8347 Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security VI <i>(Gyekenyesi)</i>	15-48
8348 Health Monitoring of Structural and Biological Systems VI <i>(Kundu)</i>	15-47

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.

Daily Schedule

Sunday	Monday	Tuesday	Wednesday	Thursday
Special Events	NDE Lifetime Achievement Award and 2011 SSM Lifetime Achievement Award presentations, 8:15 to 8:30 am, p. 7	SPIE Fellow Recognition (<i>H. Felix Wu and Sang H. Choi</i>), 8:00 to 8:05 am, p. 7	ASME Gary Anderson Early Achievement Award and ASME Best Paper presentations, 8:10 to 8:20 am, p. 7	SPIE/ASME Best Student Paper Award and Smart Structures Product Implementation Award presentations, 8:10 to 8:20 am, p. 7
	<i>Plenary Presentation: Thermo-Acoustic-Piezoelectric Energy Harvesters</i> , (<i>Amr Baz</i>), 8:30 to 9:15 am, p. 4	<i>Plenary Presentation: Adaptive Structural Systems with Multi-Field Tailoring</i> , (<i>Kon-Well Wang</i>), 8:20 to 9:05 am, p. 4	<i>Plenary Presentations: Opportunities and Challenges for Electromagnetic Materials and Structural Health Monitoring</i> , (<i>Nagy</i>), 8:20 to 9:05 am, p. 5	<i>Plenary Presentation: Shape Memory Polymer-Based Smart Composites: Future's Materials for Shape Changing</i> , (<i>Leng</i>) 8:20 to 9:05 am, p. 5
	Biomimicry, Bioinspiration, and the San Diego Zoo: The Zoo as a Living Library and Resource for Innovation , 9:15 to 10:00 am, p. 3	Poster Viewing , 10:00 am to 4:00 pm, p. 3	Best Student Paper Session , 9:10 am to 12:00 pm, p. 3	
	EAPAD Keynote Presentations , (<i>Corsiglia, Rogers</i>), 10:30 to 11:50 am, p. 3	Posters/Exhibition Reception , 6:00 to 7:30 pm, p. 3	Poster Viewing , 10:00 am to 4:00 pm, p. 3	
	14th Annual EAP-in-Action Session and Demonstrations , (<i>Bar-Cohen</i>), 4:30 to 5:45 pm, p. 8-9	EXHIBITION , p. 11		
	All Symposium Welcome Reception , 6:00 to 7:30 pm, p. 3	10:00 am to 4:00 pm; 6:00 to 7:30 pm	10:00 am to 4:00 pm	
Conferences + Course	SC634 Electroactive Polymer Actuators and Devices , 8:30 am to 5:30 pm, p. 6	Conf. 8339 Bioinspiration, Biomimetics, and Bioreplication II (<i>Lakhtakia</i>) p. 14-38		
		Conf. 8340 Electroactive Polymer Actuators and Devices (EAPAD) XIV (<i>Bar-Cohen</i>) p. 14-46		
		Conf. 8341 Active and Passive Smart Structures and Integrated Systems VI (<i>Sodano</i>) p. 14-48		
		Conf. 8342 Behavior and Mechanics of Multifunctional Materials and Composites VI (<i>Goulbourne</i>) p. 14-48		
		Conf. 8343 Industrial and Commercial Applications of Smart Structures Technologies VI (<i>Farinholt</i>) p. 14-26		
		Conf. 8344 Nano-, Bio-, Info-Tech Sensors and Systems (<i>Varadan</i>) p. 15-45		
		Conf. 8345 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems (<i>Tomizuka</i>) p. 15-48		
		Conf. 8346 Smart Sensor Phenomena, Technology, Networks, and Systems Integration V (<i>Matikas</i>) p. 15-41		
		Conf. 8347 Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security VI (<i>Gyekenyesi</i>) p. 15-48		
		Conf. 8348 Health Monitoring of Structural and Biological Systems VI (<i>Kundu</i>) p. 15-47		

EAPAD Keynote Presentations

Town & Country Ballroom

Monday 12 March 10:30 to 11:10 am

Bringing toys to life: toys today and unique opportunities for EAP sensors and actuators



Jeff Corsiglia,
Spin Master Ltd. (Canada)

Bio-integrated electronics

Monday 12 March 11:10 to 11:50 am



John Rogers,
Univ. of Illinois at Urbana-Champaign (USA)

All Symposium Welcome Reception

Tiki Pavilion

Monday 12 March 6:00 to 7:30 pm

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



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

Town & Country Ballroom

Monday 12 March 9:15 to 10:00 am



James Danoff-Burg, San Diego Zoo Global (USA)

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 presentations by San Diego Zoo "animal ambassadors."



Student Lunch with the Experts— A Networking Event

Hampton

Tuesday 13 March 12:30 to 1:30 pm

Seating is limited. 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.

Posters/Exhibition Reception

Golden Ballroom

Tuesday 13 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 13 March 10:00 am to 4:00 pm

Wednesday 14 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 13 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 14 March.

NSF Poster Session

Golden Ballroom

Tuesday 13 March 6:00 to 7:30 pm

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

Best Student Paper Session

Towne

Wednesday 14 March 9:10 to 12:00 pm

Finalists for the SPIE/ASME Best Student Paper Award will present their papers in this special session.

Special Session on Noncontact Measurement

(part of conference 8345)

Royal Palm VI

Thursday 15 March 10:30 am to 12:30 pm

This special session will include 6 invited presentations on Noncontact Measurement, followed by a 30-minute panel discussion. Please see the spie.org/ss website for detailed special event information and the current program schedule.

Plenary Sessions · Town & Country Ballroom

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

Monday 12 March 8:15 to 8:30 am

NDE Lifetime Achievement Award

presented to

Tribikram Kundu, The Univ. of Arizona (USA)

SSM Lifetime Achievement Award

presented to

Dimitris Lagoudas, Texas A&M Univ. (USA)

Monday 12 March 8:30 to 9:15 am

Thermo-Acoustic-Piezoelectric Energy Harvesters



Amr Baz, University of Maryland, College Park (USA)

Abstract: Thermo-acoustic-piezoelectric (TAP) energy harvesters are considered as a viable means for converting thermal energy, such as solar or waste heat energy, directly into electrical

energy. The thermal energy is utilized to generate a steep temperature gradient along a porous stack which is optimally sized and placed near one end of a resonator tube. At a specific threshold of the temperature gradient, self-sustained acoustic waves are generated inside the resonator. The resulting pressure fluctuations excite a piezoelectric diaphragm, placed at the opposite end of the resonator, which converts the acoustic energy directly into electrical energy without the need for any moving components. The performance characteristics of this class of thermo-acoustic-piezoelectric harvesters will be discussed for standing and traveling wave resonators. The harvesters are augmented with dynamic magnification techniques in order to enhance their overall conversion efficiency. The characteristics of the different configurations of the harvesters will be demonstrated experimentally on prototypes of

these systems. Particular emphasis is placed on monitoring the temperature field using infrared camera, the flow field using particle image velocimetry, the acoustic field using an array of microphones, and the energy conversion efficiency. Comparisons between the theoretical predictions and the experimental results are also presented. The presented theoretical and experimental techniques can be invaluable tools in the design of TAP resonators for harvesting thermal energy in areas far from the power grid such as nomadic communities and desert regions for light, agricultural applications, air conditioning, communication applications.

Biography: **Amr Baz** earned his Ph.D. in Mechanical Engineering from University of Wisconsin at Madison in 1973. Currently, he is Professor of Mechanical Engineering at the University of Maryland in College Park, MD. He is also serving as the Director of the Smart Materials & Structures Research Center. Between 2001–2006, he served as the Director of the Small Smart Systems Center. His research interests include active and passive control of vibration and noise, active acoustic metamaterials, thermoacoustic energy harvesting, and virtual reality design of smart structures. He has published more than 150 papers in referred journals and holds 7 US patents. He is Fellow of the American Society of Mechanical Engineers, Associate Fellow of AIAA, listed in Who's Who of American Inventors, and recipient of Engineering Alumni Association Outstanding Faculty Research Achievement Award. Dr. Baz received the 2009 ASME Adaptive Structures and Material Systems award and the Pi-Tau-Sigma Purple Cam-Shaft Teaching Award in 2009. In 2011, he received the Smart Structures and Materials Lifetime Achievement Award. Dr. Baz serves on the editorial boards of journals of Vibration and Control, Smart Structures & Systems, and Mechanics of Advanced Materials and Structures.

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

Monday 12 March 9:15 to 10:00 am



James Danoff-Burg, San Diego Zoo Global (USA)

Abstract: Bioinspiration, also known as biomimicry or biomimetics, is an interdisciplinary process in which biological principles and elements are studied in order to draw

analogies to be applied to human innovation. Dr. James Danoff-Burg, Director of the Conservation Education Division at the San Diego Zoo Institute for Conservation Research, will take participants on an adaptation tour of San Diego Zoo Global's diverse plant and animal collections, highlighting examples of how the natural world can inspire engineering. His talk will be complimented with an interactive exercise to help stimulate creative thinking and an in-person visit from a San Diego Zoo Animal Ambassador.

Biography: With an energetic team of top-flight educators, **James Danoff-Burg** helps enhance the success of the Institute's conservation projects around the world by ensuring public participation and support, while working with Institute researchers. He and his staff help popularize conservation success stories by the Institute through local and national education and outreach efforts, as well as international online campaigns. James enjoys training teachers, teaching students of all ages, and otherwise popularizing conservation. His research focuses primarily on the effects of human activities on invertebrate biodiversity in urban environments. He earned his undergraduate degree from the University of Michigan and an M.A. and Ph.D. from the University of Kansas. James was a Research Fellow of the American Museum of Natural History and then a faculty member at Columbia University for 14 years before coming to the Institute.

Tuesday 13 March 8:10 to 8:20

SPiE Fellow Recognition

presented to

H. Felix Wu, NIST (USA)

Sang H. Choi, NASA Langley Research Ctr. (USA)

Tuesday 13 March 8:20 to 9:05 am

Adaptive Structural Systems with Multi-Field Tailoring



Kon-Well Wang, Univ. of Michigan. (USA)

Abstract: During the past couple of decades, due to the new advances in materials, electronics, and system integration technologies, structural dynamics and control

researchers in various disciplines have been investigating the feasibility of creating adaptive structures (also have been given names such as smart structures and intelligent structures). The ultimate vision is to develop a structural system that has built-in actuation, sensing, decision making, self-powered, self-diagnostic, and self-healing abilities. From a structural system point of view, the major challenge in recent years is on how to best utilize the multi-field coupling characteristics of the adaptive materials to optimally enhance the function of the overall integrated system. Many interesting phenomena have been explored and promising results have been illustrated. It is recognized that to achieve significant advances in future adaptive structure research, the structural system researchers have to conduct even more cross talks with researchers in various other disciplines, such as biology, chemistry, electronics, materials, and nano science. This lecture will review some of the recent interdisciplinary research efforts in adaptive structure dynamics and controls enhancement via cross-field coupling synthesis.

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

Biography: **Dr. Kon-Well Wang** is the Stephen P. Timoshenko Collegiate Professor and Department Chair of Mechanical Engineering at the University of Michigan. He 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 as a faculty at the Pennsylvania State University in 1988. During his Penn State years, Professor Wang has served as the William E. Diefenderfer Chaired Professor in Mechanical Engineering, Director of the Structural Dynamics and Controls Lab, Associate Director of the Vertical Lift Research Center of Excellence, and Group Leader for the Center for Acoustics and Vibration. Dr. Wang joined the University of Michigan as Department Chair in 2008.

Professor Wang's main technical interests are in adaptive structural systems and structural dynamics & controls. His work has cross linked multiple fields, developed methodologies in synthesizing novel adaptive structures with piezoelectric circuitry networks, bio-inspired composites, or nano-scale materials for structural dynamics and controls enhancement. Professor Wang is a Fellow of the American Society of Mechanical Engineers (ASME), a Fellow of the Institute of Physics, and a Fellow of the American Association for the Advancement of Science. He has received numerous recognitions for his accomplishments; such as the SPIE Smart Structures and Materials Lifetime Achievement Award, 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, the NASA Tech Brief Award, and the SAE Ralph Teetor Award. Professor Wang has been the Chief Editor for the ASME Journal of Vibration and Acoustics (2005-2009). He is currently an Associate Editor for the Journal of Intelligent Material Systems and Structures and an Editorial Advisory Board Member of the Journal of Sound and Vibration.

Wednesday 14 March 8:10 to 8:20 am

ASME Gary Anderson Early Achievement Award

ASME Best Paper Awards

Wednesday 14 March 8:20 to 9:05 am

Opportunities and Challenges for Electromagnetic Materials and Structural Health Monitoring



Peter B. Nagy, Univ. of Cincinnati (USA)

Abstract: Electromagnetic nondestructive evaluation (NDE) methods offer unique opportunities for health monitoring of materials and structures. A variety of sensors

can be built based on electromagnetic principles to detect and quantitatively characterize subtle changes in the state of metals, such as microstructural evolution, phase transformation, plastic deformation, hardening, residual stress relaxation, etc., as well as to monitor size and shape changes due to creep deformation and less subtle effects such as corrosion and erosion. In most cases, the detection sensitivity is sufficiently high for the purposes of health monitoring and the feasibility of any given sensing method is mainly determined by its selectivity, or the lack of it, to a particular type of damage mechanism. This talk will review recent developments in electromagnetic materials characterization and in-situ health monitoring and will offer a feasibility assessment of these nondestructive methods through a couple of representative examples of broad interest.

Pacific Salon III

Thursday 15 March 8:10 to 8:20 am

SPIE/ASME Best Student Paper Award

Smart Structures Product Implementation Award

Thursday 15 March 8:20 to 9:05 am

Shape Memory Polymer-Based Smart Composites: Future's Materials for Shape Changing



Jinsong Leng, Harbin Institute of Technology (China)

Abstract: Shape-memory polymers (SMPs) are a class of stimuli-responsive materials that can switch between two shapes on command, from a temporary

shape to their permanent shape upon exposure to an external stimulus, such as temperature, electricity, magnetic field or solvent, et.al. The shape-memory phenomenon in SMPs arises from a dual segment system, in which one segment is highly elastic and the other is able to remarkably reduce its stiffness in the presence of a particular stimulus. Recent technological advances have allowed the SMPs to be triple-shape or multi-shape memory materials. SMPs differ from their metallic counterpart, shape-memory alloys (SMAs) by their glass transition or melting transition that are responsible for the shape-memory effect, while martensitic/austenitic transitions are for SMAs. Furthermore, there are distinct advantages over SMAs, including higher capacity for elastic

strain (more than 100% in most cases), lower density, tunable transformation temperature and easier processing. In addition to these advantages, low cost not only for the materials themselves but also in processing and fabrication enables the use of SMPs for a broad range of applications. This presented work summarizes the recent advances in synthesis of a novel epoxy-based SMP, design and characterization of SMP composites (SMPCs) driven by electrical approach, multi-functional nanocomposites encompassed sensors, actuators, deployable device and so on, constitutive modeling, and their potential applications in aerospace engineering and morphing aircraft.

Biography: **Professor Jinsong Leng** is a Cheung Kong Chair Professor and the Director of the Smart Materials and Structures Laboratory, at School of Astronautics of Harbin Institute of Technology, China. His research interests focus on smart materials and structures, sensors and actuators, shape memory polymers, electroactive polymers, fiber optic sensors, structural health monitoring, space deployable structures, morphing aircrafts, active vibration control and multifunctional nanocomposites.

He has authored or co-authored over 220 scientific papers, 3 books, 19 issued patents and 13 pending patents, and delivered more than 28 invited talks around the world. Prof. Leng served as the chairman of Asia-Pacific Committee on Smart and Nano Materials (APCSNM), Editor in Chief of International Journal of Smart and Nano Materials (Taylor & Francis, UK), Associate Editor of Smart Materials and Structures (IOP, UK) and Associate Editor of Journal of Intelligent Materials Systems and Structures (SAGE, UK) etc.. He has been elected as an Executive Council Member of the International Committee on Composite Materials (ICCM). Prof. Leng is Fellow of SPIE, Fellow of IOP and Associate Fellow of AIAA.



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SPIE has been approved as an authorized provider of CEUs by IACET, The International Association for Continuing Education and Training (Provider #1002091). In obtaining this approval, SPIE has demonstrated that it complies with the ANSI/IACET Standards which are widely recognized as standards of good practice.

SPIE reserves the right to cancel courses due to insufficient pre-registration.

Register for this course at SPIE Registration.

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, power harvesting, high torque and power twisting yarn actuators, 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
- become familiar with fabrication processes
- review mechanical analysis and design principles associated with EAP
- assess the applicability of current EAP actuators while accounting for their limitations
- 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 is Senior Research Scientist and Supervisor, Advanced Technologies Group, at JPL. He is a leading expert in advanced actuators using electroactive polymers and ceramic materials. Dr. Bar-Cohen is a Fellow of SPIE and ASNT. He is the author/coauthor of numerous publications, has many registered patents and is the recipient of many awards and honors. Further information on: <http://ndea.jpl.nasa.gov/nasa-nde/yosi/yosi.htm>

John Madden is an Associate Professor of Electrical & Computer Engineering at the University of British Columbia, Vancouver, Canada. His research areas include the application of EAP materials in active catheters, as well as the development and characterization of molecular and carbon nanotube actuators. <http://www.mina.ubc.ca/jmadden>

Qibing Pei is professor of materials science and engineering at the University of California, Los Angeles. His research interests cover a wide range of soft materials and span from materials synthesis, processing, to design of functional devices. He applies molecular design and nano-scale engineering in the discovery of new polymers with novel electronic or mechanical property. http://www.seas.ucla.edu/ms/faculty1/qibing_pei.html

Monday Award Presentations

Town & Country Ballroom

Monday 12 March 8:15 to 8:30 am

SSM Lifetime Achievement Award



presented to

Dimitris C. Lagoudas, Texas A&M Univ. (USA)

Biography: **Dimitris C. Lagoudas** received his Mechanical Engineering Diploma from the Aristotle University of Thessaloniki, Greece in 1982 and his Ph.D. in Applied Mathematics from Lehigh University in Bethlehem, PA in 1986. After spending

brief periods at Cornell University, Max-Planck Institute in Stuttgart and Rensselaer Polytechnic Institute, Dr. Lagoudas arrived at Texas A&M in 1992 and currently serves as the Department Head of Aerospace Engineering and the inaugural recipient of the John and Bea Slattery Chair. As Director for the Texas Institute for Intelligent Materials and Structures (TIIMS), his research involves the characterization and constitutive modeling of multifunctional material systems at various length scales and considering various functionalities, including mechanical, thermal and electrical. His research team is recognized internationally, especially in the areas of modeling and characterization of shape memory alloys and multifunctional composites. He has authored or co-authored about 350 scientific publications, including about 150 in archival journals, several of which are now considered classic papers in the field. The theoretical models that his research group developed have been implemented into finite element analysis software and utilized by many industrial and governmental entities (Boeing, DoD and NASA), as well as academic institutions worldwide.

NDE Lifetime Achievement Award



presented to

Tribikram Kundu, The Univ. of Arizona (USA)

Biography: In 1979 Professor Kundu received his bachelor degree in Mechanical Engineering from IIT Kharagpur, where he was the winner of the President of India Gold Medal. He joined UCLA as a recipient of the Regents' Fellowship. After

completing his MS and Ph.D. from UCLA he joined the University of Arizona in 1983 and was promoted to full Professor in 1994. Dr. Kundu has made significant and original contributions in both basic and applied research in nondestructive testing and structural health monitoring by ultrasonic and electromagnetic techniques. He received international acclaim for his fundamental research on the elastic and electromagnetic wave propagation modeling in multi-layered, heterogeneous, engineering and biological materials. He is the recipient of the prestigious Humboldt Research Prize (the Senior Scientist Award) in 2003 and Humboldt Fellowships in 1989 and 1996 from Germany. He was invited professors at ENS Cachan, France, University of Bordeaux, France, Universities of Frankfurt and Leipzig, Germany, University of Technology, Compiègne,

France, EPFL, Switzerland, Chalmers University of Technology, Gothenburg, Sweden, Semenov Institute of Chemical Physics, Moscow, University of Tokyo and Aarhus University Medical School, Denmark. In 2008 he received the Structural Health Monitoring Person of the Year award. He has also received several Best Paper Awards and invitations for Plenary and Keynote talks. He is a fellow of ASME, ASCE and SPIE. So far he has supervised 30 Ph.D. students, 20 MS students and published 261 technical papers, 126 journal papers, 2 text books, 15 book chapters, edited 5 research monographs and 17 conference proceedings.

Tuesday Award Presentations

Town & Country Ballroom

Tuesday 14 March 8:00 to 8:05 am

SPIE Fellow Recognition



presented to

H. Felix Wu, NIST (USA), for achievements in the areas of high-performance fibers, polymers, composite materials, and civil infrastructure.



Sang H. Choi, NASA Langley Research Ctr. (USA) for achievements in the successful development of several breakthrough technologies, smart optics, bionanobattery, quantum apertures, thermo-electric materials, magnetic liquid metals, and new bandgap semiconductor materials.



Wednesday Award Presentations

Town & Country Ballroom

Tuesday 13 March 8:00 to 8:05 am

ASME Gary Anderson Early Achievement Award

This award is given for notable contributions to the field of Adaptive Structures and Material Systems.

ASME Best Paper Awards

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

Thursday Award Presentations

Pacific Salon III

Thursday 15 March 8:10 to 8:20 am

SPIE/ASME Best Student Paper Award Presentation

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 morning 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.

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 criterion 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.

14th Annual EAP-in-Action Session and Demonstrations

Town & Country Ballroom · Monday 12 March, 4:30 to 5:45 pm

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

This Session is intended to turn the spotlight on Electroactive Polymers (EAP) materials, their capability, and their potential for smart structures. New materials and applications are continuing to emerge and this is a great opportunity for the attendees to see state-of-the-art demonstrations of the unique capabilities of EAP as possible actuators-of-choice. This Session offers a forum for interaction between developers and potential users as well as a "hands-on" experience with this emerging technology. It was during this session that the first Human/EAP-Robot Armwrestling Contest was held in 2005. We are going to have exciting demonstrations from 9 groups representing Australia, Canada, New Zealand, Switzerland, and the United States.

Tentative EAP Demonstrations

Carbon nanotube torsional muscles

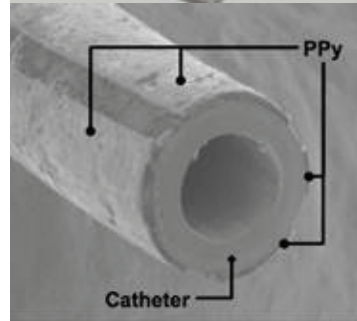
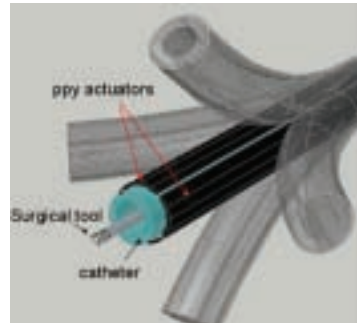
John D. W. Madden, Univ. of British Columbia (Canada), **Geoffrey M. Spunks**, Univ. of Wollongong (Australia)



The demo will consist of a rapid rotation of a plastic paddle in air driven by carbon nanotube yarn. The torsional muscle operates with part of the yarn immersed in a liquid electrolyte that is electrochemically charged by application of a small voltage. The charging of the yarn causes the yarn to partially untwist and produce rotation of the attached paddle. Discharging the yarn causes it to re-twist. The demonstration will illustrate the very rapid and large rotations achievable in these simple actuator systems.

Steerable Catheter

U. N. Rana, K. Lee, T. Shoa, S. Nafici, G. M. Spinks, V. X. D. Yang, J. D. W. Madden, Univ. of British Columbia (Canada)



A catheter is coated with polypyrrole, and patterned to enable tip deflection. This is intended to enable navigation and imaging within the neuro-vascular system.

Dielectric elastomer (DE) technology for self-sensing, portable energy harvesting, and product development

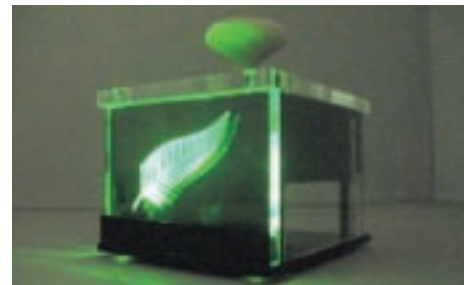
Iain Anderson, Emilio Calius, Todd Gisby, Andrew Lo, Thomas McKay, Ben O'Brien, Biomimetics Lab., Auckland Bioengineering Institute (New Zealand)

This showcase will include the following demonstrations:



1) *Cyber-proprioception and cyber-pain*

Like natural muscles, DE-based artificial muscles can now provide in real time both positional feedback (cyber-proprioception) and condition-monitoring information (cyber-pain). These capabilities, essential for the control and performance of soft machines, will be demonstrated using the lab's Self-Sensing Unit coupled to a DE actuator.



2) *A hand-held dielectric elastomer generator*

DE can be used to extract useful low voltage power from human movement. This will be demonstrated using a device that can be held in one hand



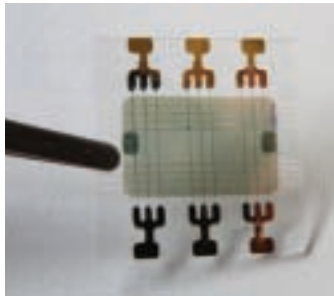
3) *The four-channel Artificial Muscle Control Unit*

This stand-alone portable laboratory instrument simplifies the generation and control of high voltages for artificial muscle research. Features include 4 independent output channels, computer control, battery operation, and safety features that make it suitable for bench-top use.

Miniaturized EAPs based on ion-implanted compliant electrodes: mm-size pumps, motors, and robots

S. Rosset, L. Maffli, S. Akbari, B. O'Brien, Herbert R. Shea, EPFL-LMST (Switzerland)

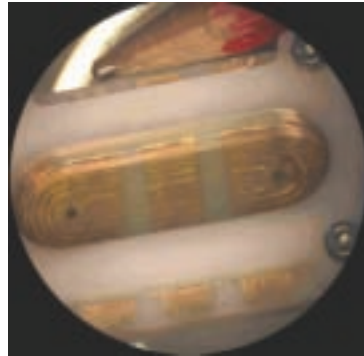
Several miniaturized dielectric elastomer devices will be demonstrated. By using metal ion-implantation compliant electrodes can be made with features as small as 50 μm . The developed devices will include micropumps, rolling robots, rotary motors, and cell-stretchers.



Array of 72 devices on a 2x2 cm² chips



Inside the ion implanter



Zipping peristaltic pump



3 mm
2-axis tilting mirror

“Feel the game” with ViviTouch™ technology

Marcus Rosenthal, Andy Cheng, Artificial Muscle, Inc., Bayer MaterialScience Co. (USA)



This demo will include the latest ViviTouch haptic actuators integrated into consumer products for “high definition feel” in Mobile and Gaming applications.

Improved bistable electroactive polymers (BSEP) and refreshable Braille display devices

Xiaofan Niu, Paul Brochu, Sungryul Yun, Zhibin Yu, Qibing Pei, Univ. of California, Los Angeles (USA)

This demo is a bistable EAP actuators with significantly improved actuation performance, and refreshable Braille display device consisting of 1 to 4x10 cells.



Braille screen fabricated on a plastic sheet.

Haptics based on EAP actuators

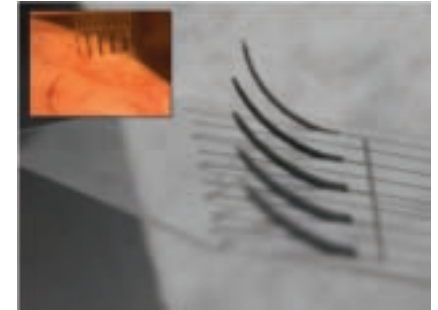
Shihai Zhang, Qiming Zhang, and Ralph Russo, Strategic Polymer Sciences, Inc. (USA)

A high definition localized smartphone haptics device will be demonstrated using EAP actuators. The actuator provides sharp and concentrated multi-touch HD haptic feedback. It is driven by voltage below 200 V allowing its activation by low cost miniature power supply.



Articulating neural interfaces

Eugene Dariush Daneshvar, Univ. of Michigan (USA); Elisabeth Smela, Univ. of Maryland, College Park (USA); Daryl Kipke, Univ. of Michigan (USA)

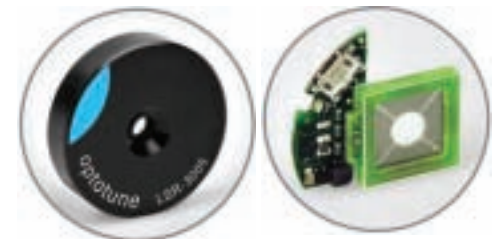


Articulating neural interfaces will be demonstrated that can guide the trajectory as well as the proximity of electrode sites to neural tissues.

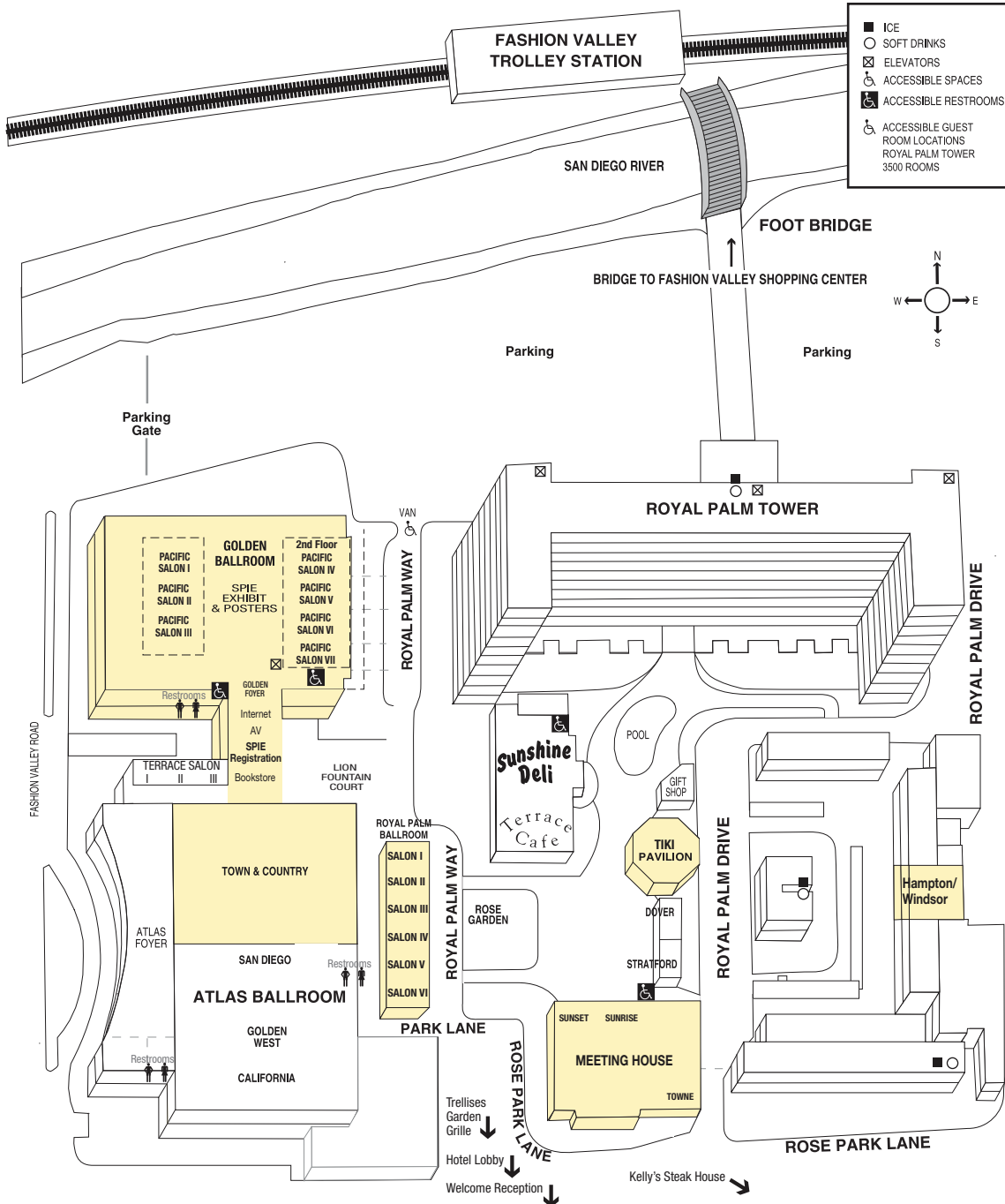
A Laser Speckle Reducer

Pit Gebbers, EPFL/ZHAW, Optotune Inc. (Switzerland)

A Laser Speckle Reducer that is actuated by DEAs will be demonstrated. The actuators cause a diffuser to perform in-plane, resonant movements. When a laser beam is directed through the moving diffuser, its speckle noise is significantly reduced by averaging the local interferences. The demonstrated device is significantly smaller and less expensive to produce than the commercial ones.



Town & Country Map



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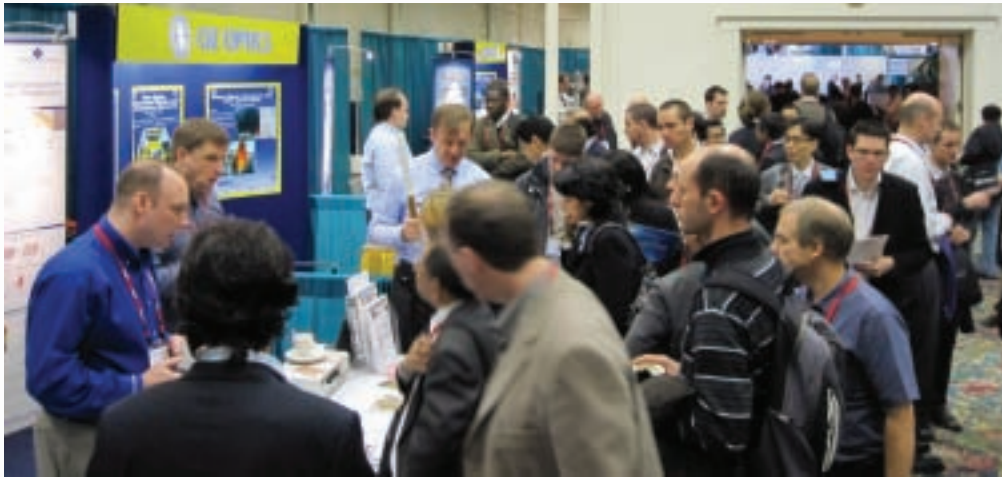
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- Structural Health Monitoring
- Nanotechnology
- Civil Infrastructure Systems
- Modeling, Control, and Optimization
- Energy Harvesting/Energy Systems
- Bio-inspired and Robotic Systems
- Electroactive Polymers
- Shape Memory Alloys
- MR Fluids and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

Exhibition Hours:

Tuesday 13 March, 10:00 am to 4:00 pm, and during the **Posters/Exhibition Reception**, 6:00 to 7:30 pm

Wednesday 14 March, 10:00 am to 4:00 pm



“Smart Structures/NDE is where a diverse community representing all facets of the field come together to talk about relevant work and interface with colleagues and vendors.”

—2011 Attendee

spie.org/ss12exhibition

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Conference Session Schedule

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Monday

8:15 to 10:00 am

Plenary Session

10:30 am to 12:30 pm	Sensors I	EAP as Emerging Actuators I	Energy Harvesting and Scavenging I: Nonlinear Energy Harvesting	Ferroelectric Materials	Aerospace Applications	Keynote Lecture I Nanowire, Nanotube, and Nanostructures I	Keynote Session		Classical Spectral-gap Sensors I: Phononics-Phoxonics	Vibration-based SHM of Civil Infrastructure I	Guided Waves I: Analysis and Signal Processing	Wind Turbine and Concrete Monitoring
1:20 to 3:10 pm	Sensors II	EAP as Emerging Actuators II	Passive and Active Vibration Isolation I	Active Composites I	Energy Harvesting	Keynote Lecture II Nanowire, Nanotube, and Nanostructures II	System Identifications for Civil Structures	Advances in Guided Waves	Classical Spectral-gap Sensors II: Phononics-Photonics	Vibration-based SHM of Civil Infrastructure II	Guided Waves II: Monitoring Pipes and Other Structures	SHM Using Electrical Properties of Materials
3:30 to 6:00 pm	Sensors III	EAP-in-Action Demonstration Session	Energy Harvesting and Scavenging II: Fluid and Biological Energy Harvesting	Active Polymers I	Structural Health Monitoring	Nano Devices and Sensors I	Next-Generation Sensing Systems for SHM: Wireless Sensors	Wireless Sensor Networks for SHM I	Fiber Bragg Grating Sensors	SHM/NDE of Nuclear Facilities and Pipe Systems	Guided Waves III: Modeling and Analysis	Medical and Biological Applications I

Tuesday

8:00 to 9:10 am

Plenary Session

9:00 to 10:10 am	Optics/ Photonics I	3D Measurement Systems Using Structured Light	Biological-inspired Systems and Bio-MEMS	Modeling of Piezoelectric Ceramics	Medical Devices	Keynote Lecture III	Intelligent Systems for Disaster Mitigation	Wireless Sensor Networks for SHM II	Acoustic Sensors	Corrosion Monitoring Technologies for Civil Infrastructure	Guided Waves IV: Aerospace Applications	Sensor Network, Signal Processing, and Feature Extraction
10:30 to 12:30 pm	Optics/ Photonics II		Optimization and Design of Integrated Systems I	Piezoelectric Materials	Smart Actuators	Nano Devices and Sensors II	Crack Detection in Structures	Acoustic Emission and Active Sensing	Classical Spectral-gap Sensors III: Phononics-Optomechanics and Heat Management		Guided Waves V: Modeling and Simulation	Novel Devices and Applications
1:30 to 3:40 pm	Flight	Ionic EAP I: Conducting, IMC, and Gels	Magneto Rheological Systems I	Piezoelectric Ceramics: Fabrication and Performance	SHM for Wind and Water Systems	Keynote Lecture IV Smart Electronics	Next-Generation Sensing Systems for SHM: Nanotechnology	Smart Sensors for SHM	Classical Spectral-gap Sensors IV: Photonics-Phononics	NDE/SHM of Composites	Modeling and Simulation Related to SHM	SHM for Space and Aerospace Industries
3:30 to 6:00 pm	Miscellaneous Applications	Ionic EAP II: Conducting, IMC, and Gels	Energy Harvesting and Scavenging III: General Energy Harvesting I	Active Composites II		Wireless Sensor System	Distributed Sensing and Controls for SHM and Human-System Interaction		Fiber Optic Sensors		Guided Waves VI: Monitoring Composites	Medical and Biological Applications II

Conference Session Schedule

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Wednesday

8:00 to 9:10 am

Plenary Session

9:00 am	Biomedical Applications	Nanotubes and Nanotechnology		Aircraft, MAV/ UAV, and Morphing Systems I		SMP: Fabrication and Characterization	Fabrication and Characterization I	Strain Sensors for SHM	Bio-inspired Technology	Wireless Sensors	Energy Harvesting for SHM Systems	Imaging-based NDE/ SHM of Civil Infrastructure I	Metamaterials I
10:30 am	Adhesion/ Surfaces I			Aircraft, MAV/ UAV, and Morphing Systems II		SMP: Modeling	Fabrication and Characterization II	Sensing Technologies for Wind Turbines	Nano-engineered Sensors for SHM	Application of Sensors to Monuments of Cultural Heritage	Ultrasonic Technologies for NDE/ SHM I	Imaging-based NDE/ SHM of Civil Infrastructure II	Civil Infrastructure I: Building Monitoring
1:30 pm	Adhesion/ Surfaces II	Dielectric Elastomers		Modeling, Simulation, Signal Processing, and Control of Integrated Systems I	Energy Harvesting and Scavenging III: General Energy Harvesting II	SMP Composites	Fabrication and Characterization III	Intelligent Sensing and NDE	Advance Sensing Systems for Civil Structures	Sensors for Structural Health Monitoring I	Ultrasonic Technologies for NDE/ SHM II	Road Surface Technologies	Metamaterials II
3:30 pm		Electronics and Electrodes		Modeling, Simulation, Signal Processing, and Control of Integrated Systems II		Magneto-active Materials	Fabrication and Characterization IV	Next-Generation Sensing Systems for SHM: Algorithms	Smart Structure Technology for Aerospace Systems	Sensors for Structural Health Monitoring II	Vibration and Impedance-based NDE/ SHM	X-ray, Fiber Optic and Thermal Technologies	Civil Infrastructure II: Bridge Monitoring

Thursday

8:00 to 9:10 am

Plenary Session

9:00 am	Sensors	Characterization	Energy Harvesting and Scavenging III: General Energy Harvesting III	SMA- and Piezo-based Materials and Systems I	CNT-based Multifunctional Materials	Applications I	Embedded Sensing In Blades	Smart Structures and Monitoring I		Strain-based SHM for Civil Infrastructure	Acoustic Emission and Ultrasonic-based NDE/ SHM of Civil Infrastructure I	Nonlinear Techniques for SHM
10:30 am	Applications I	Active Polymers: Liquid Crystals, Etc.	Micro and Nano Integrated Systems	SMA- and Piezo-based Materials and Systems II	SMA: Experimental	Applications II	Structural Vibration Control	Smart Structures and Monitoring II		SHM Systems for Civil Infrastructure I	Acoustic Emission and Ultrasonic-based NDE/ SHM of Civil Infrastructure II	Optical Devices and Techniques for SHM
1:30 pm	Applications II	Energy Harvesting	Energy Harvesting and Scavenging IV: Design of Energy Harvesting Systems	Magneto Rheological Systems II	SMA: Modeling and Characterization		Multifunctional Materials for Smart Structures	Advances in Fiber Optic Technology		SHM Systems for Civil Infrastructure II		Uncertainties in SHM and Pipe Monitoring
3:40 pm			Passive and Active Vibration Isolation II		Multifunctional Composites and Metamaterials		Next-Generation Sensing Systems for SHM: Applications	Damage Assessment and Monitoring		SHM Systems for Civil Infrastructure III		

Technical Conferences

Conference 8339

Monday-Wednesday 12-15 March 2012
Proceedings of SPIE Vol. 8339

Bioinspiration, Biomimetics, and Bioreplication II

Conference Chair: **Akhlesh Lakhtakia**, The Pennsylvania State Univ. (USA)

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

Program Committee: **Yoseph Bar-Cohen**, Jet Propulsion Lab. (USA); **Steven F. Barrett**, Univ. of Wyoming (USA); **Michael H. Bartl**, The Univ. of Utah (USA); **Javaan S. Chahl**, Defence Science and Technology Organisation (Australia); **Frank E. Fish**, West Chester Univ. of Pennsylvania (USA); **Joshua L. Hertz**, Univ. of Delaware (USA); **Dietmar W. Huttmacher**, Queensland Univ. of Technology (Australia); **Shuichi Kinoshita**, Graduate School of Frontier Biosciences (Japan); **Peng Jiang**, Univ. of Florida (USA); **Sunghoon Kwon**, Seoul National Univ. (Korea, Republic of); **Hoon Cheol Park**, Konkuk Univ. (Korea, Republic of); **Antonio Scaglione**, Univ. degli Studi di Salerno (Italy); **James D. Weiland**, The Univ. of Southern California (USA); **H. Donald Wolpert**, Bio-Optics (USA)

Conference 8340

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8340

Electroactive Polymer Actuators and Devices (EAPAD) XIV

Conference Chair: **Yoseph Bar-Cohen**, Jet Propulsion Lab. (USA)

Conference Co-Chair: **Keiichi Kaneto**, Kyushu Institute of Technology (Japan)

Program Committee: **Barbar J. Akle**, Lebanese American Univ. (Lebanon); **Tunku Ishak Al-Irsyad**, Univ. Teknologi MARA (Malaysia); **Siegfried G. Bauer**, Johannes Kepler Univ. Linz (Austria); **Ray Henry Baughman**, The Univ. of Texas at Dallas (USA); **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); **Hyouk Ryeol Choi**, Sungkyunkwan Univ. (Korea, Republic of); **Gal deBotton**, Ben-Gurion Univ. of the Negev (Israel); **Toribio Fernández Otero**, Univ. Politécnica de Cartagena (Spain); **Yahya A. Ismail**, Univ. of Nizwa (Oman); **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 (USA); **Roy D. Kornbluh**, SRI International (USA); **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); **Siavouche Nemat-Nasser**, Univ. of California, San Diego (USA); **Qibing Pei**, Univ. of California, Los Angeles (USA); **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 (USA); **Peter Sommer-Larsen**, Risø National Lab. (Denmark); **Ji Su**, NASA Langley Research Ctr. (USA); **Minoru Taya**, Univ. of Washington (USA); **Frédéric Vidal**, Univ. de Cergy-Pontoise (France); **Gordon G. Wallace**, Univ. of Wollongong (Australia); **Thomas Wallmersperger**, Technische Univ. Dresden (Germany); **Qiming M. Zhang**, The Pennsylvania State Univ. (USA)

Conference 8341

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8341

Active and Passive Smart Structures and Integrated Systems VI

Conference Chair: **Henry A. Sodano**, Univ. of Florida (USA)

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Conference 8342

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8342

Behavior and Mechanics of Multifunctional Materials and Composites VI

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Conference Co-Chair: **Zoubeida Ounaies**, The Pennsylvania State Univ. (USA)

Program Committee: **Abhijit Bhattacharyya**, Univ. of Arkansas at Little Rock (USA); **Gregory P. Carman**, Univ. of California, Los Angeles (USA); **Pavel M. Chaplya**, Sandia National Labs. (USA); **Constantin Ciocanel**, Northern Arizona Univ. (USA); **Marcelo J. Dapino**, The Ohio State Univ. (USA); **LeAnn E. Faidley**, Iowa State Univ. (USA); **Daniel J. Inman**, Virginia Polytechnic Institute and State Univ. (USA); **Marc Kamlah**, Karlsruher Institut für Technologie (Germany); **Haluk E. Karaca**, Univ. of Kentucky (USA); **Ibrahim Karaman**, Texas A&M Univ. (USA); **Kwang J. Kim**, Univ. of Nevada, Reno (USA); **Dimitris C. Lagoudas**, Texas A&M Univ. (USA); **Chad M. Landis**, The Univ. of Texas at Austin (USA); **Kam K. Leang**, Univ. of Nevada, Reno (USA); **Donald J. Leo**, Virginia Polytechnic Institute and State Univ. (USA); **Jiangyu Li**, Univ. of Washington (USA); **Sergio Luis dos Santos e Lucato**, Teledyne Scientific Co. (USA); **Christopher S. Lynch**, Univ. of California, Los Angeles (USA); **Karla M. Mossi**, Virginia Commonwealth Univ. (USA); **Robert C. O'Handley**, Massachusetts Institute of Technology (USA); **Etienne Patoor**, Univ. Metz (France); **Ralph C. Smith**, North Carolina State Univ. (USA); **Jonghwan Suhr**, Univ. of Delaware (USA); **Vishnu Baba Sundaresan**, Virginia Commonwealth Univ. (USA)

Conference 8343

Monday-Tuesday 12-13 March 2012
Proceedings of SPIE Vol. 8343

Industrial and Commercial Applications of Smart Structures Technologies VI

Conference Chair: **Kevin Farinholt**, Los Alamos National Lab. (USA)

Conference Co-Chair: **Steven F. Griffin**, Boeing LTS Maui (USA)

Program Committee: **Eric H. Anderson**, CSA Engineering, Inc. (USA); **Emil V. Ardelean**, Schaefer Corp. (USA); **Brandon J. Arritt**, Air Force Research Lab. (USA); **Christian Boller**, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); **Diann E. Brei**, Univ. of Michigan (USA); **Alan L. Browne**, General Motors Corp. (USA); **Peter C. Chen**, NASA Goddard Space Flight Ctr. (USA); **Marcelo J. Dapino**, The Ohio State Univ. (USA); **L. Porter Davis**, Honeywell Defense and Space Electronic Systems (USA); **Xiao-Yan Gong**, Medical Implant Mechanics LLC (USA); **Holger Hanselka**, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany); **Ernie Havens**, Cornerstone Research Group, Inc. (USA); **Nancy L. Johnson**, General Motors Corp. (USA); **Chad H. Joshi**, Energen, Inc. (USA); **Jayanth N. Kudva**, NextGen Aeronautics, Inc. (USA); **Amrita Kumar**, Accellent Technologies, Inc. (USA); **Ou Ma**, New Mexico State Univ. (USA); **Geoffrey P. McKnight**, HRL Labs., LLC (USA); **Christopher Niezrecki**, Univ. of Massachusetts Lowell (USA); **Gyuhae Park**, Los Alamos National Lab. (USA); **Marc E. Regelbrugge**, Rhombus Consultants Group (USA); **Eric J. Ruggiero**, GE Global Research (USA); **W. Lance Richards**, NASA Dryden Flight Research Ctr. (USA); **Janet M. Sater**, Institute for Defense Analyses (USA); **Henry A. Sodano**, Univ. of Florida (USA); **Edward V. White**, The Boeing Co. (USA)

Conference 8344

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8344

Nano-, Bio-, Info-Tech Sensors and Systems

Conference Chair: **Vijay K. Varadan**, Univ. of Arkansas (USA)

Conference Co-Chairs: **Jaehwan Kim**, Inha Univ. (Korea, Republic of); **Kyo D. Song**, Norfolk State Univ. (USA); **Sang H. Choi**, NASA Langley Research Ctr. (USA); **Yongrae Roh**, Kyungpook National Univ. (Korea, Republic of)

Program Committee: **Christina Brantley**, U.S. Army Research, Development and Engineering Command (USA); **Natalie Clark**, NASA Langley Research Ctr. (USA); **Kimiya Komurasaki**, The Univ. of Tokyo (Japan); **Ajit Khosla**, Simon Fraser Univ. (Canada); **Kunik Lee**, Turner-Fairbank Highway Research Ctr. (USA); **Uhn Lee**, Gachon Univ. Gil Medical Ctr. (Korea, Republic of); **Xinxin Li**, Shanghai Institute of Microsystem and Information Technology (China); **Yanjian Liao**, Chongqing Univ. (China); **Samuel C. Lee**, The Univ. of Oklahoma (USA); **D. Roy Mahapatra**, Indian Institute of Science (India); **Yeonjoon Park**, National Institute of Aerospace (USA); **Parag Ganapathi Patil**, Univ. of Michigan Health System (USA); **Il-Kwon Oh**, KAIST (Korea, Republic of); **Aswini K. Pradhan**, Norfolk State Univ. (USA); **Paul Ruffin**, U.S. Army Armament Research, Development and Engineering Ctr. (USA); **Ashok Srivastava**, Louisiana State Univ. (USA); **Tauno Vaha-Heikkila**, VTT Technical Research Ctr. of Finland (Finland); **Richard K. Watt**, Brigham Young Univ. (USA); **Hargsoon Yoon**, Norfolk State Univ. (USA); **T. C. Yih**, Oakland Univ. (USA); **Ming Zhou**, Suzhou Institute of Nano-tech and Nanobionics (China)

Conference 8345

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8345

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems

Conference Chair: **Masayoshi Tomizuka**, Univ. of California, Berkeley (USA)

Conference Co-Chairs: **Chung-Bang Yun**, KAIST (Korea, Republic of); **Jerome P. Lynch**, Univ. of Michigan (USA)

Program Committee: **Yoshio Akimune**, National Institute of Advanced Industrial Science and Technology (Japan); **Amr M. Baz**, Univ. of Maryland, College Park (USA); **Dumitru Caruntu**, The Univ. of Texas-Pan American (USA); **Fabio Casciati**, Univ. degli Studi di Pavia (Italy); **Chih-Chen Chang**, Hong Kong Univ. of Science and Technology (Hong Kong, China); **Genda Chen**, Missouri Univ. of Science and Technology (USA); **Shirley J. Dyke**, Washington Univ. in St. Louis (USA); **Alison B. Flatau**, Univ. of Maryland, College Park (USA); **Yozo Fujino**, The Univ. of Tokyo (Japan); **Robert X. Gao**, Univ. of Connecticut (USA); **Victor Giurgiutiu**, Univ. of South Carolina (USA); **Steven D. Glaser**, Univ. of California, Berkeley (USA); **Faramarz Gordaninejad**, Univ. of Nevada, Reno (USA); **Xiaoyan Han**, Wayne State Univ. (USA); **Benjamin Kyle Henderson**, Air Force Research Lab. (USA); **Haiying Huang**, The Univ. of Texas at Arlington (USA); **Jerry Q. Huang**, The Boeing Co. (USA); **Kumar V. Jata**, Asian Office of Aerospace Research and Development (USA); **Jeong-Tae Kim**, Pukyong National Univ. (Korea, Republic of); **Ki-Soo Kim**, Hongik Univ. (Korea, Republic of); **Jan-Ming Ko**, The Hong Kong Polytechnic Univ. (Hong Kong, China); **Francesco Lanza di Scalea**, Univ. of California, San Diego (USA); **Yingzi Lin**, Northeastern Univ. (USA); **Chin-Hsiung Loh**, National Taiwan Univ. (Taiwan); **Kenneth J. Loh**, Univ. of California, Davis (USA); **Sami F. Masri**, The Univ. of Southern California (USA); **Eduardo Misawa**, National Science Foundation (USA); **Akira Mita**, Keio Univ. (Japan); **Satish Nagarajaiah**, Rice Univ. (USA); **Yiqing Ni**, The Hong Kong Polytechnic Univ. (Hong Kong, China); **Irving J. Oppenheim**, Carnegie Mellon Univ. (USA); **Jinping Ou**, Dalian Univ. of Technology (China); **Jin-Song Pei**, The Univ. of Oklahoma (USA); **Ser-Tong Quek**, National Univ. of Singapore (Singapore); **Jennifer A. Rice**, Texas Tech Univ. (USA); **Rahmat A. Shoureshi**, Univ. of Denver (USA); **Sung-Han Sim**, Univ. of Illinois at Urbana-Champaign (USA); **Hoon Sohn**, KAIST (Korea, Republic of); **Gangbing Song**, Univ. of Houston (USA); **Billie F. Spencer, Jr.**, Univ. of Illinois at Urbana-Champaign (USA); **Lizhi Sun**, Univ. of California, Irvine (USA); **Raymond A. Swartz**, Michigan Technological Univ. (USA); **Tsu-Chin Tsao**, Univ. of California, Los Angeles (USA); **Ming L. Wang**, Northeastern Univ. (USA); **Yang Wang**, Georgia Institute of Technology (USA); **Zhishen Wu**, Ibaraki Univ. (Japan); **Chengying Xu**, Univ. of Central Florida (USA); **Lingyu Yu**, Univ. of South Carolina (USA); **Hong S. Zhou**, Worcester Polytechnic Institute (USA); **Li Zhou**, Nanjing Univ. of Aeronautics and Astronautics (China)

Conference 8346

Monday-Wednesday
12-14 March 2012
Proceedings of SPIE Vol. 8346

Smart Sensor Phenomena, Technology, Networks, and Systems Integration V

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

Conference Co-Chairs: **Kara J. Peters**, North Carolina State Univ. (USA); **Wolfgang Ecke**, Institut für Photonische Technologien e.V. (Germany)

Program Committee: **Farhad Ansari**, Univ. of Illinois at Chicago (USA); **George Y. Baaklini**, NASA Glenn Research Ctr. (USA); **Horst J. Baier**, Technische Univ. München (Germany); **Curtis E. Banks**, NASA Marshall Space Flight Ctr. (USA); **Xiaoyi Bao**, Univ. of Ottawa (Canada); **Hartmut Bartelt**, Institut für Photonische Technologien und -prüfung (Germany); **Daniele Inaudi**, Smartec S.A. (Switzerland); **Kerop D. Janoyan**, Clarkson Univ. (USA); **Leszek R. Jaroszewicz**, Military Univ. of Technology (Poland); **Jinsong Leng**, Harbin Institute of Technology (China); **Alexis Mendez**, MCH Engineering LLC (USA); **Norbert G. Meyendorf**, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (USA); **Jeff W. Miller**, Micron Optics, Inc. (USA); **Marc Nikles**, Omnisens S.A. (Switzerland); **Ioannis E. Psarobas**, National Ctr. for Scientific Research Demokritos (Greece); **Richard H. Selfridge**, Brigham Young Univ. (USA); **Nobuo Takeda**, The Univ. of Tokyo (Japan); **Roderick C. Tennyson**, Fiber Optic Systems Technology, Inc. (Canada); **Michael D. Todd**, Univ. of California, San Diego (USA); **Eric Udd**, Columbia Gorge Research (USA); **Zhishen Wu**, Ibaraki Univ. (Japan); **Zhi Zhou**, Dalian Univ. of Technology (China)

Conference 8347

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8347

Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security VI

Conference Chair: **Andrew L. Gyekenyesi**, NASA Glenn Research Ctr. (USA)

Conference Co-Chairs: **Tzu-Yang Yu**, Univ. of Massachusetts Lowell (USA); **Peter J. Shull**, The Pennsylvania State Univ. (USA); **Aaron A. Diaz**, Pacific Northwest National Lab. (USA); **H. Felix Wu**, National Institute of Standards and Technology (USA)

Program Committee: **A. Emin Aktan**, Drexel Univ. (USA); **Sreenivas Alampalli**, New York State Dept. of Transportation (USA); **Farhad Ansari**, Univ. of Illinois at Chicago (USA); **Radu Barsan**, Redfern Integrated Optics, Inc. (USA); **Shawn J. Beard**, Accellent Technologies, Inc. (USA); **Fu-Kuo Chang**, Stanford Univ. (USA); **Aditi Chattopadhyay**, Arizona State Univ. (USA); **Genda Chen**, Missouri Univ. of Science and Technology (USA); **Shenen Chen**, The Univ. of North Carolina at Charlotte (USA); **Maria Q. Feng**, Univ. of California, Irvine (USA); **Masoud Ghandehari**, Polytechnic Institute of NYU (USA); **Hamid Ghasemi**, Federal Highway Administration (USA); **Valery F. Godinez-Azcuaga**, MISTRAS Group, Inc. (USA); **Nenad Gucunski**, Rutgers, The State Univ. of New Jersey (USA); **Dryver R. Huston**, The Univ. of Vermont (USA); **Frank Jalinoos**, Federal Highway Administration (USA); **Xiaoning Jiang**, North Carolina State Univ. (USA); **Jerome P. Lynch**, Univ. of Michigan (USA); **Theodore E. Matikas**, Univ. of Ioannina (Greece); **Paul Mlakar**, U.S. Army Engineer Research and Development Ctr. (USA); **Franklin L. Moon**, Drexel Univ. (USA); **Didem Ozevin**, Univ. of Illinois at Chicago (USA); **Pradeep Ramuhalli**, Pacific Northwest National Lab. (USA); **Akira Sasamoto**, National Institute of Advanced Industrial Science and Technology (Japan); **Masanobu Shinozuka**, Univ. of California, Irvine (USA); **Kurt Silvers**, Pacific Northwest National Lab. (USA); **Pei-Chen Su**, Nanyang Technological Univ. (Singapore); **Bernhard R. Tittmann**, The Pennsylvania State Univ. (USA); **Dietmar W. Vogel**, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Ming L. Wang**, Northeastern Univ. (USA); **Yang Wang**, Georgia Institute of Technology (USA); **Sharon L. Wood**, The Univ. of Texas at Austin (USA); **Fuh-Gwo Yuan**, North Carolina State Univ. (USA); **Ying Zhang**, Georgia Institute of Technology (USA); **Paul H. Ziehl**, Univ. of South Carolina (USA)

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Conference 8348

Monday-Thursday 12-15 March 2012
Proceedings of SPIE Vol. 8348

Health Monitoring of Structural and Biological Systems VI

Conference Chair: **Tribikram Kundu**, The Univ. of Arizona (USA)

Conference Co-Chair: **Wolfgang Grill**, Univ. Leipzig (Germany)

Program Committee: **Douglas E. Adams**, Purdue Univ. (USA); **Sourav Banerjee**, Accellent Technologies, Inc. (USA); **Yoseph Bar-Cohen**, Jet Propulsion Lab. (USA); **Fu-Kuo Chang**, Stanford Univ. (USA); **Anthony J. Croxford**, Univ. of Bristol (United Kingdom); **Paul Fromme**, Univ. College London (United Kingdom); **Victor Giurgiutiu**, Univ. of South Carolina (USA); **Daniel Guymon**, Institut National des Sciences Appliquées de Lyon (France); **Shivan Haran**, Arkansas State Univ. (USA); **Guoliang Huang**, Univ. of Arkansas at Little Rock (USA); **Sridhar Krishnaswamy**, Northwestern Univ. (USA); **Francesco Lanza di Scalea**, Univ. of California, San Diego (USA); **Jerome P. Lynch**, Univ. of Michigan (USA); **Jennifer E. Michaels**, Georgia Institute of Technology (USA); **Won-Bae Na**, Pukyong National Univ. (Korea, Republic of); **Christopher Niezrecki**, Univ. of Massachusetts Lowell (USA); **Paul D. Panetta**, Applied Research Associates, Inc. (USA); **Perngjin F. Pai**, Univ. of Missouri-Columbia (USA); **Dominique Placko**, École Normale Supérieure de Cachan (France); **Henrique L. Reis**, Univ. of Illinois at Urbana-Champaign (USA); **Piervincenzo Rizzo**, Univ. of Pittsburgh (USA); **Hoon Sohn**, KAIST (Korea, Republic of); **Nobuo Takeda**, The Univ. of Tokyo (Japan); **Michael D. Todd**, Univ. of California, San Diego (USA); **Wei-Chih Wang**, Univ. of Washington (USA); **Andrei N. Zagari**, New Mexico Institute of Mining and Technology (USA); **George Zentai**, Varian Medical Systems, Inc. (USA)

Conference 8339

Conference 8340

Conference 8341

Conference 8342

Conference 8343

Announcements, Awards, Funding and Plenary Presentations

Town & Country Ballroom

8:15 to 8:30 am

2011 SSM Lifetime Achievement Award

presented to **Dimitris Lagoudas**, Texas A&M Univ. (USA)

2011 NDE Lifetime Achievement Award

presented to **Tribikram Kundu**, The Univ. of Arizona (USA)



Plenary Presentation · 8:30-9:15 am

Amr Baz, University of Maryland, College Park (USA)

See page 4 for presentation details.



Plenary Presentation · 9:15-10:00 am

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

James Danoff-Burg, San Diego Zoo Global (USA)

See page 4 for presentation details.

Coffee Break 10:00 to 10:30 am

SESSION 1

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

Sensors I

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

10:30 am: **Nature as a model for technical sensors** (*Keynote Presentation*), Horst Bleckmann, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) . . . [8339-01]

11:30 am: **Bioinspired hyperacuity vision sensors for robotic navigation**, John Davis, Univ. of Wyoming (USA); Anthony R. Kunkel, Naval Air Warfare Ctr. Weapons Div. (USA); Brian Dean, Cameron H. G. Wright, Steven F. Barrett, Univ. of Wyoming (USA) [8339-02]

Lunch Break 11:50 am to 1:20 pm

SESSION 1

Room: Town & Country Ballroom
Mon. 10:30 am to 12:10 pm

EAP as Emerging Actuators I

Session Chairs: **Yoseph Bar-Cohen**, Jet Propulsion Lab. (USA); **Keiichi Kaneto**, Kyushu Institute of Technology (Japan)

10:30 am: **Bringing toys to life: toys today and unique opportunities for EAP sensors and actuators** (*Keynote Presentation*), Jeff Corsiglia, Spin Master Ltd. (Canada) [8340-01]

11:10 am: **Bio-integrated electronics** (*Keynote Presentation*), John A. Rogers, Univ. of Illinois at Urbana-Champaign (USA) [8340-02]

11:50 am: **The need for speed**, Samuel Rosset, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Pit Gebbers, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Zürcher Hochschule für Angewandte Wissenschaften (Switzerland); Benjamin M. O'Brien, The Univ. of Auckland (New Zealand); Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [8340-03]

Lunch Break 12:10 to 1:20 pm

SESSION 1

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

Energy Harvesting and Scavenging I: Nonlinear Energy Harvesting

10:30 am: **Performance analysis of frequency up-converting energy harvesters for human locomotion**, Brittany Anderson, Adam M. Wickenheiser, The George Washington Univ. (USA) [8341-01]

10:50 am: **Harvestable vibrational energy from an avian source: theoretical predictions vs. measured values**, Michael W. Shafer, Robert B. MacCurdy, Ephraim Garcia, David Winkler, Cornell Univ. (USA) [8341-02]

11:10 am: **Vibration energy harvesting using the nonlinear oscillations of a magnetostrictive material**, Christopher Lee, Erika Tsutsumi, Zachary Del Rosario, Franklin W. Olin College of Engineering (USA) [8341-03]

11:30 am: **A statistical linearization approach to optimal nonlinear energy harvesting**, Ian L. Cassidy, Duke Univ. (USA); Jeffrey T. Scruggs, Univ. of Michigan (USA) [8341-04]

Lunch Break 11:50 am to 1:20 pm

SESSION 1

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

Ferroelectric Materials

10:30 am: **Finite element simulation of poling processes in ferroelectrics taking into account weak electric conductivity**, Holger Schwaab, Karlsruher Institut für Technologie (Germany); Marco Deluca, Peter Supancic, Montan Univ. Leoben (Austria); Marc Kamlah, Karlsruher Institut für Technologie (Germany) [8342-01]

10:50 am: **A homogenized energy model for the relaxor ferroelectric lead lanthanum zirconate titanate**, John Crews, Zhengzheng Hu, Ralph Smith, North Carolina State Univ. (USA) [8342-02]

11:10 am: **Plane wave dynamics in multiferroic materials using maxwell's equation and equation of motion**, Scott Keller, Gregory P. Carman, Univ. of California, Los Angeles (USA) [8342-03]

11:30 am: **Quadrupole effects on modeling piezoelectric and ferroelectric materials**, William S. Oates, The Florida State Univ. (USA) [8342-04]

Lunch Break 11:50 am to 1:20 pm

SESSION 1

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

Aerospace Applications

Session Chair: **Brandon J. Arritt**, Air Force Research Lab. (USA)

10:30 am: **Design and experimental validation of conformal load-bearing antenna structures**, Min Sung Kim, Chan Yik Park, Seung Moon Jun, Agency for Defense Development (Korea, Republic of) [8343-01]

10:50 am: **Status of shape memory polymers for aerospace applications**, Amber J. W. McClung, Air Force Research Lab. (USA) and National Research Council (USA); Gyaneshwar P. Tandon, Air Force Research Lab. (USA) and Univ. of Dayton Research Institute (USA); Jeffery W. Baur, Dean C. Foster, Air Force Research Lab. (USA) [8343-02]

11:10 am: **Thermal and mechanical modeling of a conceptual shape memory alloy rotary actuator for aerospace applications**, William Jinkins, Darren J. Hartl, Dimitris C. Lagoudas, Texas A&M Univ. (USA) [8343-03]

11:30 am: **Modeling fluid structure interaction of a shape memory alloy actuated morphing aerostructure**, Stephen Oehler, Darren Hartl, Texas A&M Univ. (USA); Travis L. Turner, NASA Langley Research Ctr. (USA); Dimitris C. Lagoudas, Texas A&M Univ. (USA) [8343-04]

Lunch Break 11:50 am to 1:20 pm

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Monday · 12 March

Conference 8344

Conference 8345

Conference 8346

Conference 8347

Conference 8348

Announcements, Awards, Funding and Plenary Presentations

Town & Country Ballroom

8:15 to 8:30 am

2011 SSM Lifetime Achievement Award

presented to **Dimitris Lagoudas**, Texas A&M Univ. (USA)

2011 NDE Lifetime Achievement Award

presented to **Tribikram Kundu**, The Univ. of Arizona (USA)



Plenary Presentation · 8:30-9:15 am

Amr Baz, University of Maryland, College Park (USA)

See page 4 for presentation details.



Plenary Presentation · 9:15-10:00 am

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

James Danoff-Burg, San Diego Zoo Global (USA)

See page 4 for presentation details.

Coffee Break 10:00 to 10:30 am

SESSION 1

Room: Royal Palm III
Mon. 10:30 to 11:10 am

Keynote Lecture I

Session Chair: **Vijay K. Varadan**, Univ. of Arkansas (USA)

10:30 am: **Optical sensing techniques for military applications** (*Keynote Presentation*), Paul Ruffin, Christina Brantley, Eugene Edwards, U.S. Army Research, Development and Engineering Command (USA) [8344-01]

SESSION 2

Room: Royal Palm III
Mon. 11:10 am to 12:30 pm

Nanowire, Nanotube, and Nanostructures I

Session Chair: **Hargsoon Yoon**, Norfolk State Univ. (USA)

11:10 am: **Nanostructured materials for multifunctional applications under NSF-CREST research at Norfolk State University** (*Invited Paper*), Aswini K. Pradhan, Norfolk State Univ. (USA) [8344-02]

11:50 am: **Development and Investigation of flexible polymer neural probe for chronic neural recording**, Courtney S. Smith, Kyo D. Song, Hargsoon Yoon, Norfolk State Univ. (USA); Tao Zeng, Larry D. Sanford, Woong-Ki Kim, Eastern Virginia Medical School (USA) [8344-03]

12:10 pm: **Carbon nanocones: mechanical and vibrational properties**, Fabrizio Scarpa, Univ. of Bristol (United Kingdom); Jakub Narojczyk, Institute of Molecular Physics (Poland); Krzysztof W. Wojciechowski, Polish Academy of Sciences (Poland) [8344-04]

Lunch Break 12:30 to 1:30 pm

SESSION 1

Room: Pacific Salon IV-V
Mon. 10:30 to 11:50 am

Keynote Session

10:30 am: **Laser based structural health monitoring for civil, mechanical, and aerospace systems** (*Keynote Presentation*), Hoon Sohn, KAIST (Korea, Republic of) [8345-01]

11:10 am: **Magnetostrictive sensors for civil, mechanical, and aerospace systems** (*Keynote Presentation*), Alison B. Flatau, Univ. of Maryland, College Park (USA) [8345-02]

Lunch Break 11:50 am to 1:20 pm

SESSION 1

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

Classical Spectral-gap Sensors I: Phononics-Phononics

Session Chair: **Ihab El-Kady**, Sandia National Labs. (USA)

10:30 am: **Coherent effects in graphene-based phononic crystals** (*Invited Paper*), Pierre A. Deymier, Krishna Muralidharan, Tony Gnanaprakasa, Anita Annamalai, Warren Beck, Nickolas Swintek, The Univ. of Arizona (USA) [8346-01]

11:10 am: **Phononic and phoxonic crystal slabs sensors** (*Invited Paper*), Bahram Djafari-Rouhani, Yan Pennec, Institut d'Electronique, de Microélectronique, et de Nanotechnologie (France) [8346-02]

11:30 am: **Probing elastic modes localized within a defect in a phononic slab** (*Invited Paper*), Bernard Bonello, Univ. Pierre et Marie Curie (France) and Ctr. National de la Recherche Scientifique (France); Mathieu Rénier, Juliette Pierre, Univ. Pierre et Marie Curie (France) [8346-03]

11:50 am: **Novel resonance-based phononic crystal structures** (*Invited Paper*), Ali Adibi, Saeed Mohammadi, Ali A. Eftekhar, Georgia Institute of Technology (USA) [8346-04]

Lunch Break 12:30 to 1:30 pm

SESSION 1

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

Vibration-based SHM of Civil Infrastructure I

Session Chairs: **Nenad Gucunski**, Rutgers, The State Univ. of New Jersey (USA); **Paul Ziehl**, Univ. of South Carolina (USA)

10:30 am: **Vibration analyses of electrical transmission spun-cast concrete poles for health monitoring**, Kaoshan Dai, Tongji Univ. (China); Shenen Chen, The Univ. of North Carolina at Charlotte (USA) [8347-02]

10:50 am: **Rapid identification of structural properties using vibration measurements**, Jiong Tang, Richard Christenson, Univ. of Connecticut (USA) [8347-03]

11:10 am: **Assessment of seismic performance of an RC building via long term monitoring and finite element modeling including soil-structure interaction**, Faheem Butt, Piotr Omenzetter, The Univ. of Auckland (New Zealand) [8347-04]

11:30 am: **A damage assessment model of slender bridge members based on 1D linear member theory with frequency dependent parameters**, Chih-Peng Yu, Chia-Chi Cheng, Jiunnren Lai, Chih-Hung Chiang, Chaoyang Univ. of Technology (Taiwan) [8347-01]

Lunch Break 11:50 am to 1:20 pm

Concurrent Sessions

SESSION 1a

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

Guided Waves I: Analysis and Signal Processing

Session Chairs: **Tribikram Kundu**, The Univ. of Arizona (USA); **Wolfgang Grill**, Univ. Leipzig (Germany)

10:30 am: **Comparison of analog and digital correlation methods suitable for ultrasonic structural health and load monitoring based on high temporal resolution**, Gerhard Birkelbach, Wolfgang Grill, Univ. Leipzig (Germany) [8348-01]

10:50 am: **Bimodal warped frequency transform (BWFT) for guided wave mode conversion characterization**, Emanuele Baravelli, Georgia Institute of Technology (USA) and Univ. degli Studi di Bologna (Italy); Luca De Marchi, Nicolo Speciale, Univ. degli Studi di Bologna (Italy); Massimo Ruzzene, Georgia Institute of Technology (USA) [8348-02]

11:10 am: **AE source localization using extended Kalman filter**, Ehsan Dehghan Niri, Salvatore Salamone, Puneet Singla, Univ. at Buffalo (USA) [8348-03]

11:30 am: **Fingerprinting the Lamb wave signals by using S-transformation**, Ibrahim Tansel, Florida International Univ. (USA); Ahmet Yapici, Mustafa Kemal Univ. (Turkey); Srikanth Korla, Florida International Univ. (USA); Mustafa Demetgul, Marmara Univ. (Turkey) [8348-04]

Lunch Break 11:50 am to 1:20 pm

SESSION 1b

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

Wind Turbine and Concrete Monitoring

Session Chairs: **Christopher Niezrecki**, Univ. of Massachusetts Lowell (USA); **Wieslaw J. Staszewski**, The Univ. of Sheffield (United Kingdom)

10:30 am: **Damage detection of wind turbine blades with auto-associative neural networks**, Nikolaos Dervilis, Robert J. Barthorpe, Austin D. Lafferty, Wieslaw J. Staszewski, Keith Worden, The Univ. of Sheffield (United Kingdom) [8348-05]

10:50 am: **State estimate of wind turbine blades using geometrically exact beam theory**, Stuart G. Taylor, Los Alamos National Lab. (USA) and Univ. of California, San Diego (USA); Darby J. Luscher, Kevin M. Farinholt, Gyuhae Park, Los Alamos National Lab. (USA); Michael D. Todd, Univ. of California, San Diego (USA); Curt M. Ammerman, Los Alamos National Lab. (USA) [8348-06]

11:10 am: **Ultrasonic NDE of porous ceramics and cementitious materials using fast and slow waves**, Dipayan Sanyal, Central Glass and Ceramic Research Institute (India); Ningli Yang, Oluwaseyi Balogun, Sridhar Krishnaswamy, Northwestern Univ. (USA) [8348-07]

11:30 am: **Improvement method for impedance based non-destructive evaluation on concrete structures using a piezoceramic material**, Sam Na, Haeng-Ki Lee, KAIST (Korea, Republic of) [8348-08]

Lunch Break 11:50 am to 1:20 pm

Monday · 12 March

Conference 8339	Conference 8340	Conference 8341	Conference 8342	Conference 8343
<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm VI Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Sensors II <i>Session Chair: Horst Bleckmann, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany)</i></p> <p>1:20 pm: Learning from animal sensors: the clever "design" of spider mechanoreceptors (<i>Invited Paper</i>), Friedrich G. Barth, Univ. Wien (Austria). [8339-03]</p> <p>2:00 pm: Noise-exploitation and adaptation in neuromorphic sensors (<i>Invited Paper</i>), Thamira Hindo, Shantanu Chakrabarty, Michigan State Univ. (USA) [8339-04]</p> <p>2:40 pm: Formation and characterization of membrane based artificial hair cell sensor arrays, Taylor Young, Virginia Polytechnic Institute and State Univ. (USA); Stephen A. Sarles, The Univ. of Tennessee (USA); Donald J. Leo, Virginia Polytechnic Institute and State Univ. (USA). [8339-05]</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: Town & Country Ballroom Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">EAP as Emerging Actuators II <i>Session Chairs: Jeff Corsiglia, Spin Master, Ltd. (Canada); John A. Rogers, Univ. of Illinois at Urbana-Champaign (USA)</i></p> <p>1:20 pm: Multi-functional soft smart materials and their applications (<i>Invited Paper</i>), Jinsong Leng, Harbin Institute of Technology (China). . . . [8340-04]</p> <p>2:00 pm: Actuators, biomedicine, and cell biology (<i>Invited Paper</i>), Edwin W. H. Jager, Linköping Univ. (Sweden). [8340-05]</p> <p>2:20 pm: Electroactive skin: from high-energy-density polymer to antibiofouling, Xuanhe Zhao, Duke Univ. (USA) [8340-06]</p> <p>2:40 pm: Cutting the fat: artificial muscle oscillators for lighter, cheaper, and slimmer devices, Benjamin M. O'Brien, The Univ. of Auckland (New Zealand) and Ecole Polytechnique Fédérale de Lausanne (Switzerland); Samuel Rosset, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Iain A. Anderson, The Univ. of Auckland (New Zealand) [8340-07]</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: Sunrise Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Passive and Active Vibration Isolation I</p> <p>1:20 pm: New method of negative capacitance shunt tuning for vibration control, Benjamin S. Beck, Kenneth A. Cunefare, Georgia Institute of Technology (USA); Manuel Collet, FEMTO-ST (France) . [8341-06]</p> <p>1:40 pm: Optimization of a passive piezoelectric damper for a viscously damped main system, Sebastian M. Schwarzendahl, Marcus Neubauer, Jörg Wallaschek, Leibniz Univ. Hannover (Germany). [8341-07]</p> <p>2:00 pm: Novel controller design demonstration for vibration alleviation of helicopter rotor blades, Fatma D. Ulker, Fred Nitzsche, Daniel Feszty, Carleton Univ. (Canada) [8341-08]</p> <p>2:20 pm: Macro composites with non-classical inclusions for vibration damping in wind turbine blades, Fabio Agnese, Fabrizio Scarpa, Univ. of Bristol (United Kingdom) [8341-09]</p> <p>2:40 pm: A snap-through oscillator for increasing damping and providing adaptability, David R. Johnson, Manoj Thota, Fabio Semperlotti, Kon-Well Wang, Univ. of Michigan (USA) [8341-05]</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;">Active Composites I</p> <p>1:20 pm: High energy density nanocomposites based on high aspect ratio surface-functionalized BaTiO₃ NWs, Haixiong Tang, Univ. of Florida (USA); Yirong Lin, The Univ. of Texas at El Paso (USA); Henry Sodano, Univ. of Florida (USA). [8342-05]</p> <p>1:40 pm: Nano-enhanced polymer composites for energy storage applications, Amira Barhoumi Meddeb, Texas A&M Univ. (USA); Zoubeida Ounaies, The Pennsylvania State Univ. (USA). [8342-06]</p> <p>2:00 pm: Electromechanical actuation response of PVDF-based SWNT/GO hybrid films, Nirmal Sigamani, Zoubeida Ounaies, The Pennsylvania State Univ. (USA); Henry Sodano, Univ. of Florida (USA) [8342-07]</p> <p>2:20 pm: Piezoelectric and piezoresistance performance of PZT/PVDF composites with carbon nanotubes, Xinchun Guan, Yudong Zhang, Hui Li, Jinping Ou, Harbin Institute of Technology (China) [8342-08]</p> <p>2:40 pm: Investigation of particle diameter and interphase effects on mechanical properties of SiO₂/epoxy particulate composites, Jae-Soon Jang, Jonghwan Suhr, Univ. of Delaware (USA) . . [8342-09]</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: Towne Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Energy Harvesting <i>Session Chair: Gyuhae Park, Los Alamos National Lab. (USA)</i></p> <p>1:20 pm: A lightweight thermal energy recovery system based on shape memory alloys: a DOE ARPA-E initiative, Alan L. Browne, Nancy L. Johnson, Nilesh D. Mankame, Paul W. Alexander, Peter Sarosi, Richard J. Skurkis, General Motors Corp. (USA); Geoffrey P. McKnight, Andrew C. Keefe, Guillermo Herrera, Christopher Churchill, HRL Labs., LLC (USA); Jeffrey Brown, Dynalloy, Inc. (USA); John A. Shaw, Univ. of Michigan (USA); Jan Aase, General Motors Corp. (USA) [8343-05]</p> <p>1:40 pm: Hybrid energy harvesting/transmission system for embedded devices, Adam Hehr, Gyuhae Park, Kevin M. Farinholt, Los Alamos National Lab. (USA) [8343-06]</p> <p>2:00 pm: Mechanical energy harvesting utilizing phase transition in 32 mode relaxor-ferroelectric PIN-PMN-PT single crystals, Wen Dong, Christopher S. Lynch, Univ. of California, Los Angeles (USA); Peter Finkel, Ahmed Amin, Naval Undersea Warfare Ctr. (USA) [8343-07]</p> <p>2:20 pm: Large-scale modular solid-state energy harvester for geomatics applications, Baruch Pletner, IPTRADE Inc. (USA); Christopher Hopkinson, Nova Scotia Community College (Canada); Nicholas Wettels, Somatis Technologies (USA) [8343-08]</p> <p>2:40 pm: Evaluation of energy harvesting conditioning circuits, Jesse Cruce, Gyuhae Park, Kevin M. Farinholt, Los Alamos National Lab. (USA) [8343-09]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>

Conference 8344	Conference 8345	Conference 8346	Conference 8347	Conference 8348
<p style="text-align: center;">SESSION 3</p> <p>Room: Royal Palm III Mon. 1:30 to 2:10 pm</p> <p>Keynote Lecture II <i>Session Chair: Sang H. Choi, NASA Langley Research Ctr. (USA)</i></p> <p>1:30 pm: Microwave graphene syntheses and graphene-based sensors/actuators (<i>Keynote Presentation</i>), Il-Kwon Oh, KAIST (Korea, Republic of) [8344-05]</p> <p style="text-align: center;">SESSION 4</p> <p>Room: Royal Palm III Mon. 2:10 to 3:10 pm</p> <p>Nanowire, Nanotube, and Nanostructures II <i>Session Chair: Hyunjung Kim, National Institute of Aerospace (USA)</i></p> <p>2:10 pm: Graphene-based nanocomposite smart material, Inpil Kang, Pukyong National Univ. (Korea, Republic of) [8344-06]</p> <p>2:30 pm: Magnetic and optical properties of CoFe₂O₄/ZnO core-shell nanocomposites for biomedical applications, Aswini K. Pradhan, Kai Zhang, Norfolk State Univ. (USA) [8344-07]</p> <p>2:50 pm: Carbon nanotube based composite fibers for strain sensing, signal processing, and computing, Harsh Vardhan, D. Roy Mahapatra, Indian Institute of Science (India) [8344-08]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<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 2a</p> <p>Room: Pacific Salon IV-V Mon. 1:20 to 3:00 pm</p> <p>System Identifications for Civil Structures <i>Session Chairs: Chin-Hsiung Loh, National Taiwan Univ. (Taiwan); Daniele Zonta, Univ. degli Studi di Trento (Italy)</i></p> <p>12:20 pm: Stochastic subspace identification for operational modal analysis of arch bridge, Chin-Hsiung Loh, Ming-Che Chen, National Taiwan Univ. (Taiwan); Yi-Cheng Liu, Univ. de Costa Rica (Costa Rica) . . . [8345-03]</p> <p>1:40 pm: Prediction of stress waves propagation in progressively loaded seven wire strands, Ivan Bartoli, Drexel Univ. (USA); Giovanni Castellazzi, Alessandro Marzani, Univ. degli Studi di Bologna (Italy); Salvatore Salamone, Univ. at Buffalo (USA) [8345-04]</p> <p>2:00 pm: Data-driven finite element model estimation of a distributed mass structural system using a scanning laser Doppler vibrometer, Junhee Kim, Kiyoung Kim, Hoon Sohn, KAIST (Korea, Republic of); Jerome P. Lynch, Univ. of Michigan (USA) [8345-05]</p> <p>2:20 pm: Vibration-based residue prestress force measurement for eccentrically prestressed concrete beam, Zhi Sun, Jianglin Xu, Tongji Univ. (China) [8345-06]</p> <p>2:40 pm: * Estimation of load redistribution on a cable-stayed bridge using a combination of sensing techniques, Daniele Zonta, Paolo Esposito, Marco Molignoni, Riccardo Zandonini, Univ. degli Studi di Trento (Italy); Daniele Inaudi, Daniele Posenato, Smartec S.A. (Switzerland); Yang Zhao, Jinsuk Yim, Intelligent Instrument System, Inc. (USA); Ming Wang, Northeastern Univ. (USA); Matteo Pozzi, Univ. degli Studi di Trento (Italy) [8345-07]</p> <p>Coffee Break. 3:00 to 3:30 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 2b</p> <p>Room: Pacific Salon VI-VII Mon. 1:20 to 3:00 pm</p> <p>Advances in Guided Waves <i>Session Chairs: Piervincenzo Rizzo, Univ. of Pittsburgh (USA); Irving J. Oppenheim, Carnegie Mellon Univ. (USA)</i></p> <p>1:20 pm: The use of exact Lamb waves modes for modeling the power and energy transduction of structurally-bonded piezoelectric wafer active sensors, Bin Lin, Victor Giurgiutiu, Ayman M. Kamal, Univ. of South Carolina (USA) [8345-08]</p> <p>1:40 pm: Ultrasonic monitoring of a pipe under operating conditions, Chang Liu, Joel Harley, Nicholas A. O'Donoghue, Yujie Ying, Martin H. Altschul, James H. Garrett, Jr., José M. F. Moura, Irving J. Oppenheim, Lucio Soibelman, Carnegie Mellon Univ. (USA) [8345-09]</p> <p>2:00 pm: Finite element simulation of guided waves generated by laser pulses, Jung-Wuk Hong, Wenyang Liu, Michigan State Univ. (USA) [8345-10]</p> <p>2:20 pm: Identification of subsurface damage in composite materials using laser vibrometry measurements and nonlinear vibration response characteristics, Sara S. Underwood, Douglas E. Adams, Purdue Univ. (USA) [8345-11]</p> <p>2:40 pm: Recent advancement on the NDE by means of highly nonlinear solitary waves, Xianglei Ni, Piervincenzo Rizzo, Univ. of Pittsburgh (USA) [8345-12]</p> <p>Coffee Break. 3:00 to 3:30 pm</p> </div> </div>	<p style="text-align: center;">SESSION 2</p> <p>Room: Royal Palm IV Mon. 1:30 to 3:30 pm</p> <p>Classical Spectral-gap Sensors II: Phononics-Photonics <i>Session Chair: Pierre A. Deymier, The Univ. of Arizona (USA)</i></p> <p>1:30 pm: Anisotropic metamaterials as sensing devices in acoustics and electromagnetism (<i>Invited Paper</i>), Jose Sanchez-Dehesa, Daniel Torrent, Jorge Carbonell, Univ. Politécnic de Valencia (Spain) [8346-05]</p> <p>2:10 pm: Phononic crystal sensor for liquid property determination, Ralf Lucklum, Otto-von-Guericke-Univ. Magdeburg (Germany); Manzhou Ke, Wuhan Univ. (China) and Otto-von-Guericke-Univ. Magdeburg (Germany); Mikhail Zubtsov, Aleksandar Oseev, Ralf Grundmann, Otto-von-Guericke-Univ. Magdeburg (Germany) [8346-06]</p> <p>2:30 pm: Nonlinear phenomena in granular crystals, Georgios Thecharis, Chiara Daraio, California Institute of Technology (USA) [8346-07]</p> <p>2:50 pm: Topologically evolved photonic crystals: breaking the world record in band gap size (<i>Invited Paper</i>), Osama R. Bilal, Mahmoud I. Hussein, Univ. of Colorado at Boulder (USA). [8346-08]</p> <p>Coffee Break. 3:30 to 4:00 pm</p>	<p style="text-align: center;">SESSION 2</p> <p>Room: Royal Palm V Mon. 1:20 to 3:00 pm</p> <p>Vibration-based SHM of Civil Infrastructure II <i>Session Chairs: Nenad Gucunski, Rutgers, The State Univ. of New Jersey (USA); Paul Ziehl, Univ. of South Carolina (USA)</i></p> <p>1:20 pm: Developing an optimal acoustic reflector for air-coupled impact-echo sensor, Seong-Hoon Kee, Nenad Gucunski, Farhad A. Fetrat, Rutgers, The State Univ. of New Jersey (USA). [8347-05]</p> <p>1:40 pm: Multisensor data fusion and visualization for impact echo testing of bridge decks, Ying Zhang, Zhenhua Xie, Xiangmin Wei, Georgia Institute of Technology (USA) [8347-06]</p> <p>2:00 pm: Structural flexibility identification by integrating substructures' measurements, Jian Zhang, Southeast Univ. (China) [8347-07]</p> <p>2:20 pm: Research on interface separation damage detection of concrete-filled steel tubular arch rib based on using transient impulse response, Shengshan Pan, Xuefeng Zhao, Xingjun Lv, Zhe Zhang, Dalian Univ. of Technology (China) [8347-08]</p> <p>2:40 pm: Temperature insensitive all-fiber accelerometer using a photonic crystal fiber long-period grating interferometer, Shijie Zheng, Yinian Zhu, Sidhar Krishnaswamy, Northwestern Univ. (USA). . [8347-09]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<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 2a</p> <p>Room: Royal Palm I Mon. 1:20 to 3:00 pm</p> <p>Guided Waves II: Monitoring Pipes and Other Structures <i>Session Chairs: Hoon Sohn, KAIST (Korea, Republic of); Francesco Lanza di Scalea, Univ. of California, San Diego (USA)</i></p> <p>1:20 pm: A permanently installed guided wave system for pipe monitoring, Andrea Galvagni, Peter Cawley, Imperial College London (United Kingdom) [8348-09]</p> <p>1:40 pm: Imaging of pipeline defects based on extraction of mode-converted guided waves, Hyeonseok Lee, KAIST (Korea, Republic of); Hyunwoo Park, Dong-A Univ. (Korea, Republic of); Hoon Sohn, KAIST (Korea, Republic of) [8348-10]</p> <p>2:00 pm: Bayesian probabilistic modeling for damage assessment in a bolted frame, Colin M. Haynes, Michael D. Todd, Univ. of California, San Diego (USA). [8348-11]</p> <p>2:20 pm: Guided waves for monitoring heat treatment duration and material hardness, Nilesh Korde, Tribikram Kundu, The Univ. of Arizona (USA) [8348-12]</p> <p>2:40 pm: NDE of immersed structures by means of leaky guided waves, Elisabetta Pistone, Piervincenzo Rizzo, Univ. of Pittsburgh (USA) [8348-13]</p> <p>Coffee Break. 3:00 to 3:30 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 2b</p> <p>Room: Sunset Mon. 1:20 to 3:00 pm</p> <p>SHM Using Electrical Properties of Materials <i>Session Chairs: Jerome P. Lynch, Univ. of Michigan (USA); George Zentai, Varian Medical Systems, Inc. (USA)</i></p> <p>1:20 pm: On the damage identification of glass-fiber reinforced polymers with aligned carbon nano-tube networks and electrical impedance tomography, Tyler Tallman, Univ. of Michigan (USA); Fabio Semperlotti, Univ. of Notre Dame (USA); Kon-Well Wang, Univ. of Michigan (USA). [8348-14]</p> <p>1:40 pm: Inductively coupled transducer system for damage detection in composite, Cheng Huan Zhong, Anthony J. Croxford, Paul D. Wilcox, Univ. of Bristol (United Kingdom) [8348-15]</p> <p>2:00 pm: Sensitivity enhanced piezoelectric admittance based damage detection using higher order inductive circuits, Lei Zuo, Gopinath Penamalli, Stony Brook Univ. (USA) [8348-16]</p> <p>2:20 pm: Fabrication and characterization of a planar and miniaturized solid-state reference electrode (SSRE) for corrosion sensors, Yang Liu, Jerome P. Lynch, Univ. of Michigan (USA) . . . [8348-17]</p> <p>2:40 pm: On optimized placement of multidirectional piezoelectric layers for multimodal energy scavenging: a theoretical study, Sourav Banerjee, Univ. of South Carolina (USA) [8348-18]</p> <p>Coffee Break. 3:00 to 3:30 pm</p> </div> </div>

* Indicates paper that will also be presented in the NSF Poster Session, p. 33.

Conference 8339

SESSION 3

Room: Royal Palm VI
Mon. 3:30 to 5:10 pm

Sensors III

Session Chair: Friedrich G. Barth, Univ. Wien (Austria)

3:30 pm: **A bioinspired aquatic flow sensor using an artificial cell membrane**, Preston Pinto, Kevin Garrison, Virginia Polytechnic Institute and State Univ. (USA); Stephen A. Sarles, The Univ. of Tennessee (USA); Donald J. Leo, Virginia Polytechnic Institute and State Univ. (USA) [8339-06]

3:50 pm: **Fabricating neuromast-inspired gel structures for membrane-based hair cell sensing**, Nima Tamaddoni, Stephen A. Sarles, The Univ. of Tennessee (USA) [8339-07]

4:10 pm: **Localization of a moving target using an IPMC-based artificial lateral line**, Ahmad T. Abdulsadda, Xiaobo Tan, Michigan State Univ. (USA) [8339-08]

4:30 pm: **A multi-electrode biomimetic electrolocation sensor**, Kavita Mayekar, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Deepak Damalla, Forschungszentrum Jülich GmbH (Germany); Martin G. Gottwald, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Herbert Bousack, Forschungszentrum Jülich GmbH (Germany); Gerhard von der Emde, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [8339-09]

4:50 pm: **Formation, encapsulation, and validation of membrane-based artificial hair cell sensors**, Kevin L. Garrison, Virginia Polytechnic Institute and State Univ. (USA); Stephen A. Sarles, The Univ. of Tennessee (USA); Donald J. Leo, Virginia Polytechnic Institute and State Univ. (USA) [8339-10]

Conference 8340

SESSION 3

Room: Town & Country Ballroom
Mon. 4:30 to 5:45 pm

EAP-in-Action Demonstration Session

Moderator: Yoseph Bar-Cohen, Jet Propulsion Lab. (USA)

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 full descriptions of EAP presentations on pages xx.

Conference 8341

SESSION 3

Room: Sunrise
Mon. 3:30 to 5:30 pm

Energy Harvesting and Scavenging II: Fluid and Biological Energy Harvesting

3:30 pm: **Energy harvesting of vortex-induced vibrations**, Amr M. Baz, Univ. of Maryland, College Park (USA); Osama J. Aldraihem, King Saud Univ. (Saudi Arabia); Mostafa Nouh, Univ. of Maryland, College Park (USA) [8341-10]

3:50 pm: **Nonlinear dynamics of the bi-stable piezoelectric wind energy harvester**, M. Amin Karami, Univ. of Michigan (USA); Justin R. Farmer, Virginia Polytechnic Institute and State Univ. (USA); Daniel J. Inman, Univ. of Michigan (USA) . . . [8341-11]

4:10 pm: **Reconfigurable wind blades**, Behnam Bahr, Sam May, California State Univ., Long Beach (USA) [8341-12]

4:30 pm: **Power and efficiency analysis of an aeroelastic flutter energy harvester**, Matthew J. Bryant, Michael W. Shafer, Ephraim Garcia, Cornell Univ. (USA) [8341-13]

4:50 pm: **A short investigation of the effect of an energy harvesting backpack on the human gait**, Evangelos Papatheou, Peter Green, Vitomir Racic, James M. Brownjohn, Neil D. Sims, The Univ. of Sheffield (United Kingdom) [8341-14]

5:10 pm: **An evaluation of novel transducer materials for low-level vibration energy harvesting applications**, Steven R. Anton, Kevin M. Farinholt, Los Alamos National Lab. (USA) [8341-69]

Conference 8342

SESSION 3

Room: Royal Palm II
Mon. 3:30 to 5:10 pm

Active Polymers I

3:30 pm: **Biological ion transport driven conducting polymer actuators**, Vishnu Baba Sundaesan, Virginia Commonwealth Univ. (USA) [8342-10]

3:50 pm: **Optimizing the photomechanical performance of glassy azobenzene liquid crystal polymer networks**, Liang Cheng, The Florida State Univ. (USA); Kyung Min Lee, Amber McClung, Timothy J. White, Air Force Research Lab. (USA); William S. Oates, The Florida State Univ. (USA) [8342-11]

4:10 pm: **A voltage sensing model of IPMC based on the underlying physical processes**, David Pugal, Vijjar Palmre, Kwang Jin Kim, Univ. of Nevada, Reno (USA) [8342-13]

4:30 pm: **Ultrasonic performance of PVDF thin film sensors under thermal fatigue**, Vivek T. Rathod, D. Roy Mahapatra, Indian Institute of Science (India); Anjana Jain, A. Gayathri, National Aeronautics and Space Administration (India) [8342-14]

4:50 pm: **Development of conductive fibrous polymer membrane**, Jingwen Wang, Hani Naguib, Aima Bazylak, Univ. of Toronto (Canada) . . . [8342-15]

Conference 8343

SESSION 3

Room: Towne
Mon. 3:30 to 5:10 pm

Structural Health Monitoring

Session Chair: Kevin M. Farinholt, Los Alamos National Lab. (USA)

3:30 pm: **Wireless system for structural health monitoring based on Lamb waves**, Uwe Lieske, Andre Dietrich, Bernd Frankenstein, Lars Schubert, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) [8343-10]

3:50 pm: **Embedded sensor node deployment to monitor telescope drive system components**, Stuart G. Taylor, Christopher J. Stull, James Wren, Eric Y. Raby, Charles R. Farrar, Los Alamos National Lab. (USA) [8343-11]

4:10 pm: **Laser excitation and noncontact sensing ultrasonic propagation imaging system for surface crack evaluation**, Jung Ryul Lee, Dipesh Dhital, Chonbuk National Univ. (Korea, Republic of); Eric Flynn, Los Alamos National Lab. (USA) . . . [8343-12]

4:30 pm: **Development of state-of-the-art optical sensors for the monitoring of deep sea umbilicals and flexible pipelines**, Paolo Bettini, Simone Bertoli, Giuseppe Sala, Politecnico di Milano (Italy); Roberto Gaspari, Giovanni Pozzati, Prysmian Group (Italy) [8343-13]

4:50 pm: **Evaluation of strain-based deformation shape estimation algorithms for control and monitoring applications**, Armen Derkevorkian, The Univ. of Southern California (USA); Jessica Alvarenga, California State Univ., Los Angeles (USA); W. Lance Richards, NASA Dryden Flight Research Ctr. (USA); Sami F. Masri, The Univ. of Southern California (USA); Helen A. Ryaciotaki -Boussais, California State Univ., Los Angeles (USA) [8343-14]

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Conference 8344	Conference 8345	Conference 8346	Conference 8347	Conference 8348
<p>SESSION 5</p> <p>Room: Royal Palm III Mon. 3:40 to 5:40 pm</p> <p>Nano Devices and Sensors I</p> <p><i>Session Chair: Frances Williams, Norfolk State Univ. (USA)</i></p> <p>3:40 pm: Al-doped ZnO aligned nanorod arrays for opto-electronic and sensor applications, Arwini K. Pradhan, Norfolk State Univ. (USA) [8344-09]</p> <p>4:00 pm: Acetone vapor sensor made with cellulose-TiO₂/MWCNTs hybrid nanocomposite, Yi Chen, Hyejun Jung, Jaehwan Kim, Inha Univ. (Korea, Republic of) [8344-10]</p> <p>4:20 pm: Design of nanostructured-based glucose biosensors, Frances Williams, Archana Komirisetty, Norfolk State Univ. (USA) [8344-11]</p> <p>4:40 pm: Integrated linear Fresnel spectrometer chip, Yeonjoon Park, National Institute of Aerospace (USA); Sang H. Choi, Glen C. King, NASA Langley Research Ctr. (USA); Hargsoon Yoon, Norfolk State Univ. (USA); Uhn Lee, Gachon Univ. Gil Medical Ctr. (Korea, Republic of) [8344-12]</p> <p>5:00 pm: Smart healthcare textile sensor system for unhindered-pervasive health monitoring, Pratyush Rai, Prashanth S. Kumar, Sechang Oh, Hyeokjun Kwon, Gyanesh N. Mathur, M. P. Agarwal, Vijay K. Varadan, Univ. of Arkansas (USA) [8344-13]</p> <p>5:20 pm: The Zigbee wireless electrocardiogram measurement system design with an algorithm removing motion artifact by using adaptive filter and moving weighted factor, Hyeokjun Kwon, Sechang Oh, Vijay K. Varadan, Univ. of Arkansas (USA) [8344-62]</p>	<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 3a</p> <p>Room: Pacific Salon IV-V Mon. 3:30 to 5:10 pm</p> <p>Next-Generation Sensing Systems for SHM: Wireless and Microcontroller-Based Sensors</p> <p><i>Session Chairs: Shamim N. Pakzad, Lehigh Univ. (USA); Yang Wang, Georgia Institute of Technology (USA)</i></p> <p>3:30 pm: Substrate material property effects of a folded patch antenna for wireless strain sensing, Xiaohua Yi, Rushi Vyas, Chunhee Cho, Hoseon Lee, Yang Wang, Roberto T. Leon, Manos M. Tentzeris, Georgia Institute of Technology (USA) [8345-13]</p> <p>3:50 pm: Success and pitfalls in wireless sensor network for SHM, Junliang Tao, Mark Richardson, Xiong Yu, Case Western Reserve Univ. (USA) [8345-14]</p> <p>4:10 pm: Network architecture design of an agile sensing system with sandwich wireless sensor nodes, Siavash Dorvash, Xu Li, Shamim N. Pakzad, Liang Cheng, Lehigh Univ. (USA) [8345-15]</p> <p>4:30 pm: A radar-based sensor network for distributed bridge displacement measurements, Jennifer A. Rice, Univ. of Florida (USA); Changzhi Li, Changzhan Gu, Texas Tech Univ. (USA) [8345-16]</p> <p>4:50 pm: Percussive augments of rotary drills (PARoD), Mircea Badescu, Yoseph Bar-Cohen, Stewart Sherrit, Xiaoci Bao, Chris Donnelly, Jack B. Aldrich, Jet Propulsion Lab. (USA) [8345-121]</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 3b</p> <p>Room: Pacific Salon VI-VII Mon. 3:30 to 5:10 pm</p> <p>Wireless Sensor Networks for SHM I</p> <p><i>Session Chairs: Sung-Han Sim, Univ. of Illinois at Urbana-Champaign (USA); Marco Torbol, Univ. of California, Irvine (USA)</i></p> <p>3:30 pm: Wireless signal networks for monitoring subsurface infrastructures, Ehsan Ghazanfari, Suk-Un Yoon, Sibel Pamukcu, Muhammad T. Suleiman, Liang Cheng, Lehigh Univ. (USA) [8345-17]</p> <p>3:50 pm: Response time improvement using sandwich-node architecture in wireless sensor networks for structural health monitoring, Zi Wang, Shamim N. Pakzad, Lehigh Univ. (USA) [8345-18]</p> <p>4:10 pm: Long-term monitoring of a cable stayed bridge using a SCADA system, Marco Torbol, Masanobu Shinozuka, Univ. of California, Irvine (USA) [8345-19]</p> <p>4:30 pm: Heterogeneous wireless sensor networks for computational partitioning of a Markov parameter-based system identification method, Jeff Bergman, Junhee Kim, Jerome P. Lynch, Univ. of Michigan (USA) [8345-20]</p> <p>4:50 pm: Decentralized system identification on wireless smart sensor networks, Sung-Han Sim, Ulsan National Institute of Science and Technology (Korea, Republic of); Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (USA) . . . [8345-21]</p> </div> </div>	<p style="text-align: center;">SESSION 3</p> <p>Room: Royal Palm IV Mon. 4:00 to 5:40 pm</p> <p>Fiber Bragg Grating Sensors</p> <p><i>Session Chair: Wolfgang Ecke, Institut für Photonische Technologien e.V. (Germany)</i></p> <p>4:00 pm: Smart pressure and temperature measurement on paper machine rolls: an embedded fiber Bragg grating sensor system enables continuous nip monitoring during paper production (<i>Invited Paper</i>), Wolfgang Ecke, Institut für Photonische Technologien e.V. (Germany); Matthias W. Schmitt, Voith Paper Fabrics GmbH & Co. KG (Germany); Yang Shieh, Voith Paper Inc. (USA); Eric Lindner, FBGS Technologies GmbH (Germany) [8346-09]</p> <p>4:40 pm: Automatically produced GFRP beams with embedded FOS in complex geometry: process, material compatibility, micromechanical analysis, and performance tests, Markus Gabler, Univ. Stuttgart (Germany); Viktoriya Tkachenko, Bundesanstalt für Materialforschung und -prüfung (Germany); Simon Küppers, Deutsche Institute für Textil- und Faserforschung (Germany); Georg G. Kuka, Fiberware GmbH (Germany); Wolfgang R. Habel, Bundesanstalt für Materialforschung und -prüfung (Germany); Jan Knippers, Univ. Stuttgart (Germany) . . . [8346-10]</p> <p>5:00 pm: Full spectral interrogation of fiber Bragg grating sensors for measurements of damage during steady-state vibration, Sean Webb, Kara J. Peters, Mohammed Zikry, North Carolina State Univ. (USA); Spencer Chadderdon, Nikola Stan, Richard H. Selfridge, Stephen Schultz, Brigham Young Univ. (USA) [8346-11]</p> <p>5:20 pm: Nanofilm-coated photonic crystal fiber long-period gratings with model transition for high chemical sensitivity and selectivity, Shijie Zheng, Yinian Zhu, Sridhar Krishnaswamy, Northwestern Univ. (USA) [8346-12]</p>	<p style="text-align: center;">SESSION 3</p> <p>Room: Royal Palm V Mon. 3:30 to 5:10 pm</p> <p>SHM/NDE of Nuclear Facilities and Pipe Systems</p> <p><i>Session Chairs: Ryan M. Meyer, Pacific Northwest National Lab. (USA); Anthony D. Cinson, Pacific Northwest National Lab. (USA)</i></p> <p>3:30 pm: On the development of a self-calibrating and adjustable robotic scanner for NDT on nuclear nozzle-vessel welds through a specially designed 2D phased array UT probe, Vasilis Papadimitriou, Giannis Roditis, Ctr. for Research and Technology, Thessaly (Greece); Panagiotis Chatzidakos, Innoora Ltd. (Greece); Dimos Liaptsis, Tat-Hean Gan, TWI Ltd. (United Kingdom) [8347-10]</p> <p>3:50 pm: Ultrasonic phased array evaluation of control rod drive mechanism (CRDM) nozzle interference fit and weld region: NDE results and destructive analysis, Anthony D. Cinson, Susan Crawford, Paul MacFarlan, Brady Hanson, Royce Mathews, Aaron A. Diaz, Pacific Northwest National Lab. (USA) [8347-11]</p> <p>4:10 pm: Monitoring thermal fatigue damage in 304 stainless steel specimens using acoustic emission, Ryan M. Meyer, Timothy Roosendaal, Bruce Watson, Pradeep Ramuhalli, Leonard Bond, Pacific Northwest National Lab. (USA) [8347-12]</p> <p>4:30 pm: Experimental findings of acceleration-based identification of breaks in a scaled water pipe network, Konstantinos Papakonstantinou, Masanobu Shinozuka, Univ. of California, Irvine (USA) [8347-13]</p> <p>4:50 pm: GPR survey for pipe leakage detection: experimental and analytical Study, Leitong Dong, Sergio Carnalla, Masanobu Shinozuka, Univ. of California, Irvine (USA) . . . [8347-14]</p>	<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 3a</p> <p>Room: Royal Palm I Mon. 3:30 to 5:50 pm</p> <p>Guided Waves III: Modeling and Analysis</p> <p><i>Session Chairs: Francesco Lanza di Scalea, Univ. of California, San Diego (USA); Hoon Sohn, KAIST (Korea, Republic of)</i></p> <p>3:30 pm: Local interaction approach modeling for guided-wave propagation in composite plates and sandwich panels, Kalyan S. Nadella, Carlos E. S. Cesnik, Univ. of Michigan (USA) [8348-19]</p> <p>3:50 pm: Elastic waves simulation using CUDA technology and multiple GPU workstations, Pawel Packo, Tadeusz Uhl, Wieslaw J. Staszewski, AGH Univ. of Science and Technology (Poland) [8348-20]</p> <p>4:10 pm: Assessment of the excitelet algorithm for in situ mechanical characterization of orthotropic structures, Patrice Masson, Pierre-Claude Ostiguy, Nicolas Quaegebeur, Univ. de Sherbrooke (Canada) [8348-21]</p> <p>4:30 pm: Guided-wave based structural health monitoring of built-up composite structures using spectral finite element method, Ajith Vezhapparambu, Srinivasan Gopalakrishnan, Indian Institute of Science (India) [8348-22]</p> <p>4:50 pm: Imaging non-classical elastic nonlinearities using reciprocal time reversal and phase symmetry analysis, Michele Meo, Univ. of Bath (United Kingdom) [8348-23]</p> <p>5:10 pm: Evaluation of Hertzian contact state using guided waves, Nohyu Kim, Korea Univ. of Technology and Education (Korea, Republic of) [8348-24]</p> <p>5:30 pm: Characterization of mode selective actuator and sensor systems for Lamb wave excitation, Daniel Schmidt, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [8348-25]</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 3b</p> <p>Room: Sunset Mon. 3:30 to 5:10 pm</p> <p>Medical and Biological Applications I</p> <p><i>Session Chairs: Wei-Chih Wang, Univ. of Washington (USA); Paul D. Panetta, Applied Research Associates, Inc. (USA)</i></p> <p>3:30 pm: Pulse thermography for quantitative nondestructive evaluation of sound, de-mineralized and re-mineralized enamel, Masatoshi Ando, Indiana Univ. (USA); Douglas E. Adams, Nathan D. Sharp, Purdue Univ. (USA) [8348-26]</p> <p>3:50 pm: Design and fabrication of mechanical resonance based optical scanner using push-pull actuator, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan) [8348-27]</p> <p>4:10 pm: Noninvasive ultrasonic monitoring of the mechanical properties of selected muscles and connected tendons, Muhammad Zakir Hossain, Wolfgang Grill, Univ. Leipzig (Germany) [8348-28]</p> <p>4:30 pm: Fabrication and characterization of polymer gel for MRI liver phantom with embedded lesion particles, Eunji In, Hani E. Naguib, Univ. of Toronto (Canada) [8348-29]</p> <p>4:50 pm: Compact Fourier transform spectrometer without moving parts, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan) [8348-30]</p> </div> </div>
	<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>* Indicates paper that will also be presented in the NSF Poster Session, p. 33.</p> </div>			

Conference 8339

Conference 8340

Conference 8341

Conference 8342

Conference 8343

Announcements, Awards, and Plenary Presentation

Town & Country Ballroom

SPIE Fellow Recognition · 8:10 to 8:20 am

H. Felix Wu, NIST (USA);
Sang H. Choi, NASA Langley Research Ctr. (USA)

See p. 7 for details.



Plenary Presentation · 8:20 to 9:05 am

Adaptive Structural Systems

Kon-Well Wang, Univ. of Michigan (USA)

See page 4 for presentation details.

SESSION 4

Room: Royal Palm VI
Tues. 9:20 to 10:00 am

Optics/Photonics I

Session Chair: Shantanu Chakrabarty,
Michigan State Univ. (USA)

9:20 am: **Large area and high-speed reproduction of the Morpho butterfly's color for true practical applications** (*Invited Paper*), Akira Saito, Masaru Yonezawa, Takuto Shibuya, Megumi Akai-kasaya, Yuji Kuwahara, Osaka Univ. (Japan) [8339-11]

Coffee Break. 10:00 to 10:30 am

SESSION 4

Room: Town & Country Ballroom
Tues. 9:10 am to 12:20 pm

Special Session: EAP Actuated Medical and Tactile Devices

Session Chairs: John D. W. Madden, The Univ. of British Columbia (Canada); **Yahya A. Ismail**, Univ. of Nizwa (Oman)

9:10 am: **Navigating conjugated polymer actuated neural probes in a brain phantom**, Eugene D. Daneshvar, Univ. of Michigan (USA); Elisabeth Smela, Univ. of Maryland, College Park (USA); Daryl R. Kipke, Univ. of Michigan (USA) [8340-08]

9:30 am: **Designing micro- and nanostructures for artificial urinary sphincters**, Bert Müller, Univ. Basel (Switzerland); Gabor Kovacs, Swiss National Institute for Materials Testing and Research (EMPA) (Switzerland); Florian Weiss, Univ. Basel (Switzerland) [8340-09]

9:50 am: **Precession curvature control of a self-sensing IPMC actuator for active endovascular micro-catheters**, Yousef Bahramzadeh, Mohsen Shahinpoor, Univ. of Maine (USA) [8340-10]

Coffee Break. 10:10 to 10:40 am

SESSION 4

Room: Sunrise
Tues. 9:20 to 10:20 am

Biological-inspired Systems and Bio-MEMS

9:20 am: **Fabrication and characterization of fluidic artificial muscles having millimeter-scale diameters**, Erica G. Hocking, Norman M. Wereley, Univ. of Maryland, College Park (USA) [8341-15]

9:40 am: **Haptics using a smart material for eyes free interaction in mobile devices**, Huihui Wang, Dimosthenis Kaleas, Roger M. Ruuspakka, Robert Tartz, QUALCOMM MEMS Technologies, Inc. (USA) [8341-16]

10:00 am: **Experiments on the focusing and use of acoustic energy to accelerate polymer healing**, Alexander J. Cushman, Brian C. Fehrman, Shaun Gruenig, Umesh A. Korde, South Dakota School of Mines and Technology (USA) [8341-17]

Coffee Break. 10:20 to 10:50 am

SESSION 4

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

Modeling of Piezoelectric Ceramics

9:20 am: **Some new aspects of fracture mechanics of piezoelectrics** (*Invited Paper*), Andreas Ricoeur, Roman Gellmann, Univ. Kassel (Germany) [8342-16]

10:00 am: **Harmonic electro-optic modulation using relaxor ferroelectric PLZT ceramics**, Ribal G. Sabat, Royal Military College of Canada (Canada) [8342-18]

Coffee Break. 10:20 to 10:50 am

SESSION 4

Room: Towne
Tues. 9:20 to 10:20 am

Medical Devices

Session Chair: Kevin M. Farinholt, Los Alamos National Lab. (USA)

9:20 am: **Design of 4 DOF ER haptic master for medical application**, Jong-Seok Oh, Han-Jun Cho, Seung-Bok Choi, Inha Univ. (Korea, Republic of) [8343-15]

9:40 am: **Miniature image guided three-axes scanning and positioning system**, Dragan Avirovik, Shashank Priya, Virginia Polytechnic Institute and State Univ. (USA); Digant Dave, The Univ. of Texas at Arlington (USA) [8343-16]

10:00 am: **Study of a smart polymer medical device, product development obstacles, and innovative solutions**, Mark Banister, Mark McWilliams, Gary Walters, Medipacs, LLC (USA); Dominic McGrath, The Univ. of Arizona (USA); Yordan Geronov, Ray Clark, Mark Van Veen, Ralph Sias, Eric Coiner, Medipacs, LLC (USA) [8343-17]

Coffee Break. 10:20 to 10:50 am

Announcements, Awards, and Plenary Presentation

Town & Country Ballroom

SPIE Fellow Recognition · 8:10 to 8:20 am
H. Felix Wu, NIST (USA);
Sang H. Choi, NASA Langley Research Ctr. (USA)
See p. 7 for details.



Plenary Presentation · 8:20 to 9:05 am
Adaptive Structural Systems
Kon-Well Wang, Univ. of Michigan (USA)
See page 4 for presentation details.

SESSION 6

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

Keynote Lecture III
Session Chair: Vijay K. Varadan, Univ. of Arkansas (USA)

9:10 am: **Printed hybrid systems** (*Keynote Presentation*), Jukka-Tapani Mäkinen, Kimmo Keränen, Teemu Alajoki, Matti Koponen, Antti Kemppainen, Kari Rönkä, Raimo Korhonen, VTT Technical Research Ctr. of Finland (Finland) . . . [8344-14]

9:50 am: **Synthesis and characterization of thermoelectric ink for renewable energy applications**, Jungmin Lee, Univ. of Arkansas (USA); Hyun Jung Kim, NASA Langley Research Ctr. (USA); Sechang Oh, Univ. of Arkansas (USA); Sang H. Choi, NASA Langley Research Ctr. (USA); Vijay K. Varadan, Univ. of Arkansas (USA) . . . [8344-15]

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

Concurrent Sessions

SESSION 4a

Room: Pacific Salon IV-V
Tues. 9:20 to 10:20 am

Intelligent Systems for Disaster Mitigation

Session Chairs: Genda Chen, Missouri Univ. of Science and Technology (USA); **Peter Kung**, QPS Photonics Inc. (Canada)

9:20 am: **External confinement and energy dissipation for seismic accelerated bridge construction**, Genda Chen, Missouri Univ. of Science and Technology (USA) [8345-22]

9:40 am: **Experimental validation of the finite element model analysis of a steel frame in simulated post-earthquake fire environments**, Ying Huang, Wesley J. Bevans, Missouri Univ. of Science and Technology (USA); Zhi Zhou, Dalian Univ. of Technology (China); Hai Xiao, Genda Chen, Missouri Univ. of Science and Technology (USA) [8345-23]

10:00 am: **A novel landslide warning solution using single mode telecom fiber embedded in geo-textile**, Peter Kung, QPS Photonics Inc. (Canada) [8345-24]

Coffee Break. . . . 10:20 to 10:50 am

SESSION 4b

Room: Pacific Salon VI-VII
Tues. 9:20 to 10:20 am

Wireless Sensor Networks for SHM II

Session Chairs: Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of); **Sung-Han Sim**, Univ. of Illinois at Urbana-Champaign (USA)

9:20 am: **Recent enhancements to and applications of the SmartBrick structural health monitoring platform**, Arun Gunasekaran, Neil Patel, Sahra Sedigh, Missouri Univ. of Science and Technology (USA) [8345-25]

9:40 am: **Wireless structural health monitoring of cable-stayed bridge using iMote2-platformed smart sensors**, Duc-Duy Ho, Khac-Duy Nguyen, Po-Young Lee, Dong-Soo Hong, So-Young Lee, Jeong-Tae Kim, Sung-Woo Shin, Pukyong National Univ. (Korea, Republic of); Chung-Bang Yun, KAIST (Korea, Republic of); Masanobu Shinozuka, Univ. of California, Irvine (USA) [8345-26]

10:00 am: **Efficient campaign-type structural health monitoring system using wireless smart sensors**, Jian Li, Univ. of Illinois at Urbana-Champaign (USA); Tomonori Nagayama, The Univ. of Tokyo (USA); Kirill A. Mechtov, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (USA) [8345-27]

Coffee Break. . . . 10:20 to 10:50 am

SESSION 4

Room: Royal Palm IV
Tues. 9:20 to 10:40 am

Acoustic Sensors

Session Chair: Dimitrios G. Aggelis, Univ. of Ioannina (Greece)

9:20 am: **Stress wave propagation in curved granular crystals constrained by elastic guides** (*Presentation Only*), Jinkyu Yang, Univ. of South Carolina (USA); Chiara Daraio, California Institute of Technology (USA)[8346-13]

9:40 am: **Influence of propagation distance on the acoustic emission parameters in metal plates**, Dimitrios G. Aggelis, Theodore E. Matikas, Univ. of Ioannina (Greece) [8346-14]

10:00 am: **Investigation of co-travelling solitary wave collisions in a granular chain**, Paul Anzel, Chiara Daraio, California Institute of Technology (USA) [8346-15]

10:20 am: **Monitoring the efficiency of plasticizer in fresh cement using ultrasound**, Dimitrios G. Aggelis, Theodore E. Matikas, Univ. of Ioannina (Greece) [8346-16]

Coffee Break. . . . 10:40 to 11:00 am

SESSION 4

Room: Royal Palm V
Tues. 9:20 to 11:50 am

Corrosion Monitoring Technologies for Civil Infrastructure

Session Chairs: Maria Q. Feng, Univ. of California, Irvine (USA); **Dryver R. Huston**, The Univ. of Vermont (USA)

9:20 am: **Advanced sensing, degradation detection, diagnostic and prognostic capabilities for structural health management**, Duane R. Darr, Jeffrey Morse, Bernard C. Laskowski, Analatom Inc. (USA); Raimondo Betti, Columbia Univ. (USA) [8347-15]

9:40 am: **Condition assessment of rebar corrosion in concrete bridge decks using ground-penetrating radar**, Hao Liu, Tzu-Yang Yu, Univ. of Massachusetts Lowell (USA); Ming L. Wang, Northeastern Univ. (USA) [8347-17]

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

10:30 am: **A reflectometer-based reader for passive wireless electronic structural surveillance sensors**, Praveen Pasupathy, Tanuj Trivedi, The Univ. of Texas at Austin (USA); Frank Raffaeli, National Instruments Corp. (USA); Ye Chen, Dean P. Neikirk, Sharon L. Wood, The Univ. of Texas at Austin (USA) [8347-18]

Concurrent Sessions

SESSION 4a

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

Guided Waves IV: Aerospace Applications

Session Chairs: Paul D. Panetta, Applied Research Associates, Inc. (USA); **Paul Fromme**, Univ. College London (United Kingdom)

9:20 am: **Integral ultrasonic structural health and load monitoring on a fiber reinforced polymer based composite helicopter tail boom**, Gerhard Birkelbach, Wolfgang Grill, Univ. Leipzig (Germany); Iagoba J. Aldave, Ion López, Fundación Centro de Tecnologías Aeronáuticas (Spain) [8348-31]

9:40 am: **Integral structural health and load monitoring of a helicopter tail boom manufactured from aluminum sheet metal with support from frames and stringers by guided ultrasonic waves**, Gerhard Birkelbach, Wolfgang Grill, Univ. Leipzig (Germany); Vitalijs Pavelko, Sergey Kuznetsov, Riga Technical Univ. (Latvia) [8348-32]

10:00 am: **Damage detection in sandwich plates using shear horizontal wave**, Keshava Kumar S. Rao, Dinesh K. Harursampath, Ranjan Ganguli, Indian Institute of Science (India) [8348-33]

Coffee Break. . . . 10:20 to 10:50 am

SESSION 4b

Room: Sunset
Tues. 9:20 to 10:20 am

Sensor Network, Signal Processing, and Feature Extraction

Session Chairs: Piervincenzo Rizzo, Univ. of Pittsburgh (USA); **Lingyu Yu**, Univ. of South Carolina (USA)

9:20 am: **Cointegration as a data normalization tool for structural health monitoring applications**, Dustin Y. Harvey, Michael D. Todd, Univ. of California, San Diego (USA) [8348-34]

9:40 am: **Uncertainty propagation of transmissibility-based structural health monitoring features**, Zhu Mao, Michael D. Todd, Univ. of California, San Diego (USA) [8348-35]

10:00 am: **An experimental study on disbond detection in a thermal insulation system using guided waves under a load-temperature environment**, Yishou Wang, Shuyi Ma, Zhanjun Wu, Kehai Liu, Dalian Univ. of Technology (China) [8348-36]

Coffee Break. . . . 10:20 to 10:50 am

Conference 8339	Conference 8340	Conference 8341	Conference 8342	Conference 8343
<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Royal Palm VI Tues. 10:30 am to 12:10 pm</p> <p style="text-align: center;">Optics/Photonics II <i>Session Chair: Akira Saito, Osaka Univ. (Japan)</i></p> <p>10:30 am: Arrays of bioinspired compound lenses (BCLs) 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. (USA) [8339-12]</p> <p>10:50 am: Biomimetic one-dimensional photonic crystals having black thin layers, Hiroshi Yabu, Yuji Hirai, Matsusugu Shimomura, Tohoku Univ. (Japan) [8339-13]</p> <p>11:10 am: Light transmission of the marine diatom <i>Coscinodiscus wailesii</i>, Shih-Hsin Hsu, Camille Paoletti, Moacir Torres, Raymond J. Ritchie, Anthony W. D. Larkum, Christian Grillet, The Univ. of Sydney (Australia) [8339-14]</p> <p>11:30 am: A mechanism of reflective camouflage in silvery fish as design inspiration for an omnidirectional broadband mirror, Tom Jordan, Nicholas Roberts, Noah Linden, Julian Partridge, Univ. of Bristol (United Kingdom) [8339-15]</p> <p>11:50 am: Toward pest control via mass production of realistic decoys of insects, Drew P. Pulsifer, Akhlesh Lakhtakia, The Pennsylvania State Univ. (USA); Jayant Kumar, Univ. of Massachusetts Lowell (USA); Tom C. Baker, The Pennsylvania State Univ. (USA); Raúl J. Martín-Palma, Univ. Autónoma de Madrid (Spain) [8339-16]</p> <p>Lunch/Exhibition Break 12:10 to 1:40 pm</p>	<p style="text-align: center;">SESSION 4, continued</p> <p>10:40 am: Molecular engineering of polymer actuators for biomedical and industrial use, Mark Banister, Yordan Geronov, Medipacs, LLC (USA); Dominic V. McGrath, The Univ. of Arizona (USA) [8340-11]</p> <p>11:00 am: A rigid coupling tactile display, Hyouk Ryeol Choi, Ja Choon Koo, Hyungpil Moon, Hyung Seok Lee, Sungkyunkwan Univ. (Korea, Republic of) [8340-12]</p> <p>11:20 am: Dielectric elastomer vibrissal structure for active tactile sensing, Andrew T. Conn, Univ. of Bristol (United Kingdom); Martin J. Pearson, Anthony G. Pipe, Jason Welsby, Bristol Robotics Lab. (United Kingdom); Jonathan Rossiter, Univ. of Bristol (United Kingdom) [8340-13]</p> <p>11:40 am: Manufacturing issues around world first commercial EAP (electro-active polymer) based haptic actuator and its scale-up, Duk Su Kim, Dong Hyuk Shin, Jae Ik Yang, ELK Corp. (Korea, Republic of) [8340-14]</p> <p>12:00 pm: A dynamic physics-based model for base-excited IPMC sensors, Chai Yong Lim, Hong Lei, Xiaobo Tan, Michigan State Univ. (USA) [8340-15]</p> <p>Lunch/Exhibition Break 12:20 to 1:30 pm</p>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Sunrise Tues. 10:50 am to 12:10 pm</p> <p style="text-align: center;">Optimization and Design of Integrated Systems I</p> <p>10:50 am: Design of smart composite platforms for adaptive trust vector control and adaptive laser telescope for satellite applications, Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i (USA) . . . [8341-18]</p> <p>11:10 am: Uncertainty quantification of acoustic emission filtering techniques, Boris A. Zarate, Juan M. Caicedo, Paul H. Ziehl, Univ. of South Carolina (USA) [8341-19]</p> <p>11:30 am: Optimal design of viscous damper connectors for adjacent structures using Genetic Algorithm and Nelder-Mead Algorithm, Kasra Bigdeli, Warren L. Hare, Solomon Tesfamariam, The Univ. of British Columbia (Canada) [8341-20]</p> <p>11:50 am: A modified command feedforward tracking control system applied to the PRRR-RR parallel mechanism, Jeffrey A. Parkins, John F. O'Brien, Univ. of Wyoming (USA) [8341-21]</p> <p>Lunch/Exhibition Break 12:10 to 1:40 pm</p>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Royal Palm II Tues. 10:50 am to 12:10 pm</p> <p style="text-align: center;">Piezoelectric Materials</p> <p>10:50 am: Interdigitated electrode design for ferroelectric materials, David M. Pisani, Christopher S. Lynch, Univ. of California, Los Angeles (USA) [8342-19]</p> <p>11:10 am: Parametric study on the geometry and matrix properties impact on the performance of the AFCs, Hassene Ben Attallah, Ali Khadimallah, Zoubeida Ounaies, The Pennsylvania State Univ. (USA); Anastasia Muliana, Texas A&M Univ. (USA) [8342-20]</p> <p>11:30 am: Sliding mode control design for hysteretic smart systems, Jerry A. McMahan, Jr., Ralph Smith, North Carolina State Univ. (USA) [8342-21]</p> <p>11:50 am: In situ polarization of polymer films in microsensors, Michael S. Kranz, Stanley Associates (USA); Tracy D. Hudson, U.S. Army Aviation and Missile Command (USA) [8342-22]</p> <p>Lunch/Exhibition Break 12:10 to 1:20 pm</p>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Towne Tues. 10:50 am to 12:10 pm</p> <p style="text-align: center;">Smart Actuators <i>Session Chair: Steven F. Griffin, Boeing LTS Inc. (USA)</i></p> <p>10:50 am: Design of shape memory alloy pipe couplers: modeling and experiments, Majid Tabesh, James G. Boyd, Dimitris C. Lagoudas, Texas A&M Univ. (USA) [8343-18]</p> <p>11:10 am: Design of a smart material electro-hydraulic actuator with improved frequency bandwidth, John P. Larson, Marcelo J. Dapino, The Ohio State Univ. (USA) [8343-19]</p> <p>11:30 am: Piezoelectrically-induced ultrasonic lubrication by way of Poisson effect, Sheng Dong, Marcelo J. Dapino, The Ohio State Univ. (USA) [8343-20]</p> <p>11:50 am: Adaptronic tools for superfinishing of cylinder bores, Hans-Juergen Roscher, Carsten Hochmuth, Michael Hoffmann, Michael Praedicow, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany) [8343-21]</p> <p>Lunch/Exhibition Break 12:10 to 1:40 pm</p>

Conference 8344

Conference 8345

Conference 8346

Conference 8347

Conference 8348

SESSION 7

Room: Royal Palm III
Tues. 10:30 to 11:50 am
Nano Devices and Sensors II

Session Chair: Christina Brantley, U.S. Army Research, Development and Engineering Command (USA)

10:30 am: **Cellulose-gold nanowire applications**, Joo-Hyung Kim, Byungwook Lim, Seongsoon Park, Chosun Univ. (Korea, Republic of) [8344-16]

10:50 am: **Titanium dioxide-cellulose hybrid nanocomposite based conductometric glucose biosensor**, Mohammad Maniruzzaman, Suresha K. Mahadeva, Hyejun Jung, Jaehwan Kim, Inha Univ. (Korea, Republic of) [8344-17]

11:10 am: **The development of ternary alloy thin film plasmonic and magneto-optical sensors**, Jonathan R. Skuza, National Institute of Aerospace (USA); Sang H. Choi, NASA Langley Research Ctr. (USA) [8344-18]

11:30 am: **Effects of iron sources on the structural and electrochemical properties of LiFePO₄/C composites for lithium ion batteries**, Gaojun Wang, Linfeng Chen, Gyanesh N. Mathur, Vijay K. Varadan, Univ. of Arkansas (USA) [8344-19]

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

Concurrent Sessions

SESSION 5a

Room: Pacific Salon IV-V
Tues. 10:50 am to 12:10 pm

Crack Detection in Structures

Session Chairs: Li Zhou, Nanjing Univ. of Aeronautics and Astronautics (China); **Yingzi Lin**, Northeastern Univ. (USA)

10:50 am: **A novel approach to detecting breathing cracks based on vibration-data**, Guirong Yan, Univ. of Western Sydney (Australia)[8345-28]

11:10 am: **Comparative study of electromechanical impedance and Lamb wave techniques for fatigue crack detection and monitoring in metallic structures**, Say Ian Lim, Yu Liu, Chee Kiong Soh, Nanyang Technological Univ. (Singapore) [8345-29]

11:30 am: **Spectral element method for modeling Lamb wave interaction with open and closed crack**, Hu Sun, Li Zhou, Nanjing Univ. of Aeronautics and Astronautics (China) ... [8345-30]

11:50 am: *** Impact localization on a cylindrical plate by near-field beamforming analysis**, Hayato Nakatani, Tokyo Univ. of Science (Japan); Taleh Hajzargerbashi, Tribikram Kundu, The Univ. of Arizona (USA); Nobuo Takeda, The Univ. of Tokyo (Japan) [8345-31]

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

SESSION 5b

Room: Pacific Salon VI-VII
Tues. 10:50 am to 12:10 pm

Acoustic Emission and Active Sensing

Session Chairs: Haiying Huang, The Univ. of Texas at Arlington (USA); **Victor Giurgiutiu**, Univ. of South Carolina (USA)

10:50 am: *** Nonlinear solitary wave-based inspection of plate structures using granular crystals** (*Presentation Only*), Jinkyu Yang, Univ. of South Carolina (USA); Devvrath Khatri, Paul Anzel, Chiara Daraio, California Institute of Technology (USA)[8345-32]

11:10 am: **Delineation of structural damage from piezo-fibre-based sensor degradation**, Mohammad Mehdizadeh, Sabu J. John, Chun H. Wang, RMIT Univ. (Australia); Viktor Verijenko, Defence Materials Technology Centre Ltd. (Australia); Paul J. Callus, Defence Science and Technology Organisation (Australia) [8345-33]

11:30 am: **Experimental detection of debonding of piezotransducers with the segmented electrode**, Hector A. Tinoco Navarro, Univ. Autónoma de Manizales (Colombia); Alberto L. Serpa, Univ. Estadual de Campinas (Brazil) [8345-34]

11:50 am: **PWAS-based wireless acoustic emission sensor**, Haiying Huang, The Univ. of Texas at Arlington (USA) [8345-35]

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

SESSION 5

Room: Royal Palm IV
Tues. 11:00 am to 12:40 pm

Classical Spectral-gap Sensors III: Phoxonics-Optomechanics and Heat Management

Session Chair: Ali Adibi, Georgia Institute of Technology (USA)

11:00 am: **Thermal conductivity reduction in phononic crystals: interplay of coherent versus incoherent scattering** (*Invited Paper*), Ihab El-Kady, Sandia National Labs. (USA) [8346-17]

11:40 am: **High-frequency phonon boundary scattering effects on the transport of heat in semiconductor nanostructures**, Martin Maldovan, Massachusetts Institute of Technology (USA) [8346-18]

12:00 pm: **Dynamically tuned zero-gap phoXonic systems**, Ioannis E. Psarobas, Univ. of Athens (Greece); Vassilios Yannopoulos, Univ. of Patras (Greece); Nikolaos Papanikolaou, National Ctr. for Scientific Research Demokritos (Greece); Nikolaos Stefanou, Univ. of Athens (Greece) [8346-19]

12:20 pm: **Mechanical impedance in periodic media**, Ryan M. Camacho, Peter T. Rakich, Sandia National Labs. (USA) [8346-20]

Lunch/Exhibition
Break 12:40 to 2:00 pm

SESSION 4, continued

10:50 am: **Detection of multiple corrosion thresholds in reinforced concrete structures using passive sensors**, Ali E. Abu Yosef, Praveen Pasupathy, Sharon L. Wood, Dean P. Neikirk, The Univ. of Texas at Austin (USA) [8347-19]

11:10 am: **Rebar corrosion detection by active wave propagation approach**, Wensong Zhou, Hui Li, Hengqiang Jiang, Harbin Institute of Technology (China) [8347-20]

11:30 am: **Ultrasonic guided waves monitoring and evaluation for steel rebar corrosion damage**, Dongsheng Li, Dalian Univ. of Technology (China) [8347-21]
Lunch/Exhibition
Break 11:50 am to 1:20 pm

Concurrent Sessions

SESSION 5a

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

Guided Waves V: Modeling and Simulation

Session Chairs: Sridhar Krishnaswamy, Northwestern Univ. (USA); **Sourav Banerjee**, Univ. of South Carolina (USA)

10:50 am: **Multiple scattering of Lamb waves by multiple corrosion pits in a plate**, Brandon W. Strom, Sridhar Krishnaswamy, Jan D. Achenbach, Northwestern Univ. (USA) [8348-37]

11:10 am: **Structural health monitoring through a wave finite element method**, Manuel Collet, Univ. de Franche-Comté (France); Mohamed Ichchou, Olivier Bareille, Ecole Centrale de Lyon (France) . [8348-38]

11:30 am: **High-frequency guided ultrasonic waves for the detection of hidden defects in multi-layer aerospace structures**, Bernard Masserey, Christian Raemy, HES-SO Fribourg (Switzerland); Paul Fromme, Univ. College London (United Kingdom) [8348-39]

11:50 am: **Ultrasonic characterization of LiNbO₃ single crystal using scanning acoustic microscope**, Anowarul Habib, Univ. Siegen (Germany); Amit Shelke, The Univ. of Arizona (USA); Ullrich Pletsch, Univ. Siegen (Germany); Tribikram Kundu, The Univ. of Arizona (USA) [8348-40]

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

SESSION 5b

Room: Sunset
Tues. 10:50 am to 12:10 pm

Novel Devices and Applications

Session Chairs: Wolfgang Grill, Univ. Leipzig (Germany); **Lingyu Yu**, Univ. of South Carolina (USA)

10:50 am: **Inkjet fabrication of spiral frequency-steerable acoustic transducers (FSATs)**, Emanuele Baravelli, Georgia Institute of Technology (USA) and Univ. degli Studi di Bologna (Italy); Matteo Senesi, David S. Gottfried, Georgia Institute of Technology (USA); Luca De Marchi, Univ. degli Studi di Bologna (Italy); Massimo Ruzzene, Georgia Institute of Technology (USA)[8348-41]

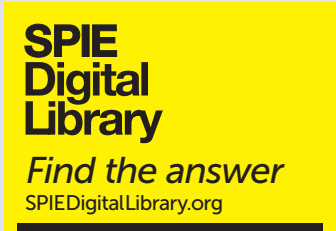
11:10 am: **Non-destructive evaluation of acoustic properties of fuel cell proton-exchange membranes by vector contrast acoustic microscopy**, Albert E. Kamanyi, Jr., Wolfgang Grill, Univ. Leipzig (Germany) [8348-42]

11:30 am: **Study of waveforms effect on PEDOT inkjet printing**, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan); Cheng-Ling Chang, Univ. of Washington (USA) [8348-43]

11:50 am: **Laser ultrasonic imaging of a rotating blade**, Byeongjin Park, Troung Thanh Chung, Chul Min Yeum, Hoon Sohn, KAIST (Korea, Republic of) [8348-44]

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

Conference 8339	Conference 8340	Conference 8341	Conference 8342	Conference 8343
<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm VI Tues. 1:40 to 3:00 pm</p> <p style="text-align: center;">Flight <i>Session Chair: Bert Müller, Univ. Basel (Switzerland)</i></p> <p>1:40 pm: The development of a closed-loop flight controller with panel method integration for gust alleviation using biomimetic feathers on aircraft wings, Christopher J. Blower, Woody Lee, Adam M. Wickenheiser, The George Washington Univ. (USA) [8339-17]</p> <p>2:00 pm: Measurement and estimation of thrust produced by flapping-wing systems with passive wing rotation mechanism, Vu H. Phan, Quang-Tri Truong, Viet Q. Nguyen, Hoon Cheol Park, Doyoung Byun, Nam Seo Goo, Konkuk Univ. (Korea, Republic of) [8339-19]</p> <p>2:20 pm: Dynamic characteristics of a beetle hind wing, Ngoc-San Ha, Nam-Seo Goo, Hoon-Cheol Park, Konkuk Univ. (Korea, Republic of) [8339-20]</p> <p>2:40 pm: Micro-electro-mechanical flapping wing technology for micro air vehicles, Asha Hall, Motile Robotics Inc. (USA) [8339-21]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Town & Country Ballroom Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Ionic EAP I: Conducting, IMC, and Gels <i>Session Chairs: Keiichi Kaneto, Kyushu Institute of Technology (Japan); Alvo Aabloo, Univ. of Tartu (Estonia)</i></p> <p>1:30 pm: Applications of scanned pipette techniques for the highly localized electrochemical fabrication and characterization of conducting polymers (<i>Invited Paper</i>), Jadranka Travas-Sejdic, The Univ. of Auckland (New Zealand) [8340-16]</p> <p>2:10 pm: Patterning process and actuation in open air of micro-beam actuator based on conducting IPNs (<i>Invited Paper</i>), Cedric Plesse, Univ. de Cergy-Pontoise (France); Alexandre Khaldi, Univ. de Valenciennes et du Hainaut-Cambrésis (France); Ali Maziz, Univ. de Cergy-Pontoise (France); Caroline Soyer, Univ. de Valenciennes et du Hainaut-Cambrésis (France); Claude Chevrot, Dominique Teyssie, Frederic Vidal, Univ. de Cergy-Pontoise (France); Eric Cattan, Univ. de Valenciennes et du Hainaut-Cambrésis (France) [8340-17]</p> <p>2:50 pm: How to improve electrochemomechanical strain in conducting polymers, Keiichi Kaneto, Kyushu Institute of Technology (Japan) [8340-18]</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: Sunrise Tues. 1:40 to 3:20 pm</p> <p style="text-align: center;">Magneto Rheological Systems I</p> <p>1:40 pm: High shear rate characterization of magnetorheological fluids, Andrew C. Becnel, Wei Hu, Norman M. Wereley, Univ. of Maryland, College Park (USA) [8341-22]</p> <p>2:00 pm: Realization of a MRF-Safety-Clutch for high torsional moments based on a novel Ball-Clutch design, Michael Matthias, Björn Seipel, Marco Jackel, Jannes Kloepper, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) [8341-23]</p> <p>2:20 pm: Feasibility study of self-powered magnetorheological damper systems, Chao Chen, Wei-Hsin Liao, The Chinese Univ. of Hong Kong (Hong Kong, China) [8341-24]</p> <p>2:40 pm: Model reference adaptive control of the intelligent above-knee prosthesis with MR damper, Daihua Wang, Qiang Fu, Chongqing Univ. (China) [8341-25]</p> <p>3:00 pm: Structural damping using encapsulated shear thickening fluids, Mathieu Soutrenon, Véronique J. Michaud, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [8341-26]</p> <p>Coffee Break. 3:20 to 3:50 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;">Piezoelectric Ceramics: Fabrication and Performance</p> <p>1:20 pm: Lead-free piezoelectric thick films for transducer applications, Wei Ren, Xi'an Jiaotong Univ. (China) [8342-23]</p> <p>1:40 pm: Electrical properties and sensing ability of novel piezoelectric ceramics fibers with Pt core, Jianzhou Du, Jinhao Qiu, Kongjun Zhu, Hongli Ji, Huayun Zhao, Nanjing Univ. of Aeronautics and Astronautics (China) [8342-24]</p> <p>2:00 pm: Overcoming hysteresis in multilayered piezoceramic actuators used in adaptive optics, Emma Bryce, Erman Uzgur, David Hutson, Katherine Kirk, Univ. of the West of Scotland (United Kingdom); Mel Strachan, Heriot Watt Univ. (United Kingdom); Noah Schwartz, Phil Parr-Burman, The Royal Observatory, Edinburgh (United Kingdom) . [8342-25]</p> <p>2:20 pm: A general framework for numerical solutions to rate-dependent plasticity problems of piezo-composites, Ajay B. Harish, Dineshkumar Harursampath, Indian Institute of Science (India) [8342-26]</p> <p>2:40 pm: Effect of cross-sectional nonlinearities on actuation characteristics of smart composite beams, A. P. Sathiskumar, Dineshkumar Harursampath, Indian Institute of Science (India) [8342-27]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Towne Tues. 1:40 to 3:00 pm</p> <p style="text-align: center;">SHM for Wind and Water Systems <i>Session Chair: Christopher Niezrecki, Univ. of Massachusetts Lowell (USA)</i></p> <p>1:40 pm: Damage detection in wind turbine gearboxes using outlier analysis, Ifigenia Antoniadou, Graeme Manson, Wieslaw J. Staszewski, Keith Worden, The Univ. of Sheffield (United Kingdom) [8343-22]</p> <p>2:00 pm: Ultrasonic underwater transmission of composite turbine blade structural health, Andrew J. Heckman, Joshua L. Rovey, K. Chandrashekhara, Steve E. Watkins, Missouri Univ. of Science and Technology (USA) [8343-23]</p> <p>2:20 pm: Full-scale fatigue tests of CX-100 wind turbine blades. Part I: Testing, Kevin M. Farinholt, Los Alamos National Lab. (USA); Stuart G. Taylor, Los Alamos National Lab. (USA) and University of California, San Diego (USA); Gyuhae Park, Curtt M. Ammerman, Los Alamos National Lab. (USA) [8343-24]</p> <p>2:40 pm: Full-scale fatigue tests of CX-100 wind turbine blades. Part II: Analysis, Stuart G. Taylor, Los Alamos National Lab. (USA) and University of California, San Diego (USA); Hyomi Jeong, Jae Kyeong Jang, Kevin M. Farinholt, Gyuhae Park, Los Alamos National Lab. (USA); Michael D. Todd, Univ. of California, San Diego (USA); Curtt M. Ammerman, Los Alamos National Lab. (USA) [8343-25]</p>



Conference 8344

Conference 8345

Conference 8346

Conference 8347

Conference 8348

SESSION 8

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

Keynote Lecture IV

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

1:30 pm: **Wirelessly powered airship with 3rd gen energy sources for the future transportation systems** (Keynote Presentation), Kunik Lee, Turner-Fairbank Highway Research Ctr. (USA) [8344-20]

SESSION 9

Room: Royal Palm III
Tues. 2:10 to 3:30 pm

Smart Electronics

Session Chair: Ashok Srivastava, Louisiana State Univ. (USA)

2:10 pm: **Probabilistic analysis and design considerations of LINA-type QCA Devices**, Samuel C. Lee, Loyd R. Hook IV, The Univ. of Oklahoma (USA) [8344-21]

2:30 pm: **Electronic current transport in CNT-FETs for operation in ballistic region**, Ashok Srivastava, Yao Xu, Louisiana State Univ. (USA); Ashwani K. Sharma, Clay Mayberry, Air Force Research Lab. (USA) [8344-22]

2:50 pm: **Designing quantum-dot cellular automata logic devices in 3-dimensional space**, Juan F. Herrera, Samuel C. Lee, The Univ. of Oklahoma (USA) [8344-23]

3:10 pm: **Surface topography dependent plasmonic characteristics**, Glen C. King, NASA Langley Research Ctr. (USA); Hyunjung Kim, Yeonjoon Park, National Institute of Aerospace (USA); Kyo D. Song, Norfolk State Univ. (USA); Sang H. Choi, NASA Langley Research Ctr. (USA) [8344-24]

Coffee Break. 3:30 to 3:50 pm

Concurrent Sessions

SESSION 6a

Room: Pacific Salon IV-V
Tues. 1:40 to 3:20 pm

Next-Generation Sensing Systems for SHM: Nanotechnology

Session Chairs: Kenneth J. Loh, Univ. of California, Davis (USA); Ying Zhang, Georgia Institute of Technology (USA)

1:40 pm: * **Finite element model updating of a steel pedestrian bridge with wireless and mobile sensors**, Dapeng Zhu, Jiajie Guo, Chunhee Cho, Chia-Hung Fang, Yang Wang, Kok-Meng Lee, Georgia Institute of Technology (USA)[8345-36]

2:00 pm: * **Structural damage monitoring with piezo paint acoustic emission sensor**, Yunfeng Zhang, Univ. of Maryland, College Park (USA) [8345-37]

2:20 pm: **Enhancing piezoelectric properties of PVDF using zinc oxide nanoparticles**, John S. Dodds, Frederick J. Meyers, Kenneth J. Loh, Univ. of California, Davis (USA) [8345-38]

2:40 pm: * **Development of a self-sensing, flexible, and multifunctional thin film sensor using P3HT and carbon nanotubes**, Donghyeon Ryu, Kenneth J. Loh, Univ. of California, Davis (USA) [8345-39]

3:00 pm: **Design and evaluation of a thermoelectrical energy harvesting system**, Guangxi Wu, Xiong Yu, Case Western Reserve Univ. (USA)[8345-40]

Coffee Break. 3:20 to 3:50 pm

SESSION 6b

Room: Pacific Salon VI-VII
Tues. 1:40 to 3:20 pm

Smart Sensors for SHM

Session Chairs: Hyung-Jo Jung, KAIST (Korea, Republic of); Sung-Han Sim, Univ. of Illinois at Urbana-Champaign (USA)

1:40 pm: * **Design and validation of high-precision wireless strain sensors for structural health monitoring of steel structures**, Hongki Jo, Univ. of Illinois at Urbana-Champaign (USA); Jongwoong Park, KAIST (Korea, Republic of); Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (USA) . . . [8345-41]

2:00 pm: **Smart PZT-interfaces for hybrid SHM in cable-stayed bridge**, Khac Duy Nguyen, Po-Young Lee, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of) . . [8345-42]

2:20 pm: **Preliminary study of low-cost GPS receivers for time synchronization of wireless sensors**, Robin E. Kim, Univ. of Illinois at Urbana-Champaign (USA); Tomonori Nagayama, The Univ. of Tokyo (Japan); Hongki Jo, Bille Spencer, Jr., Univ. of Illinois at Urbana-Champaign (USA) [8345-43]

2:40 pm: * **Passive, wireless conductivity sensors for reinforced concrete structures**, JinYoung Kim, Paraveenkumar Pasupathy, Sharon L. Wood, Dean P. Neikirk, The Univ. of Texas at Austin (USA) [8345-44]

3:00 pm: **Experimental validation of energy harvesting devices for civil engineering applications**, Hyung-Jo Jung, In-Ho Kim, Jeongsu Park, KAIST (Korea, Republic of) [8345-45]

Coffee Break. 3:20 to 3:50 pm

SESSION 6

Room: Royal Palm IV
Tues. 2:00 to 3:40 pm

Classical Spectral-gap Sensors IV: Photonics-Phononics

Session Chair: Ioannis E. Psarobas, National Ctr. for Scientific Research Demokritos (Greece)

2:00 pm: **The implication of Dirac cones at k=0 in photonic and phononic crystals** (Invited Paper), F. M. Liu, Che-Ting Chan, Hong Kong Univ. of Science and Technology (Hong Kong, China) [8346-21]

2:40 pm: **Topological photonic structures**, Vassilios Yannopapas, Univ. of Patras (Greece) . . . [8346-22]

3:00 pm: **Optical sensing elements based on ordered semiconductor and metal nanoparticle arrays and surface plasmons**, Carsten Reinhardt, Andrey B. Evlyukhin, Wei Cheng, Arune Gaidukeviciute, Arseniy I. Kuznetsov, Urs Zywietz, Boris N. Chichkov, Laser Zentrum Hannover e.V. (Germany) [8346-23]

3:20 pm: **THz hyperbolic metamaterials made of polaritonic media**, Maria Kafesaki, Alejandro Reyes-Coronado, Foundation for Research and Technology-Hellas (Greece); Stavroula Foteinopoulou, The Univ. of Exeter (United Kingdom); Alexey Basharin, Eleftherios N. Economou, Costas M. Soukoulis, Foundation for Research and Technology-Hellas (Greece) [8346-24]

Coffee Break. 3:40 to 4:10 pm

SESSION 5

Room: Royal Palm V
Tues. 1:20 to 4:10 pm

NDE/SHM of Composites

Session Chairs: Shawn J. Beard, Acellent Technologies, Inc. (USA); Simon Laflamme, Iowa State Univ. (USA)

1:20 pm: **Evaluation of nano/micro composites for nondestructive repair of micro cracks and delaminations**, Giri Venkitesala, Matthew Klein, Husam Najm, Balaguru Perumalsamy, Rutgers, The State Univ. of New Jersey (USA) . . [8347-22]

1:40 pm: **Laser-generated ultrasound with liquid crystal on silicon (LCoS) technology in the thermoelastic regime**, Michael Kalms, Sandra Hellmers, Ralf B. Bergmann, Bremer Institut für angewandte Strahltechnik GmbH (Germany) [8347-23]

2:00 pm: **On the development of an automatic sample geometry identification robotic scanner for NDT on 1-plane curved composite parts using thermography and near infrared cameras or a UT array**, Vasilis Papadimitriou, Giannis Roditis, Ctr. for Research and Technology, Thessaly (Greece); Panagiotis Chatzidakos, Innora Ltd. (Greece); Nico Avdelidis, National Technical Univ. of Athens (Greece); Geoff Diamond, G-Tronix Ltd. (United Kingdom); Chiraz Ennaceur, Tat-Hean Gan, TWI Ltd. (United Kingdom) [8347-24]

2:20 pm: **Impact damage characterization in cross-ply carbon fiber/thermoplastic composites using thermoelastic stress analysis**, Tsuyoshi Yoshida, Toshiyuki Uenoya, Hiroyuki Miyamoto, Doshisha Univ. (Japan) . . . [8347-25]

2:40 pm: **Thermoelastic estimation of fatigue damage growth in orthotropic CF/NY6 laminates**, Ryuta Suzuki, Toshiyuki Uenoya, Hiroyuki Miyamoto, Doshisha Univ. (Japan) [8347-26]

Coffee Break. 3:00 to 3:30 pm

Concurrent Sessions

SESSION 6a

Room: Royal Palm I
Tues. 1:40 to 3:20 pm

Modeling and Simulation Related to SHM

Session Chairs: Sourav Banerjee, Univ. of South Carolina (USA); Daniel Guyomar, Institut National des Sciences Appliquées de Lyon (France)

1:40 pm: **Temperature effect on the accuracy of vibration-based damage detection of thin plates**, Mana Afshari, Virginia Polytechnic Institute and State Univ. (USA); Daniel J. Inman, Univ. of Michigan (USA) [8348-45]

2:00 pm: **Application of multi-objective optimization to structural damage estimation via model updating**, Faisal Shabbir, Piotr Omennzetter, The Univ. of Auckland (New Zealand) [8348-46]

2:20 pm: **Robust method to identify damages in beams based on frequency shift analysis**, Gilbert-Mana Afshari, Zenon-Iosif Praisach, Univ. Eftimie Murgu Resita (Romania) [8348-47]

2:40 pm: **On optimized placement of multidirectional piezoelectric layers for multimodal energy scavenging: a theoretical study**, Sourav Banerjee, Univ. of South Carolina (USA)[8348-48]

3:00 pm: **Simulation of ultrasonic NCF composites testing using 3D finite element model**, Zenghua Liu, Beijing Univ. of Technology (China); Nader Saffari, Paul Fromme, Univ. College London (United Kingdom) [8348-49]

Coffee Break. 3:20 to 3:50 pm

SESSION 6b

Room: Sunset
Tues. 1:40 to 3:20 pm

SHM for Space and Aerospace Industries

Session Chairs: Andrei N. Zagrai, New Mexico Institute of Mining and Technology (USA); Perngjin F. Pai, Univ. of Missouri-Columbia (USA)

1:40 pm: **Vibration-based monitoring to detect mass changes in satellites**, Arup K. Maji, Breck Vernon, The Univ. of New Mexico (USA) [8348-50]

2:00 pm: **In situ measurement of viscoelastic effects in composite tape springs**, Alessa J. Makuch, Whitney D. Reynolds, Air Force Research Lab. (USA) [8348-51]

2:20 pm: **Structural assurance testing for post-shipping satellite inspection**, Whitney D. Reynolds, Derek T. Doyle, Air Force Research Lab. (USA) [8348-52]

2:40 pm: **Design, development, and assembly of sub-orbital space flight structural health monitoring experiment**, William Reiser, Brandon Runnels, Chris White, Abraham Light-Marquez, Andrei N. Zagrai, Stephen Marinsek, Andrew Murray, New Mexico Institute of Mining and Technology (USA); Stuart G. Taylor, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (USA); Richard Sansom, New Mexico Institute of Mining and Technology (USA) [8348-53]

3:00 pm: **Condition-based maintenance: an aerospace perspective**, Nezhir Mrad, Defence Research and Development Canada, Ottawa (Canada) [8348-54]

Coffee Break. 3:20 to 3:50 pm

Conference 8339

SESSION 7

Room: Royal Palm VI
Tues. 3:30 to 4:50 pm

Miscellaneous Applications

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

3:30 pm: **Adaptive honeycomb structure with pneumatic muscle fibers**, Weilong Yin, Dongkui Tian, Harbin Institute of Technology (China) [8339-22]

3:50 pm: **Water uptake through an open capillary by wharf roach, Ligia exotica**, Masatsugu Shimomura, Tohoku Univ. (Japan); Takahiko Hariyama, Hamamatsu Univ. School of Medicine (Japan); Daisuke Ishii, Yuji Hirai, Hiroshi Yabu, Tohoku Univ. (Japan); Kuniharu Ijiro, Yasutaka Matsuo, Tateshi Shimozawa, Hokkaido Univ. (Japan); Kaoru Tsujii, Consultant (Japan); Hiroko Horiguchi, Hamamatsu Univ. School of Medicine (Japan) [8339-23]

4:10 pm: **Biologically inspired highly efficient buoyancy engine**, Barbar J. Akle, Wassim Habchi, Lebanese American Univ. (Lebanon); John B. Blottman III, Naval Undersea Warfare Ctr. (USA); Donald J. Leo, Virginia Polytechnic Institute and State Univ. (USA) [8339-24]

4:30 pm: **Mobile robot with retractable paws**, Behnam Bahr, Pedram Safi, Sergio Varela, California State Univ., Long Beach (USA) [8339-25]

Conference 8340

SESSION 6

Room: Town & Country Ballroom
Tues. 3:40 to 5:40 pm

Ionic EAP II: Conducting, IMC, and Gels

Session Chairs: Bert Müller, Univ. Basel (Switzerland); Cedric Plesse, Univ. de Cergy-Pontoise (France)

3:40 pm: **Equivalent circuit modeling of ionomer and ionic polymer conductive network composite actuators containing ionic liquids**, Yang Liu, Ran Zhao, Sheng Liu, Junhong Lin, Mehdi Ghaffari, The Pennsylvania State Univ. (USA); Hülya Cebeci, Roberto Guzmán de Villoria, Massachusetts Institute of Technology (USA); Reza Montazami, Iowa State Univ. (USA); Dong Wang, Virginia Polytechnic Institute and State Univ. (USA); Brian L. Wardle, Massachusetts Institute of Technology (USA); James R. Heflin, Virginia Polytechnic Institute and State Univ. (USA); Qiming Zhang, The Pennsylvania State Univ. (USA) [8340-19]

4:00 pm: **Influence of micro- and nanofillers on electro-mechanical performance of silicone EAPs**, Anca Gabriela Bejenariu, Anders E. Daugaard, Anne L. Skov, Sindhu Vudayagiri, Technical Univ. of Denmark (Denmark) [8340-20]

4:20 pm: **Nanocomposites based on conducting polymers and multiwall carbon nanotubes**, Subhash B. Kondawar, RTM Nagpur Univ. (India); Devendra K. Burghate, Shivaji Univ. (India); Shikha P. Agrawal, RTM Nagpur Univ. (India) [8340-21]

4:40 pm: **Influence of the counterions of ionic membranes on the performance of IEAP actuators**, Reza Montazami, Iowa State Univ. (USA); Dong Wang, James R. Heflin, Virginia Polytechnic Institute and State Univ. (USA) [8340-22]

5:00 pm: **Physics based electromechanical model of IPMC considering various underlying currents**, David Pugal, Kwang Jin Kim, Vijjar Palmer, Kam K. Leang, Univ. of Nevada, Reno (USA); Alvo Aabloo, Univ. of Tartu (Estonia) [8340-24]

5:20 pm: **Multi-physical modeling for electro-transport and deformation of ionic polymer metal composites**, Zicai Zhu, Hualing Chen, Yongquan Wang, Bo Li, Xi'an Jiaotong Univ. (China) . . [8340-25]

5:40 pm: **Bistable electroactive polymer with improved actuation stability and tunable transition temperature**, Xiaofan Niu, Paul Brochu, Qibing Pei, Univ. of California, Los Angeles (USA) [8340-95]

Conference 8341

SESSION 7

Room: Sunrise
Tues. 3:50 to 5:30 pm

Energy Harvesting and Scavenging III: General Energy Harvesting I

3:50 pm: **Investigating the energy harvesting potential of ferro-fluids sloshing in base-excited containers**, Mohammed Daqaq, Amin Bibo, Ravindra Masana, Amanda King, Gang Li, Clemson Univ. (USA) [8341-27]

4:10 pm: **Electromechanical and statistical modeling of turbulence-induced vibration for energy harvesting**, Jared D. Hobeck, Daniel J. Inman, Univ. of Michigan (USA) [8341-28]

4:30 pm: **Energy harvesting using piezoelectric/shape memory alloy composites containing spatially oriented inclusions**, Mohamed Rhimi, Nizar Lajnef, Michigan State Univ. (USA) [8341-29]

4:50 pm: **Impedance optimization of wireless electromagnetic (EM) energy harvester for maximum output efficiency at μ W input power**, Antwi Nimo, Leonhard M. Reindl, Dario Grgic, Albert-Ludwigs-Univ. Freiburg (Germany) [8341-30]

5:10 pm: **Performance evaluation of multiple piezoelectric energy harvesters endowed with different interfacing circuits**, I-Ching Lien, Yi-Chung Shu, National Taiwan Univ. (Taiwan) [8341-31]

2:00 pm: **Design and analysis of a new type of electromagnetic vibration energy harvester with high power density**, Xiudong Tang, Stony Brook Univ. (USA) [8341-68]

Conference 8342

SESSION 7

Room: Royal Palm II
Tues. 3:30 to 5:30 pm

Active Composites II

3:30 pm: **Structural health monitoring damage detection for remending multifunctional fiber composites**, Karen R. Chiu, Terrisa Duenas, NextGen Aeronautics, Inc. (USA); John Ayorinde, Shadé Inc. (USA); Ajit Mal, Univ. of California, Los Angeles (USA); Joan R. Smith, John K. Roberts, Daniel Carter, U.S. Army Research, Development and Engineering Command (USA) [8342-28]

3:50 pm: **Toughening mechanisms of thermoplastic particulate polycarbonate composites**, Hyung-ick Kim, Wenjie Zhao, Jonghwan Suhr, Univ. of Delaware (USA) [8342-72]

4:10 pm: **An experimental study of the self-healing behavior of ionomeric systems under ballistic impact tests**, Antonio M. Grande, Sara Coppi, Luca Di Landro, Politecnico di Milano (Italy); Cinzia Giacomuzzo, Alessandro Francesconi, Univ. degli Studi di Padova (Italy) [8342-29]

4:30 pm: **Mechanical properties of continuously reinforced MWCNT polymer composites in compression**, Yupeng Li, Jonghwan Suhr, Univ. of Delaware (USA) [8342-31]

4:50 pm: **Intelligent energy dissipation capability of MWCNTs based nanofluid**, Xiang Xu, Hui Li, Harbin Institute of Technology (China) [8342-85]

5:10 pm: **Nanoparticle superlattice for blast-induced shock-wave management**, Kristin L. Schaaf, Univ. of California, San Diego (USA); Greg Williams, Univ. of California, Irvine (USA); Sia Nemat-Nasser, Univ. of California, San Diego (USA) [8342-64]

Tuesday · 13 March

Conference 8344	Conference 8345	Conference 8346	Conference 8347	Conference 8348
<p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Royal Palm III Tues. 3:50 to 5:50 pm</p> <p style="text-align: center;">Wireless Sensor System <i>Session Chair: Eugene Edwards, U.S. Army Research, Development and Engineering Command (USA)</i></p> <p>3:50 pm: Music close to one's heart! Rate variability with music: diagnostic with e-bra and smart phone (<i>Invited Paper</i>), Shantala Hegde, National Institute of Mental Health and Neuro Sciences (India); Prashanth S. Kumar, Pratyush Rai, Gyanesh N. Mathur, Vijay K. Varadan, Univ. of Arkansas (USA)[8344-25]</p> <p>4:30 pm: Wireless power using magnetic resonance coupling for neural sensing applications, Kyo D. Song, Hargsoon Yoon, Demetris L. Geddis, Norfolk State Univ. (USA); Kunik Lee, Federal Highway Administration (USA); Jaehwan Kim, Inha Univ. (Korea, Republic of); Sang H. Choi, NASA Langley Research Ctr. (USA)[8344-26]</p> <p>4:50 pm: Wireless structural sensor made with frequency selective surface antenna, Sang-Dong Jang, Jaehwan Kim, Inha Univ. (Korea, Republic of)[8344-27]</p> <p>5:10 pm: Wireless brain-machine interface using EEG and EOG: brain wave classification and robot control, Sechang Oh, Prashanth S. Kumar, Hyeokjun Kwon, Vijay K. Varadan, Univ. of Arkansas (USA)[8344-28]</p> <p>5:30 pm: A film-type haptic actuator for mobile devices, Dong-gu Kim, Inha Univ. (Korea, Republic of); Sang-Youn Kim, Korea Univ. of Technology and Education (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of)[8344-29]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Pacific Salon IV-V Tues. 3:50 to 5:10 pm</p> <p style="text-align: center;">Distributed Sensing and Controls for SHM and Human-System Interaction <i>Session Chairs: Masayoshi Tomizuka, Univ. of California, Berkeley (USA); Yingzi Lin, Northeastern Univ. (USA)</i></p> <p>3:50 pm: Embedding passive wireless shear/compression sensors in shoes for diabetic foot diagnostics, Irshad Mohammad, Haiying Huang, The Univ. of Texas at Arlington (USA)[8345-46]</p> <p>4:10 pm: Mutual synchronization between structure and central pattern generator, Junich Hongu, Daisuke Iba, Kyoto Institute of Technology (Japan)[8345-47]</p> <p>4:30 pm: Simultaneous localization and mapping with consideration of robot system dynamics, Rubyca Jaai, Nikhil Chopra, Balakumar Balachandran, Univ. of Maryland, College Park (USA); Hamad Karki, The Petroleum Institute (United Arab Emirates)[8345-48]</p> <p>4:50 pm: An in situ damage imaging algorithm for a distributed array of passive and active sensors, Chun H. Wang, Francis Rose, RMIT Univ. (Australia)[8345-154]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Royal Palm IV Tues. 4:10 to 5:50 pm</p> <p style="text-align: center;">Fiber Optic Sensors <i>Session Chair: Rosalind M. Wynne, Villanova Univ. (USA)</i></p> <p>4:10 pm: Photonic crystal fiber monitors for intracellular ice formation, Rosalind M. Wynne, Emily Battinelli, Villanova Univ. (USA)[8346-25]</p> <p>4:30 pm: An iterative search method for strain measurement in EFPI sensors, William J. Ebel, Sr., Kyle K. Mitchell, Saint Louis Univ. (USA)[8346-26]</p> <p>4:50 pm: Performance optimization of bundled fiber optic displacement sensors, Erik A. Moro, Michael D. Todd, Univ. of California, San Diego (USA); Anthony Puckett, Los Alamos National Lab. (USA)[8346-27]</p> <p>5:10 pm: Photonic crystal fiber nanospectrometer chemical agent detection, Rosalind M. Wynne, Mark Reimlinger, William Harkins, Villanova Univ. (USA)[8346-28]</p> <p>5:30 pm: Self-repairing waveguide sensor with highly repeatable strain response, Young J. Song, Kara J. Peters, North Carolina State Univ. (USA)[8346-29]</p>	<p style="text-align: center;">SESSION 5, continued</p> <p>3:30 pm: Predictive modeling of composite material degradation using piezoelectric wafer sensors electromechanical impedance spectroscopy, Lingyu Yu, Matthieu Gresil, Mike Sutton, Siming Guo, Univ. of South Carolina (USA)[8347-27]</p> <p>3:50 pm: Textural analyses of carbon fiber materials by 2D-FFT of complex images obtained by high frequency eddy current imaging (HF ECI), Martin H. Schulze, Henning Heuer, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany)[8347-28]</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 7a</p> <p style="text-align: center;">Room: Royal Palm I Tues. 3:50 to 6:10 pm</p> <p style="text-align: center;">Guided Waves VI: Monitoring Composites <i>Session Chairs: Paul Fromme, Univ. College London (United Kingdom); Nobuo Takeda, The Univ. of Tokyo (Japan)</i></p> <p>3:50 pm: Real-time prediction of impact-induced damage in composite structures based on numerical failure analysis and efficient database methods, Surajit Roy, Ingolf Mueller, Stanford Univ. (USA); Samik Das, Accellent Technologies Inc. (USA); Vishnuvardhan Janapati, Fu-Kuo Chang, Stanford Univ. (USA)[8348-55]</p> <p>4:10 pm: SHM system using rectangular versus circular piezoceramic for the inspection within the bond of a composite bonded joint, Nicolas Quaegebeur, Philippe Micheau, Patrice Masson, Univ. de Sherbrooke (Canada)[8348-56]</p> <p>4:30 pm: Damage detection in underwater composite structures using ultrasonic guided waves, Fei Yan, Owen M. Malinowski, Xiang Zhao, FBS Inc. (USA); Joseph L. Rose, FBS Inc. (USA) and The Pennsylvania State Univ. (USA) . . .[8348-57]</p> <p>4:50 pm: Nonlinear guided wave based debonding detection in honeycomb sandwich structures, Guoliang Huang, Fei Song, Univ. of Arkansas at Little Rock (USA) [8348-58]</p> <p>5:10 pm: Ultrasonic guided wave based damage detection in foam-core sandwich panel using PWAS and LDV, Nibir Chakraborty, D. Roy Mahapatra, Srinivasan Gopalakrishnan, Indian Institute of Science (India)[8348-59]</p> <p>5:30 pm: Damage localization and quantification on a CFRP panel using guided waves, Anthony J. Vizzini II, Aditi Chattopadhyay, Arizona State Univ. (USA) . [8348-60]</p> <p>5:50 pm: Guided wave based damage detection in a composite T-joint using 3D scanning laser Doppler vibrometer, Ganesh K. Geetha, D. Roy Mahapatra, Srinivasan Gopalakrishnan, Indian Institute of Science (India)[8348-61]</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 7b</p> <p style="text-align: center;">Room: Sunset Tues. 3:50 to 5:10 pm</p> <p style="text-align: center;">Medical and Biological Applications II <i>Session Chairs: George Zentai, Varian Medical Systems, Inc. (USA); Wei-Chih Wang, Univ. of Washington (USA)</i></p> <p>3:50 pm: Development of a 2D electro-optic scanner, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan); Chi-Leung Tsui, Univ. of Washington (USA)[8348-62]</p> <p>4:10 pm: Prediction of ultrasonic guided waves excitability to support the non-invasive assessment of human long bones, Giovanni Castellazzi, Alessandro Marzani, Univ. degli Studi di Bologna (Italy); Ivan Bartoli, Drexel Univ. (USA) . . [8348-63]</p> <p>4:30 pm: Mechanical property quantification of endothelium cell using scanning acoustic microscopy, Amit Shelke, The Univ. of Arizona (USA); Sebastian Brand, Fraunhofer-Institut für Werkstoffmechanik (Germany); Jürgen Bereiter-Hahn, Christopher Blase, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany)[8348-64]</p> <p>4:50 pm: A full-scale foot pressure/shear sensor based on fiberoptic bend loss sensor, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan)[8348-65]</p> </div> </div>

Posters · Exhibition Hall/Golden Ballroom · 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 am and 4 pm on Tuesday 13 March.

Conference 8339

Controlling spontaneous emission in bioreplica photonic crystals, Matthew R. Jorgensen, Michael H. Bartl, The Univ. of Utah (USA) [8339-35]

Analysis of object properties of a tube wall by active electrolocation, Michael G. Metzner, Sandra Krueger, Imène Al Ghouz, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Herbert Bousack, Forschungszentrum Jülich GmbH (Germany); Gerhard von der Emde, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) . . [8339-36]

Effect of Gurney flap and fixed droop leading edge on dynamic stall, Muhammad Nafees Mumtaz Qadri, Syed Hossein R. Hamdani, Khalid Parvez, Aamer Shahzad, National Univ. of Science and Technology (Pakistan) [8339-38]

Investigation of fluids as filling of a biomimetic infrared sensor based on the infrared receptors of pyrophilous insects, Thilo Kahl, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Na Li, Forschungszentrum Jülich GmbH (Germany); Helmut Schmitz, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Herbert Bousack, Forschungszentrum Jülich GmbH (Germany) [8339-39]

Fabrication of bioinspired low-frictional surfaces by using honeycomb-patterned porous polymer films, Yuta Saito, Yuji Hirai, Hiroshi Yabu, Masatugu Shimomura, Tohoku Univ. (Japan) [8339-40]

A biomimetic hydrophilic-hydrophobic patterned multi-functional surface, QianFeng Xu, Fang-Ju Lin, Bikash Mondal, Yang Liu, Alan M. Lyons, College of Staten Island (USA) [8339-41]

Morphology of primary feathers in two falcon species, Anke Schmitz, Benjamin Honisch, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) [8339-42]

Conference 8340

Design and fabrication of an IPMC-based valve-less micro-pump, Yong-Quan Wang, Bo Li, Zi-cai Zhu, Hua-ling Chen, Xi'an Jiaotong Univ. (China) [8340-68]

Adaptive absorber based on dielectric elastomer stack actuator with variable stiffness, Roman Karsten, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [8340-69]

Partial discharge analysis of prestretched and unstretched acrylic elastomers for dielectric elastomer actuators (DEA), Daniel Muffoletto, Kevin Burke, Jennifer Zirnheld, Univ. at Buffalo (USA) . . . [8340-70]

PVDF-TrFE composite with methacrylate triblock copolymer elastomer for actuator application, Kie Yong Cho, Korea Institute of Science and Technology (Korea, Republic of); Hoichang Yang, Inha Univ. (Korea, Republic of); Jong Min Koo, Kyung-Youl Baek, Korea Institute of Science and Technology (Korea, Republic of) [8340-71]

Characteristics of nanostructured polyelectrolyte membranes incorporating imidazolium ionic liquids with varying cationic chain lengths for ionic transducer applications, Jang-Woo Lee, Chong Min Koo, Soon Man Hong, Jin Hong Lee, Ji-Young Jung, Seung-Gun Yu, Korea Institute of Science and Technology (Korea, Republic of) [8340-72]

Interpenetrating polymer networks based on no prestretch as basis for electrical actuators, Lei Gao, Frederikke Bahrt, Anders Egede Daugaard, Søren Hvilsted, Anne Ladegaard Skov, Technical Univ. of Denmark (Denmark) [8340-73]

Fabrication of transparent active skin using few layer graphene, Taeseon Hwang, Hyeok-Yong Kwon, Joon Suk Oh, Jung-Pyo Hong, Hyouk Ryeol Choi, Jae-Do Nam, Sungkyunkwan Univ. (Korea, Republic of) [8340-74]

Electroactive polymer blends of neoprene rubbers and conductive polyaniline nanoparticles, Ruksapong Kunanurksapong, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) [8340-75]

Electrical and temperature response of nanowire polypyrrole/gelatin hydrogel as an actuator, Thawatchai Tungket, Anuvat Sirivat, Chulalongkorn Univ. (Thailand); Nispa Seetapan, National Metal and Materials Technology Ctr. (Thailand); Datchanee Pattavarakorn, Chiang Mai Univ. (Thailand) [8340-76]

Electroactive ionic liquid-cellulose gel: effects of temperature and electric field strength, Wissawin Kunchornsup, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) [8340-77]

Flexible autonomous scavengers: the combination of dielectric polymers and electrets, Claire Jean-Mistral, Institut National des Sciences Appliquées de Lyon (France); Cong Thanh Vu, Alain Sylvestre, G2Elab (France) [8340-78]

High performance dielectric elastomer stack actuators with optimized electrical interconnection, Henry Haus, Holger Moessinger, Klaus Flittner, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [8340-79]

Effect of temperature on electrostriction in dielectric elastomers, Junjie Sheng, Hualing Chen, Bo Li, Yong-Quan Wang, Junhua Qiang, Xi'an Jiaotong Univ. (China) [8340-80]

Electric field induced deformation in dielectric, Xiaoqian Luo, Liwu Liu, Yanju Liu, Jingsong Leng, Harbin Institute of Technology (China) [8340-81]

Design and modeling of dielectric elastomer actuators, William Kaal, Sven Herold, Tobias Melz, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) [8340-82]

Novel DEA with organically modified silicone elastomer for permittivity enhancement, Holger Böse, Detlev Uhl, Fraunhofer-Institut für Silicatforschung (Germany) [8340-83]

Electroactive nanostructured polymer materials for the next generation actuators, Chong Min Koo, Soon Man Hong, Youn Duk Park, Korea Institute of Science and Technology (Korea, Republic of) [8340-84]

Optimal operation of dielectric elastomer generators, Christian Graf, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) [8340-86]

Dual-axis hybrid type force sensor, Seonggi Kim, Baek-Chul Kim, Ja Choon Koo, Hyouk Ryeol Choi, Hyungpil Moon, Sungkyunkwan Univ. (Korea, Republic of) [8340-87]

Large electromechanical and electro-optical effects of polydomain liquid crystal elastomers, Yusril Yusuf, Univ. Gadjah Mada (Indonesia) [8340-88]

Reduction of the stress-relaxation of IPMC actuators by a fluctuating input and with a cooperative control, Kentaro Takagi, Nagoya Univ. (Japan) and RIKEN (Japan); Suguru Hirayama, Shigenori Sano, Naoki Uchiyama, Toyohashi Univ. of Technology (Japan); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan) [8340-89]

A structure model for ionic polymer-metal composite (IPMC), Longfei Chang, Hualing Chen, Zicai Zhu, Xi'an Jiaotong Univ. (China) [8340-90]

Characterization of longitudinal tensile force of millimeter thick IPMCs, Viljar Palmre, David Pugal, Kwang Jin Kim, Univ. of Nevada, Reno (USA) [8340-92]

Electrochemical impedance spectroscopy of the bucky-gel actuators and their electromechanical modeling, Kinji Asaka, Takushi Sugino, Kenji Kiyohara, Ken Mukai, National Institute of Advanced Industrial Science and Technology (Japan); Hyacinthe Randriamahazaka, Univ. Paris 7-Denis Diderot (France) [8340-93]

Compliant composite electrodes and bistable electroactive polymers, Sungryul Yun, Weili Hu, Xiaofan Niu, Zhibin Yu, Lu Li, Qibing Pei, Univ. of California, Los Angeles (USA) [8340-94]

Ionic polymer-metal composites (IPMCs) as dexterous manipulators and tactile sensors for minimally invasive robotic surgery, Yousef Bahramzadeh, Mohsen Shahinpoor, Univ. of Maine (USA) . [8340-96]

Zippering it up: DEAs independent of the elastomer's electric breakdown field, Pit Gebbers, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Zürcher Hochschule für Angewandte Wissenschaften (Switzerland); Chauncey Grätzel, Optotune AG (Switzerland); Luc Maffii, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Christoph Stamm, Zürcher Hochschule für Angewandte Wissenschaften (Switzerland); Herbert Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [8340-97]

Pump it up, Luc Maffii, Benjamin M. O'Brien, Samuel Rosset, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [8340-99]

Product oriented DEA design and characterization, Marc Matysek, Roland van de Molengraaf, Floris Crompvoets, Philips Research Nederland B.V. (Netherlands) [8340-100]

Electromechanical properties of P(PVDF-TrFE)/graphene nanocomposites, Soon Man Hong, Seung Sang Hwang, Kyung Ho Min, Chong Min Koo, Korea Institute of Science and Technology (Korea, Republic of) [8340-101]

Bimorph and trimorph actuators based on polyaniline nanofiber reinforced PVA nanocomposites, Ashok Kumar, Somik Banerjee, Tezpur Univ. (India) . . . [8340-102]

Nanocrystalline nickel ferrite reinforced conducting polyaniline composites, Subhash B. Kondawar, Arti I. Nandapura, RTM Nagpur Univ. (India) [8340-103]

Effect of Janus particles as filler materials for acrylate-based dielectric elastomers, Hsinyu Chen, Itona Kretzschmar, The City College of New York (USA); Ashok Maliakal, LGS Innovations Inc. (USA) [8340-105]

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Topology optimization design of actuation voltage in plates with active constrained layer damping treatments, Ling Zheng, Zhiming Han, Dongdong Zhang, Yinong Li, Chongqing Univ. (China) [8341-82]

Peeling stress analysis of piezo-bonded laminated composite plate, Bin Huang, Heung Soo Kim, Dongguk Univ. (Korea, Republic of) [8341-84]

Cyclic behavior of damaged RC short columns confined with superelastic shape memory alloys wires, Hui Qian, Zhengzhou Univ. (China); Gangbing Song, Univ. of Houston (USA); Hongnan Li, Dalian Univ. of Technology (China) [8341-85]

An inter-crosslinking network gels that has both shape memory and high ductility, Yoshitaka Amano, Ruri Hidema, Hidemitsu Furukawa, Yamagata Univ. (Japan) [8341-86]

Soft and wet actuator developed with responsible high-strength gels, Sho Harada, Ruri Hidema, Hidemitsu Furukawa, Yamagata Univ. (Japan) [8341-87]

P-delta effect of high bridge pier considering performance-based design, Zeyu Wu, North China Univ. of Water Conservancy and Electric Power (China); Dongwei Wang, Zhengzhou Univ. (China) [8341-88]

Research on mode classification and quantization, Yuhe Li, North China Univ. of Water Conservancy and Electric Power (China); Zeyu Wu, Zhengzhou Univ. (China) [8341-89]

Active vibration control of submerged cylindrical shell by piezoelectric sensors and actuators, Moon K. Kwak, Dongho Yang, Jae-Ha Lee, Dongguk Univ. (Korea, Republic of) [8341-90]

A rapidly realized test platform for transfemoral prosthetic knees, Daihua Wang, Lei Xu, Chongqing Univ. (China) [8341-91]

A novel method for piezoelectric energy harvesting from keyboard, Levent Bekler, Ali Muhtaroglu, Haluk Kulah, Middle East Technical Univ. (Turkey) [8341-92]

Maximizing PV module harvested output power using a computer based automatic sun tracker, Ali Abou-Elnour, Ajman Univ. of Science & Technology (United Arab Emirates) [8341-93]

On the dynamic control of beams, subjected by multiple moving masses in resonance state, using piezo-ceramic actuators, Massood Mofid, Sharif Univ. of Technology (Iran, Islamic Republic of); Saeed Eftekar Azama, Roham Afghani Khorasgani, Politecnico di Milano (Italy) [8341-94]

Three-dimensional base-isolation system using thick rubber bearings, Tao Wang, Fei Wang, China Earthquake Administration (China) [8341-96]

Optimization of bond transducer vibrations using active and semi-active control, Marcus Neubauer, Leibniz Univ. Hannover (Germany); Michael Brökelmann, Hesse & Knipps GmbH (Germany); Sebastian M. Schwarzendahl, Leibniz Univ. Hannover (Germany); Hans J. Hesse, Hesse & Knipps GmbH (Germany); Jörg Wallaschek, Leibniz Univ. Hannover (Germany) [8341-97]

Optimal vibration control of a rotating plate with self-sensing active constrained layer damping, Zhengchao Xie, Pak Kin Wong, Univ. of Macau (Macao, China) . . . [8341-98]

Development of cantilevered energy harvesters coupled with a topologically optimized piezoelectric layer oscillating in vortex, Cheol Kim, Kyungpook National Univ. (Korea, Republic of) [8341-99]

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Piezoelectric energy harvesting experiments using distributed high-polymer films. Tsutomu Nishigaki, Kinki Univ. (Japan) [8341-100]

Metrological characterization of piezoelectric material as energy harvesting for health structural monitoring based on embedded sensors. Marco Borotto, Francesco Braghin, Ferruccio Resta, Gisella Tomasini, Politecnico di Milano (Italy) [8341-101]

Conference 8342

Towards auxetic nanofibres. Yong Tao Yao, Harbin Institute of Technology (China) and The Univ. of Bolton (United Kingdom) [8342-12]

A study of characteristics of cellulose based nano composite. Chulho Yang, Andong National Univ. (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) [8342-67]

Investigation of filler geometry and local debonding stress effects on mechanical properties of glass short fiber reinforced polycarbonate composites. Wenjie Zhao, Hyung-ick Kim, Jonghwan Suhr, Univ. of Delaware (USA) [8342-68]

Temperature tuning of band-structure of 1D periodic elastic composites. Hossein Sadeghi, Ankit Srivastava, Ryan Griswold, Sia Nemat-Nasser, Univ. of California, San Diego (USA) [8342-69]

Novel shape memory polyurethane containing silicone. Chang Zhou, Dihong Li, Dongxing Zhang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [8342-70]

Fabrication of grape-like structures with micro capsule covering metal powder, and application to novel porous metal. Shun Asano, Toshinori Makuta, Go Murasawa, Yamagata Univ. (Japan) [8342-73]

Viscoelastic response of nanofiller enhanced carbon fiber epoxy composites. Joshua A. Varischetti, Univ. of Nevada, Reno (USA); Jae-Soon Jang, Jonghwan Suhr, Univ. of Delaware (USA) [8342-74]

Effects of aging on the shape memory behavior of highly nickel rich NiTi alloys. İrfan Kaya, Haluk E. Karaca, Burak Basaran, Univ. of Kentucky (USA) [8342-75]

Piezo actuator shape design for optimized ultrasonic radiation in phased array applications. Christoph Feyrer, Johannes Korak, Helmut Wernick, PROFACTOR GmbH (Austria) [8342-76]

Analysis of functionally graded piezoelectric plates in actuator mode. Robert G. Reid, Rathnam Paskaramoorthy, Univ. of the Witwatersrand (South Africa) [8342-77]

Strain gradient elasticity solution for functionally graded thick-walled cylinders. Hossein Sadeghi, Univ. of California, San Diego (USA); Mostafa Baghani, Reza Naghdabadi, Sharif Univ. of Technology (Iran, Islamic Republic of) [8342-78]

Mechanical vibration induced electrospinning of polyvinylidene difluoride. Kee S. Moon, Samuel Kassegne, Khaled Morsi, Abtin Sepehri, San Diego State Univ. (USA) [8342-80]

Characterization of friction joints subjected to high levels of random vibration. Omar de Santos, Paul MacNeal, Jet Propulsion Lab. (USA) [8342-81]

Applications of multifunctional polymer-matrix composites in hybrid heat sinks. Siu Ning Leung, Omer Muhammad Khan, Hani Naguib, Francis Dawson, Univ. of Toronto (Canada); Vincent Adinkrah, AEG Power Solutions (Canada) [8342-82]

Challenges of the electromechanical characterization of structural supercapacitors. Constantin Ciocanel, Doug LaMaster, Cindy Browder, Northern Arizona Univ. (USA) [8342-83]

Mechanical characterization of electro-bonded laminates. Luigi Di Lillo, ETH Zurich (Switzerland); Andrea Bergamini, EMPA (Switzerland); Dario A. Carnelli, Paolo Ermanni, ETH Zurich (Switzerland) [8342-84]

Conference 8343

A 4-DOF haptic master device for minimally invasive surgery. Phuong-Bac Nguyen, Jong-Seok Oh, Seung-Bok Choi, Inha Univ. (Korea, Republic of) [8343-26]

A fractional calculus for nonlinear energy sink used in vibration absorption system. Bo Fang, Song Li, Tianzhi Yang, Wenhui Huang, Harbin Institute of Technology (China) [8343-27]

Charging SiO₂ and CYTOP electret film by air purifier for MEMS-based energy harvesting systems. Awd Saad, Hochschule Furtwangen Univ. (Germany) [8343-28]

Conference 8344

Analysis of micro bending test for polycrystalline materials by modified strain gradient theory. Bong-Bu Jung M.D., Hyun-Chul Park, Pohang Univ. of Science and Technology (Korea, Republic of) [8344-54]

Synthesis and characterization of lithium ion batteries. Aswini K. Pradhan, Kai Zhang, Meric Arslan, Norfolk State Univ. (USA) [8344-55]

Remarkable evolution of electrical conductivity in Al:ZnO films. Hareesh Dondapati, Aswini K. Pradhan, Kai Zhang, Norfolk State Univ. (USA) [8344-56]

The investigation of Molybdenum (Mo) thin films properties as a function of reduced deposition thickness. Oluwakayode Bamiduro, Hareesh Dondapati, Aswini K. Pradhan, Norfolk State Univ. (USA) [8344-57]

Ultrasound contrast agent fabricated from microbubbles containing instant adhesives, and its ultrasound imaging ability. Toshinori Makuta, Yukina Tamakawa, Yamagata Univ. (Japan) [8344-58]

Synthesis and characterization of lithium ion batteries. Meric Arslan, Kai Zhang, Aswini K. Pradhan, Norfolk State Univ. (USA) [8344-59]

The effects of Molybdenum (Mo) thin films properties as a function of reduced deposition thickness. Oluwakayode Bamiduro, Hareesh Dondapati, Aswini K. Pradhan, Norfolk State Univ. (USA) [8344-60]

Remarkable evolution of electrical conductivity in Al:ZnO films. Hareesh Dondapati, Aswini K. Pradhan, Norfolk State Univ. (USA) [8344-61]

Conference 8345

A new control approach for the design and implementation of low frequency large band inertial platforms. Fausto Acernese, Gerardo Giordano, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Silvia Vilasi, Rocco Romano, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [8345-116]

Long term seismic noise acquisition and analysis with tunable monolithic horizontal sensors at the INFN Gran Sasso Laboratory. Fausto Acernese, Gerardo Giordano, Silvia Vilasi, Rocco Romano, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [8345-117]

Mechanical monolithic tiltmeter for low frequency measurements. Fausto Acernese, Gerardo Giordano, Silvia Vilasi, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Rocco Romano, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [8345-118]

Low-frequency/high-sensitivity horizontal monolithic sensor. Fausto Acernese, Gerardo Giordano, Silvia Vilasi, Rocco Romano, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Fabrizio Barone, Univ. degli Studi di Salerno (Italy) [8345-119]

State-of-the-art of IT-based high precision patch/implant system technology development for safety management of buildings/large structures in Korea. Ki Tae Park, Chin-Hyung Lee, Bo-Mi Lee, Young-Jun Yu, Korea Institute of Construction Technology (Korea, Republic of) [8345-120]

A damage detection technique for reinforced concrete structures. Ailun Wu, Jann N. Yang, Univ. of California, Irvine (USA); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) [8345-122]

A sub-PolyMAX method for structural flexibility identification. Jian Zhang, Southeast Univ. (China) [8345-123]

Assessment of mode-based damage detection methods to severely damaged steel building. Hien HoThu, Akira Mita, Keio Univ. (Japan) [8345-124]

Research of a real-time overload monitoring and response system of bridges and roads. Yan Yu, Yan Shi, Xuefeng Zhao, Jinping Ou, Dalian Univ. of Technology (China) [8345-125]

Homeostasis control of building environment using sensor agent robot. Eri Nagahama, Akira Mita, Keio Univ. (Japan) [8345-126]

Design and concept of fiber-optical and I²C hybrid sensor bus system for telecommunication satellites. Philipp Putzer, Technische Univ. München (Germany); Andreas Humn, Markus Manhart, Christoph Tiefenbeck, Markus P. Plattner, Kayser-Threde GmbH (Germany); Alexander W. Koch, Technische Univ. München (Germany) [8345-127]

Music recommendation system for biofield building considering multiple residents. Takahiro Ito, Akira Mita, Keio Univ. (Japan) [8345-128]

Distributed measurement of impact strain and pressure in clay by use of embedded fiber-optic sensors. Hai Lin, Lehigh Univ. (USA); Qingsong Cui, BeiHang Univ. (China); Mesut Pervizpour, Widener Univ. (USA); Sibel Pamukcu, Lehigh Univ. (USA); Mark A. Mentzer, U.S. Army Research Lab. (USA) [8345-129]

Distributed multifunctional sensor network for composite structural state sensing. Xinlin P. Qing, Limin Gao, Commercial Aircraft Corp. of China, Ltd. (China) [8345-130]

A statistical approach of fatigue crack detection for a structural hotspot. Pei Jin, Li Zhou, Nanjing Univ. of Aeronautics and Astronautics (China) [8345-131]

Genetic mechanism for designing new generation of buildings from data obtained by sensor agent robots. Chihiro Ono, Keio Univ. (Japan) [8345-132]

Frequency response analysis of multi-degree-of-freedom system with harmonically varying damping. Satoshi Hirohata, Daisuke Iba, Kyoto Institute of Technology (Japan) [8345-133]

Optimal sensor placement based on substrate sensitivity. Shumei Zhou, Yuequan Bao, Hui Li, Harbin Institute of Technology (China) [8345-135]

Development of the damage assessment methodology for ceiling elements. Yoshihiro Nitta, Atsumi Iwasaki, Ashikaga Institute of Technology (Japan); Akira Nishitani, Waseda Univ. (Japan); Morimasa Wakatabe, Shinsuke Inai, Toda Corp. (Japan); Iwao Ohdomari, Waseda Univ. (Japan); Hiroki TsuTsumi, Maebashi Institute of Technology (Japan) [8345-136]

Research on sensing ability of the FBG strain sensor encapsulated by asphalt. Tuo Zhao, Xuefeng Zhao, Yanjun Cui, YongCheng Wang, Jundong Chen, Dalian Univ. of Technology (China) [8345-137]

Large substructure identification using substructure isolation method. Jilin Hou, Dalian Univ. of Technology (China) [8345-138]

A new deformation monitoring method for flexible variable camber wings (FVCW) based on FBG Sensors. Peng Li, Jinsong Leng, Harbin Institute of Technology (China) [8345-139]

Damage identification using substructural virtual distortion method. Qingxia Zhang, Dalian Nationalities Univ. (China) [8345-140]

Performance evaluation of reinforced concrete slab using a load test with continuous AE monitoring. Matteo Di Benedetti, Zahra Karim, Antonio De Luca, Tala Shokri, Antonio Nanni, Univ. of Miami (USA) [8345-141]

Study of the compact fiber optic photoacoustic ultrasonic transducer. Nan Wu, Ye Tian, Xiaotian Zou, Xingwei Wang, Univ. of Massachusetts Lowell (USA) [8345-142]

New federal regulations about the safety management of railroad bridge in U.S.: opportunities and challenges for railroad bridge monitoring. Fernando Moreu, Billie F. Spencer, Jr., James M. LaFave, Univ. of Illinois at Urbana-Champaign (USA) [8345-143]

Sensorless position estimation for piezoelectric actuators at different temperature. Mohammad N. Islam, Rudolf J. Seethaler, The Univ. of British Columbia (Canada) [8345-144]

Computer-vision based crack detection and analysis. Prateek Prasanna, Kristin J. Dana, Nenad Gucunski, Basily Basily, Rutgers, The State Univ. of New Jersey (USA) [8345-145]

Posters · Exhibition Hall/Golden Ballroom · 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 am and 4 pm on Tuesday 13 March.

Determining corrosion intensity in prestressed concrete with acoustic emission. Jese Mangual, Mohamed K. ElBatanouny, William Velez, Paul Ziehl, Fabio Matta, Univ. of South Carolina (USA); Miguel Gonzalez, MISTRAS Group, Inc. (USA) [8345-146]

Failure study of SnO₂ room temperature gas sensors fabricated on nanospike substrates. Haizhou Ren, Pengtao Wang, Haibin Huo, Mengyan Shen, Hongwei Sun, Marina Ruths, Univ. of Massachusetts Lowell (USA) [8345-147]

Miniature control surface actuation device for precision guided mortar munitions. Dragan Avirovik, Shashank Priya, Virginia Polytechnic Institute and State Univ. (USA) [8345-148]

Damage assessment of small-scale wind turbine blade using piezoelectric sensors. Mi-Sun Rim, Sang-Woo Kim, In Lee, KAIST (Korea, Republic of) [8345-149]

Modal parameter extraction of highway bridge by FEM simulation of operational loading conditions. Priscilla O. Mensah-Bonsu, Shinae Jang, Univ. of Connecticut (USA) [8345-150]

Decision support system for integrating remote sensing in bridge condition assessment and preservation. Arthur Endsley, Colin Brooks, Michigan Tech Research Institute (USA); Devin Harris, Tess Ahlborn, Michigan Technological Univ. (USA) [8345-151]

A study on Q-factor of CCBG sensors by coupled mode theory. Songping Wu, Tao Wei, Jie Huang, Hai Xiao, Jun Fan, Missouri Univ. of Science and Technology (USA) [8345-152]

Comparison of passive and active mass dampers for control of floor vibrations. Malcolm J. Hudson, The Univ. of Sheffield (United Kingdom); Paul Reynolds, The Univ. of Sheffield (United Kingdom) and Full Scale Dynamics Ltd. (United Kingdom); Donald S. Nyawako, The Univ. of Sheffield (United Kingdom) [8345-153]

A novel kind of fiber optic sensor based on BOTDA for steel corrosion. Xuefeng Zhao, Xianglong Kong, Peng Gong, Xingjun Lv, Jinping Ou, Dalian Univ. of Technology (China) [8345-155]

Fiber optics sensors simplify the problem of monitoring bridge deflection and provide a comprehensive solution for weight in motion, traffic monitoring, and analysis. Peter Kung, QPS Photonics Inc. (Canada) [8345-156]

Quantitative comparison of Lamb wave interaction with high- and low-cycle fatigue cracks measured using laser Doppler vibrometry. C. Todd Owens, Eric D. Swenson, Air Force Institute of Technology (USA) [8345-157]

Damage detection capability of electromechanical impedance technique under varying static load. Yee Yan Lim, Univ. Malaysia Sabah (Malaysia) and Nanyang Technological Univ. (Singapore); Chee Kiong Soh, Nanyang Technological Univ. (Singapore) [8345-158]

Real-time vision-based modal parameters estimation at 10000 fps. Hua Yang, Idaku Ishii, Takeshi Takaki, Hiroshima Univ. (Japan) [8345-159]

Seismic performance of RC shear wall structure with novel shape memory alloy dampers in coupling beams. Chenxi Mao, China Earthquake Administration (China); Jinzhi Dong, Tongji Univ. (China); Hui Li, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) [8345-160]

Fully integrated dynamic and static tactile sensing system for manipulators. Nicholas Wettels, Somatis Technologies (USA); Baruch Pletner, IPTRADE Inc. (USA) [8345-161]

Global stability analysis of side torsion for thin-walled aqueduct. Xinli Bai, North China Univ. of Water Conservancy and Electric Power (China) [8345-163]

Hybrid SHM of cable-anchorage system in cable-stayed bridge using smart sensors and interfaces. Po-Young Lee, Khac Duy Nguyen, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of) [8345-164]

Wireless vibration-based SHM of caisson-type breakwater under foundation damage. So Young Lee, Khac-Duy Nguyen, Jeong-Tae Kim, Pukyong National Univ. (Korea, Republic of); Jin-Hak Yi, Korea Ocean Research & Development Institute (Korea, Republic of) [8345-165]

Full-scale laboratory validation of a wireless MEMS-based technology for damage assessment of concrete structures. Daniele Zonta, Univ. degli Studi di Trento (Italy); Davide Trapani, Univ. degli Studi di Trento (Canada) [8345-166]

A study on real time monitoring for railroad bogie using energy harvesting. Jaehoon Kim, Korea Railroad Research Institute (Korea, Republic of) [8345-167]

Mechanical design of a langmuir probe for a QuadSat PnP satellite. Jordan Klepper, Jared Kuker, Chris Del Barga, Andrei N. Zagrai, Anders M. Jorgensen, New Mexico Institute of Mining and Technology (USA) [8345-168]

Electromechanical impedance-based health diagnosis for tendon and anchorage zone in a nuclear containment structure. Jiyoung Min, Hyojin Shim, Chung-Bang Yun, KAIST (Korea, Republic of) [8345-169]

Inductively coupled corrosion potential sensor for steel reinforced concrete with time domain gating interrogation. Douglas J. Thomson, Khalada Perveen, Greg E. Bridges, Sharmistha Bhadra, Univ. of Manitoba (Canada) [8345-171]

A novel large strain sensor using SrAl₂O₇:Eu²⁺ / rubber composite. Lin Zhang, Chaonan Xu, Naohiro Ueno, National Institute of Advanced Industrial Science and Technology (Japan) and CREST, Japan Science and Technology Agency (Japan); Yan Zhang, Chenshu Li, Hiroshi Yamada, National Institute of Advanced Industrial Science and Technology (Japan) [8345-172]

Dispersion and curing monitoring of carbon nanotube modified epoxy systems. Alkiviadis S. Paipetis, Giorgos Gkikas, Sotirios A. Grammatikos, Nektaria-Marianthi Barkoula, Univ. of Ioannina (Greece) [8345-174]

Comprehensive property retrieval and measurement of concrete spalling using machine vision for post-earthquake safety assessments. Stephanie German, Ioannis Briklakis, Reginald DesRoches, Georgia Institute of Technology (USA) [8345-175]

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Aerosol printed strain sensors subjected to large strain. Bradley Thompson, Hwan-Sik Yoon, Tennessee Technological Univ. (USA) [8346-47]

Diagnosis at a glance of biological non-Newtonian fluids with Film Interference Flow Imaging (FIFI). Ruri Hidema, Hidemitsu Furukawa, Yamagata Univ. (Japan) [8346-48]

An introduction to a 'Cognitive network system' that establishes a 'to and fro' communication between a structure and the cognitive sensor network by processing the structure responses and the sensor feedbacks through a TRIZ system. Duwarahan Rajendra, Univ. of Pittsburgh (USA) and University of Tulsa (USA) [8346-49]

Injecting "smartness" into distributed structures. Peter S. Sapaty, National Academy of Sciences of Ukraine (Ukraine) [8346-50]

Smart-label-based behavior monitoring IOT system for the infrastructures under harsh environments. Zhi Zhou, Dalian Univ. of Technology (China) [8346-51]

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Simultaneous acoustic and dielectric real time curing monitoring of epoxy systems. Alkiviadis S. Paipetis, Giorgos Gkikas, Sotirios A. Grammatikos, Dimitrios G. Aggelis, Univ. of Ioannina (Greece) [8346-53]

Application research of distributed optical fiber temperature sensor in power system. Jianfeng Wang, China Jiliang Univ. (China) [8346-54]

Structural health monitoring of materials used in aerospace industry using combined electrical methods. Alkiviadis S. Paipetis, Sotirios A. Grammatikos, Giorgos Gkikas, Univ. of Ioannina (Greece) [8346-55]

Development of PVDF-ultrasonic sensor based aircraft landing gear control system: a work in progress. Chetan Byrappa, Bangalore Institute of Technology (India) [8346-56]

Temperature and strain sensing techniques using Brillouin optical time domain reflectometry. Hisham Mohamad, Univ. Teknologi Malaysia (Malaysia) [8346-57]

Development of a guided wave-based concrete strength estimation system using an integrated smart sensor. Dong Jin Kim, Seok Inn Hong, Changgil Lee, Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of) [8346-58]

Damage detection and identification using support vector machines and neural networks. Muhammad Farooq, Akshata H. Nagabhushana, Hao Zheng, Susan L. Burkett, Samit Roy, Edward S. Sazonov, The Univ. of Alabama (USA) [8346-59]

Automated machine vision approach for in situ localization and classification of corrosion defects. Petros E. Kapsalas, National Technical Univ. of Athens (Greece); P. Maravelaki-Kalaitzaki, M. Zervakis, Technical Univ. of Crete (Greece); Ekaterini T. Delegou, Antonia Moropoulou, National Technical Univ. of Athens (Greece) [8346-60]

Transient thermography as a smart tool to assess cleaning interventions on marble surfaces. Ekaterini T. Delegou, Magda Krokida, Nicolas P. Avdelidis, Antonia Moropoulou, National Technical Univ. of Athens (Greece) [8346-61]

Optical sensors for electrical elements of a medium voltage distribution network. Letizia De Maria, D. Bartalesi, P. Serragli, ERSE S.p.A. (Italy) [8346-62]

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Millimeter-wave nondestructive evaluation of pavement conditions. David Vines-Cavanau, Northeastern Univ. (USA); Dan Busuico, DBC Group Inc. (USA); Ralf Birken, Ming Wang, Northeastern Univ. (USA) [8347-84]

Test assessment of RC structures in marine environment: the Geiger Key Bridge. Giovanni Loreto, Univ. of Miami (USA) and Univ. degli Studi di Napoli Federico II (Italy); Matteo Di Benedetti, Antonio Nanni, Univ. of Miami (USA) [8347-85]

Experimental investigation of Graphene-polymer Bucky- paper on electro-thermal properties. Qiangqiang Zhang, Li Hui, Harbin Institute of Technology (China) . . . [8347-86]

Evaluating vehicular-induced bridge vibrations for energy harvesting applications. Matthew Reichenbach, Jeremiah Fasl, Vasilis Samaras, Sharon L. Wood, Todd Helwig, The Univ. of Texas at Austin (USA); Richard Lindenberg, Wiss, Janney, Elstner Associates, Inc. (USA) [8347-87]

Acoustic emission monitoring of concrete columns and beams strengthened with fiber reinforced polymer sheets. Gao Ma, Hui Li, Guijun Xian, Harbin Institute of Technology (China) [8347-88]

The application of strain field intensity method in the steel bridge fatigue life evaluation. Xuefeng Zhao, Yanhong Wang, Dalian Univ. of Technology (China) [8347-89]

Improved magneto-inductive waveguide as wireless sensor array net for structural health monitoring. Ye Chen, Praveen Pasupathy, Tanuj Trivedi, Dean P. Neikirk, Sharon L. Wood, The Univ. of Texas at Austin (USA) [8347-90]

Nondestructive methods of integrating energy harvesting systems for highway bridges. Sumedh Inamdar, Krystian Zimowski, Richard Crawford, Kristin Wood, The Univ. of Texas at Austin (USA); Dan Jensen, U.S. Air Force Academy (USA) [8347-91]

Instrumented composite turbine blade for health monitoring. Kevin E. Robison, Steve E. Watkins, Missouri Univ. of Science and Technology (USA); James Nicholas, Missouri Univ. of Science and Technology (USA); K. Chandrashekhara, Joshua L. Rovey, Missouri Univ. of Science and Technology (USA) [8347-93]

Infrared image filtering for pedestrian surveillance. Kathryn N. Rodhouse, Steve E. Watkins, Missouri Univ. of Science and Technology (USA) [8347-94]

Spatial and diffusion prefiltering in surveillance video compression. M. Ryan Bales, Steve E. Watkins, Missouri Univ. of Science and Technology (USA) . . . [8347-95]

Hybrid architecture for building secure sensor networks. Ken R. Owens, Jr., Savvis (USA); Steve E. Watkins, Missouri Univ. of Science and Technology (USA) . . . [8347-96]

Posters · Exhibition Hall/Golden Ballroom · Tuesday · 6:00 to 7:30 pm

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Rapid NDT of polycrystalline silicon wafers by hybrid noncontact ultrasonics, Dipayan Sanyal, Central Glass and Ceramic Research Institute (India); M. Janardhan Padiyar, C. V. Krishnamurthy, Krishnan Balasubramaniam, Indian Institute of Technology Madras (India) [8347-97]

Novel designed magnetic leakage testing sensor with GMR for image reconstruction algorithm, Akira Sasamoto, National Institute of Advanced Industrial Science and Technology (Japan) [8347-98]

Rapid sensing and structural identification for large populations of bridges, David Masceri, Adrienne Deal, John DeVitis, Jeffrey Weidner, Franklin Moon, A. Emin Aktan, Drexel Univ. (USA) [8347-99]

Enhanced bridge inspection through the integration of sensing and decision making technologies, Sharada Alampalli, Prospect Solutions, LLC (USA); Vineet Kamat, Atul Prakash, Univ. of Michigan (USA); Michael Lepech, LFL Associates (USA); Manu Akula, Jerome P. Lynch, Univ. of Michigan (USA); Margaret Tang, Mohammed M. Ettouney, Weidinger Associates, Inc. (USA) [8347-100]

Status of program to develop low cost application of carbon fiber to strengthen water and other pipes, Sean Wisotzky, Ed Fyfe, Fyfe Co., LLC (USA) [8347-101]

Computer-aided ultrasound non destructive testing analysis, Fairouz Bettayeb, Scientific Research Ctr. on Non Destructive Testing and Welding (Algeria) [8347-102]

Collaborative mobile sensing and computing for civil infrastructure condition assessment: framework and applications, ZhiQiang Chen, Jianfei Chen, Univ. of Missouri-Kansas City (USA) [8347-104]

Measurement of nonlinear elastic constants of rail steel at elevated temperatures, Haifeng Zhang, Charlie Williams, Guangyuan Xiong, Univ. of North Texas (USA) [8347-105]

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Bayesian networks to prognoses and monitor the prostate cancer, Camelia Gavrilă, Narcisa Teodorescu, Univ. Tehnică de Construcții București (Romania) . . . [8348-98]

Damage detection using cloud-based optimization algorithm, Jin Zhou, Akira Mita, Keio Univ. (Japan) [8348-99]

Fatigue damage monitoring for fiber reinforced polymer composites by using acoustic emission technique combining with real time scanning electronic microscope image observation, Wentao Wang, Hui Li, Harbin Institute of Technology (China) [8348-100]

Structural damage detection using Lamb wave and DORT method, Wenzhong Qu, Xiao Li, Wuhan Univ. (China) . . . [8348-101]

A nonlinear structural damage detection using autoregressive support vector, Xiao Li, Wenzhong Qu, Wuhan Univ. (China) [8348-102]

The defect analysis and preventive measures of in-service bridge in the city, Shengli Li, Zhengzhou Univ. (China) [8348-103]

Micro-organism index analysis of soil around pier on the riverside of yellow river, Shengli Li, Zhengzhou Univ. (China) [8348-104]

Micro-organism index of water around bridge pier in the typical area of the Zhengzhou Yellow River Bridge, Nan Jiang, Zhengzhou Univ. (China) [8348-105]

Defect detection in underwater pipeline using ultrasonic guided waves, Shuyi Ma, Zhanjun Wu, Yishou Wang, Kehai Liu, Dalian Univ. of Technology (China) [8348-106]

Effects of honeycomb-patterned porous films on the morphologies and functions of stem cells, Madoka Sato, Takahito Kawano, Hiroshi Yabu, Masatsugu Shimomura, Tohoku Univ. (Japan) [8348-107]

Data analysis for long-term structural health monitoring on a continuous rigid frame bridge, Lei Wang, Harbin Institute of Technology (China) [8348-108]

Quantitative structural health monitoring using statistical methods, Jian Liu, Nanjing Univ. of Aeronautics and Astronautics (China) [8348-109]

Harvesting strain energy from an aircraft wing under gust loading for structural health monitoring, Michele Pozzi, Shijun Guo, Meiling Zhu, Cranfield Univ. (United Kingdom) [8348-110]

Experimental characterisation of macro fibre composites and monolithic piezoelectric transducers for strain energy harvesting, Michele Pozzi, Alfredo Canziani, Meiling Zhu, Cranfield Univ. (United Kingdom) [8348-111]

Development of muscular strength training system for the lower limbs using magneto-rheological dampers, Tae-Kyu Kwon, Mi Yu, Yong-Jun Park, Gu-Young Jeong, Kyong Kim, Woo-Suk Chong, Chonbuk National Univ. (Korea, Republic of) [8348-112]

Moving force identification method for cable-stayed bridges with uncertain parameters and noisy measurements, Fujian Zhang, Hui Li, Harbin Institute of Technology (China) [8348-113]

An Investigation of Photoacoustic Tomography for Inflammatory Tissues, Che Hua Yang, Tai Chieh Wu, Chung Hao Chang, Yu Hang Yeh, Tung Wing Chen, National Taipei Univ. of Technology (Taiwan) [8348-114]

Low-cost low-power wireless system for health monitoring applications, Ali Abou-Elmour, Ammar M. Safi, Ahmed N. Aldalu, Ajman Univ. of Science & Technology (United Arab Emirates) [8348-115]

Stochastic optimization using automatic relevance determination prior model for Bayesian compressing sensing, Yong Huang, Harbin Institute of Technology (China); James L. Beck, Stephen Wu, California Institute of Technology (USA); Hui Li, Harbin Institute of Technology (China) . . . [8348-117]

Development of a novel health remote monitoring system with mechanoluminescence material, Chenshu Li, Chao-Nan Xu, Lin Zhang, Naohiro Ueno, Nao Terasaki, Yoshitaro Sakata, Shuqiang Guo, Hiroshi Yamada, National Institute of Advanced Industrial Science and Technology (Japan); Hiroshi Sakai, Takunori Tsuji, Logical Product Corp. (Japan) [8348-118]

Amplifier design for an extensometer in high temperature deformation monitoring, Xiaoyin Hu, Jiahong Jia, Shantung Tu, East China Univ. of Science and Technology (China) [8348-119]

Numerical studies on a novel damage localization approach of cantilever beams, Yonghui An, Jinping Ou, Dalian Univ. of Technology (China) [8348-120]

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.*

*** Estimation of load redistribution on a cable-stayed bridge using a combination of sensing techniques**, Daniele Zonta, Paolo Esposito, Marco Molignoni, Riccardo Zandonini, Univ. degli Studi di Trento (Italy); Daniele Inaudi, Daniele Posenato, Smartec S.A. (Switzerland); Yang Zhao, Jinsuk Yim, Intelligent Instrument System, Inc. (USA); Ming Wang, Northeastern Univ. (USA); Matteo Pozzi, Univ. degli Studi di Trento (Italy) [8345-7]

*** A radar-based sensor network for distributed bridge displacement measurements**, Jennifer A. Rice, Univ. of Florida (USA); Changzhi Li, Changzhan Gu, Texas Tech Univ. (USA) [8345-16]

*** Wireless signal networks for monitoring subsurface infrastructures**, Ehsan Ghazanfari, Suk-Un Yoon, Sibel Pamukcu, Muhanad T. Suleiman, Liang Cheng, Lehigh Univ. (USA) [8345-17]

*** Response time improvement using sandwich-node architecture in wireless sensor networks for structural health monitoring**, Zi Wang, Shammim N. Pakzad, Lehigh Univ. (USA) [8345-18]

*** Heterogeneous wireless sensor networks for computational partitioning of a Markov parameter-based system identification method**, Jeff Bergman, Junhee Kim, Jerome P. Lynch, Univ. of Michigan (USA) [8345-20]

*** Impact localization on a cylindrical plate by near-field beamforming analysis**, Hayato Nakatani, Tokyo Univ. of Science (Japan); Taleh Hajzargerbashi, Tribikram Kundu, The Univ. of Arizona (USA); Nobuo Takeda, The Univ. of Tokyo (Japan) [8345-31]

*** Nonlinear solitary wave-based inspection of plate structures using granular crystals**, Jinkyu Yang, Univ. of South Carolina (USA); Devvrath Khatri, Paul Anzel, Chiara Daraio, California Institute of Technology (USA) [8345-32]

*** Finite element model updating of a steel pedestrian bridge with wireless and mobile sensors**, Dapeng Zhu, Jiajie Guo, Chunhee Cho, Chia-Hung Fang, Yang Wang, Kok-Meng Lee, Georgia Institute of Technology (USA) [8345-36]

*** Structural damage monitoring with piezo paint acoustic emission sensor**, Yunfeng Zhang, Univ. of Maryland, College Park (USA) [8345-37]

*** Development of a self-sensing, flexible, and multifunctional thin film sensor using P3HT and carbon nanotubes**, Donghyeon Ryu, Kenneth J. Loh, Univ. of California, Davis (USA) [8345-39]

*** Design and validation of high-precision wireles strain sensors for structural health monitoring of steel structures**, Hongki Jo, Univ. of Illinois at Urbana-Champaign (USA); JongWoong Park, KAIST (Korea, Republic of); Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (USA) [8345-41]

*** Passive, wireless conductivity sensors for reinforced concrete structures**, JinYoung Kim, Paraveenkumar Pasupathy, Sharon L. Wood, Dean P. Neikirk, The Univ. of Texas at Austin (USA) [8345-44]

*** Ultra-fast nano-oscillators based on carbon nanoscrolls for nano-scale energy harvesting and storage**, Zhao Zhang, Teng Li, Univ. of Maryland, College Park (USA) [8345-59]

*** Strain gradient monitoring using a Ba_{0.67}Sr_{0.33}TiO₃ flexoelectric sensor**, Wenbin Huang, Fuh-Gwo Yuan, Xiaoning Jiang, North Carolina State Univ. (USA) [8345-62]

*** Coaxial cable Bragg grating sensors for large strain measurement with high accuracy**, Jie Huang, Tao Wei, Xinwei Lan, Jun Fan, Hai Xiao, Missouri Univ. of Science and Technology (USA) [8345-103]

*** Triboluminescence multifunctional cementitious composites with in-situ damage sensing capability**, David O. Olawale, Bark J. Dickens, William G. Sullivan, Divyesh Bhakta, Okenwa O. Okoli, The Florida State Univ. (USA) [8345-112]

Effects of surface electric field on SnO₂ room temperature gas sensors fabricated on nanospike substrates, Haizhou Ren, Pengtao Wang, Haibin Huo, Mengyan Shen, Marina Ruths, Hongwei Sun, Univ. of Massachusetts Lowell (USA) [8345-176]

Ultrasonic gas accumulation detection and evaluation in nuclear cooling pipes, Lingyu Yu, Bin Lin, Yong-June Shin, Jing Jiang Wang, Zhenhua Tian, Univ. of South Carolina (USA) [8345-177]

Miniature fiber optic temperature sensor for concrete structural health monitoring, Xiaotian Zou, Alice Chao, Nan Wu, Ye Tian, Tzu-yang Yu, Xingwei Wang, Univ. of Massachusetts Lowell (USA) [8345-178]

Magnetic nanoparticle enhanced actuation strategy for mixing, separation, and detection of biomolecules in a microfluidic lab-on-a-chip system, Ahsan Munir, Hong S. Zhou, Worcester Polytechnic Institute (USA) [8345-179]

Experimental and theoretical characterization of non-bending ionic polymer transducer sensing, Bilge Kocer, Ursula Zangrilli, Lisa M. Weiland, Univ. of Pittsburgh (USA) [8345-181]

Swell-based in-situ oxide removal methods for PDMS-copper particle composite corrosion sensing elements, Po-Hao A. Huang, Jerry W. King, Univ. of Arkansas (USA) [8345-182]

Computation assisted design of flow sensing pillar, Junliang Tao, Xiong Yu, Case Western Reserve Univ. (USA) [8345-183]

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Announcements, Awards, and Plenary Presentation

Town & Country Ballroom

8:10 to 8:20 am

ASME Gary Anderson Early Achievement Award

ASME Best Paper Awards



Plenary Presentation · 8:10 to 9:05 am

Opportunities and Challenges for Electromagnetic Materials and Structural Health Monitoring

Peter B. Nagy, Univ. of Cincinnati (USA)

See page 5 for presentation details.

SESSION 8

Room: Royal Palm VI
Wed. 9:20 to 10:20 am

Biomedical Applications

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

9:20 am: **Micro- and nano-structured cantilevers for biomedical applications** (*Invited Paper*), Bert Müller, Univ. Basel (Switzerland); Prabitha Urwyler, Jasmin Althaus, Univ. Basel (Switzerland) and Paul Scherrer Institut (Switzerland); Helmut Schiff, Paul Scherrer Institut (Switzerland); Uwe Pieles, Univ. of Applied Sciences, Northwestern Switzerland (Switzerland); Jens Gobrecht, Paul Scherrer Institut (Switzerland) [8339-26]

10:00 am: **Toward bioinspired parylene-C coatings of implant surfaces**, Lai Wei, Akhlesh Lakhtakia, The Pennsylvania State Univ. (USA) [8339-27]

Coffee Break 10:20 to 10:50 am

SESSION 7

Room: Town & Country Ballroom
Wed. 9:10 am to 12:20 pm

Nanotubes and Nanotechnology

Session Chairs: **Hyouk Ryeol Choi**, Sungkyunkwan Univ. (Korea, Republic of); **William S. Oates**, The Florida State Univ. (USA)

9:10 am: **Electrical actuation and control of shape memory polymer carbon nanocomposites** (*Invited Paper*), Fei Liang, Robert Sivilli, Jihua Gou, Yunjun Xu, Univ. of Central Florida (USA) [8340-26]

9:50 am: **CNT/conductive polymer composites for low-voltage driven EAP actuators**, Takushi Sugino, Yoshiyuki Shibata, Kenji Kiyohara, Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan) [8340-27]

Coffee Break 10:10 to 10:40 am

SESSION 8

Room: Sunrise
Wed. 9:20 to 10:20 am

Aircraft, MAV/UAV, and Morphing Systems I

9:20 am: **Steerable adaptive bullet (StAB) piezoelectric flight control system**, Ronald M. Barrett, Ryan Barnhart, Richard B. Bramlette, The Univ. of Kansas (USA) [8341-32]

9:40 am: **Elementary morphing shells: their complete behaviour**, Evripides G. Loukaides, Univ. of Cambridge (United Kingdom); Corrado Maurini, Univ. Pierre et Marie Curie (France) and Ctr. National de la Recherche Scientifique (France); Keith A. Seffen, Univ. of Cambridge (United Kingdom) [8341-33]

10:00 am: **Miniaturizable high voltage control system for piezo-composite self-actuating flapping wing micro air vehicle**, Ajay B. Harish, Sneha S. Kudli, Ashwin Sridhar, Anupama M. Kulkarni, Shruti Honnunar, Dineshkumar Harursampath, Indian Institute of Science (India) [8341-34]

Coffee Break 10:20 to 10:50 am

SESSION 8

Room: Royal Palm II
Wed. 9:20 to 10:40 am

SMP: Fabrication and Characterization

9:20 am: **Design of a deployable structure with shape memory polymers** (*Invited Paper*), Jonathan M. Rossiter, Fabrizio Scarpa, Univ. of Bristol (United Kingdom); Kazuto Takashima, Kyushu Institute of Technology (Japan); Peter Walters, Univ. of the West of England (United Kingdom) [8342-32]

10:00 am: **Fabrication of sub-micron unidirectional patterns on shape memory polymer substrates**, Zhongbi Chen, Sridhar Krishnaswamy, Northwestern Univ. (USA) [8342-33]

10:20 am: **Shape memory performances and thermomechanical properties of shape memory cyanate composites**, Fang Xie, Longnan Huang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [8342-34]

Coffee Break 10:40 to 11:10 am

SESSION 11

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

Fabrication and Characterization I

Session Chair: **Bonnie L. Gray**, Simon Fraser Univ. (Canada)

9:10 am: **New technologies for micropatterning functional nanocomposite polymers** (*Invited Paper*), Ajit Khosla, Bonnie L. Gray, Simon Fraser Univ. (Canada) [8344-30]

9:50 am: **Effect of doping with rare earth elements (Er, Ho) on smart optical materials (ScN, AlN) in an applied electric field**, Hyunjung Kim, Yeonjoon Park, National Institute of Aerospace (USA); Glen C. King, Sang H. Choi, NASA Langley Research Ctr. (USA) [8344-31]

Coffee Break 10:10 to 10:30 am

Conference 8345

Conference 8346

Conference 8347

Conference 8348

Announcements, Awards, and Plenary Presentation

Town & Country Ballroom

8:10 to 8:20 am

ASME Gary Anderson Early Achievement Award

ASME Best Paper Awards



Plenary Presentation · 8:10 to 9:05 am

Opportunities and Challenges for Electromagnetic Materials and Structural Health Monitoring

Peter B. Nagy, Univ. of Cincinnati (USA)

See page 5 for presentation details.

Concurrent Sessions

SESSION 8a

Room: Pacific Salon IV-V
Wed. 9:20 to 10:20 am

Strain Sensors for SHM

9:20 am: **Numerical and experimental demonstration of MEMS strain sensor**, Hossain Saboonchi, Didem Ozevin, Univ. of Illinois at Chicago (USA) [8345-49]
9:40 am: **Measurement of longitudinal strain and estimation of peel stress in adhesive-bonded single-lap joint of CFRP material using embedded FBG sensor**, Xiaoguang Ning, Hideaki Murayama, Kazuro Kageyama, Kiyoshi Uzawa, Daichi Wada, The Univ. of Tokyo (Japan) [8345-50]
10:00 am: **Wireless interrogation of patch antenna for strain measurement**, Xiang Xu, Haiying Huang, The Univ. of Texas at Arlington (USA) [8345-51]
Coffee Break 10:20 to 10:50 am

SESSION 8b

Room: Pacific Salon VI-VII
Wed. 9:20 to 10:20 am

Bio-inspired Technology

Session Chairs: Xiong Yu, Case Western Reserve Univ. (USA); Jerome P. Lynch, Univ. of Michigan (USA)
9:20 am: **Self-healing sandwich composite structures**, Daniela Fugon, Chunlin Chen, Kara J. Peters, North Carolina State Univ. (USA) [8345-52]
9:40 am: **A bio-inspired acoustic source locator**, Junliang Tao, Xiong Yu, Jim Berrilla, Case Western Reserve Univ. (USA) [8345-53]
10:00 am: **Fly-ear inspired directional acoustic sensors**, Haijun Liu, Miao Yu, Univ. of Maryland, College Park (USA) . . [8345-54]
Coffee Break 10:20 to 10:50 am

SESSION 8

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

Wireless Sensors

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

9:20 am: **Wireless vibration sensor using frequency modulation technique**, Minhyuck Kim, Hwan-Sik Yoon, Tennessee Technological Univ. (USA); Sehun Kim, Joo-Hyung Kim, Chosun Univ. (Korea, Republic of) [8346-30]
9:40 am: **System identification of a tied arch bridge using reference-based wireless sensor networks**, Colby Hietbrink, Matthew J. Whelan, The Univ. of North Carolina at Charlotte (USA) [8346-31]
10:00 am: **An RFID approach to corrosion monitoring**, Nezhir Mrad, Defence Research and Development Canada, Ottawa (Canada) [8346-32]
Coffee Break 10:20 to 10:50 am

Concurrent Sessions

SESSION 6a

Room: Royal Palm V
Wed. 9:20 to 10:20 am

Energy Harvesting for SHM Systems

Session Chairs: Ming Wang, Northeastern Univ. (USA); Jerome P. Lynch, Univ. of Michigan (USA)
9:20 am: **Nondestructive methods of integrating energy harvesting systems with structures**, Krystian Zimowski, Sumedh Inamdar, Richard H. Crawford, Kristin L. Wood, The Univ. of Texas at Austin (USA) [8347-29]
9:40 am: **Low power wireless sensor networks for infrastructure monitoring**, Mohammad M. Ghahramani, Gregory Chen, Matthew Fojtik, Dennis M. Sylvester, Michael P. Flynn, Univ. of Michigan (USA) . [8347-30]
10:00 am: **High power density energy harvester with high permeability magnetic material embedded in a rotating wheel**, Qi Wang, Yi Zhang, Nian Sun, J. Gregory McDaniel, Jr., Ming Wang, Northeastern Univ. (USA) [8347-31]
Coffee Break 10:20 to 10:50 am

SESSION 6b

Room: Sunset
Wed. 9:20 to 10:20 am

Imaging-based NDE/SHM of Civil Infrastructure I

Session Chairs: Shen-En Chen, The Univ. of North Carolina at Charlotte (USA); Lingyu Yu, Univ. of South Carolina (USA)
9:20 am: **Issues in bridge deck damage evaluation using aerial photos**, Shenen Chen, Meenu Natarajan, The Univ. of North Carolina at Charlotte (USA); Chuck Boyle, Boyle Consulting Engineering LLC (USA); Edd Hauser, The Univ. of North Carolina at Charlotte (USA) [8347-32]
9:40 am: **Sensitivity study of lidar based bridge inspection algorithms**, Haitao Bian, Libin Bai, The Univ. of North Carolina at Charlotte (USA); Wanqiu Liu, Dalian Univ. of Technology (China); Shen-En Chen, Sheng-Guo Wang, The Univ. of North Carolina at Charlotte (USA) [8347-33]
10:00 am: **Strain quantification using 3D lidar scan**, Benjamin Smith, Shen-En Chen, Youngjin Park, Kaoshan Dai, The Univ. of North Carolina at Charlotte (USA) . [8347-34]
Coffee Break 10:20 to 10:50 am

SESSION 8

Room: Royal Palm I
Wed. 9:20 to 10:20 am

Metamaterials I

Session Chairs: Guoliang Huang, Univ. of Arkansas at Little Rock (USA); Amr M. Baz, Univ. of Maryland, College Park (USA)

9:20 am: **Particle trapping and focusing in liquid based on acoustic metamaterials**, Xiaobing Cai, Qiuquan Guo, Jun Yang, The Univ. of Western Ontario (Canada) [8348-66]
9:40 am: **Dissipation-triggered phenomena in periodic acoustic metamaterials**, Michael J. Frazier, Mahmoud I. Hussein, Univ. of Colorado at Boulder (USA) [8348-67]
10:00 am: **Numerical effective formulation for guided wave propagation in a metamaterial plate with anisotropic mass density**, Guoliang Huang, Univ. of Arkansas at Little Rock (USA) [8348-68]
Coffee Break 10:20 to 10:50 am

Wednesday · 14 March

Conference 8339	Conference 8340	Conference 8341	Conference 8342	Conference 8344
<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Royal Palm VI Wed. 10:50 am to 12:10 pm</p> <p style="text-align: center;">Adhesion/Surfaces I</p> <p><i>Session Chair: Akhlesh Lakhtakia, The Pennsylvania State Univ. (USA)</i></p> <p>10:50 am: Biological adhesives and fastening devices (<i>Invited Paper</i>), H. Donald Wolpert, Bio-Optics (USA) [8339-28]</p> <p>11:30 am: Biologically inspired reversible adhesives: Where are we now? (<i>Invited Paper</i>), Stanislav N. Gorb, Christian-Albrechts-Univ. zu Kiel (Germany) [8339-29]</p> <p>Lunch/Exhibition Break 12:10 to 1:40 pm</p>	<p style="text-align: center;">SESSION 7, continued</p> <p>10:30 am: Giant torsional actuation from carbon nanotube yarns (<i>Invited Paper</i>), Javad Foroughi, Geoffrey M. Spinks, Gordon Wallace, Univ. of Wollongong (Australia); Jiyoung Oh, Mikhail E. Kozlov, Shaoli Fang, The Univ. of Texas at Dallas (USA); John D. W. Madden, The Univ. of British Columbia (Canada); Tissaphern Mirfakhrai, Stanford Univ. (USA); Min Kyoong Shin, Seon Jeong Kim, Hanyang Univ. (Korea, Republic of); Ray H. Baughman, The Univ. of Texas at Dallas (USA) [8340-28]</p> <p>11:10 am: Ionic EAP transducers with amorphous nanoporous carbon electrodes (<i>Invited Paper</i>), Friedrich Kaasik, Janno Torop, Inga Põldsalu, Indrek Must, Alvo Aabloo, Univ. of Tartu (Estonia) . [8340-29]</p> <p>11:50 am: A new twist on artificial muscle: metal yarns that wiggle!, John D. Madden, William Sikkema, Douglas Sim, Georgia Russell, Tissaphern Mirfakhrai, The Univ. of British Columbia (Canada); Sina Nafici, Univ. of Wollongong (Canada); Ray H. Baughman, The Univ. of Texas at Dallas (USA); Geoffrey M. Spinks, Univ. of Wollongong (Canada); Chad Sinclair, The Univ. of British Columbia (Canada) [8340-30]</p> <p>Lunch/Exhibition Break 12:10 to 1:30 pm</p>	<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Sunrise Wed. 10:50 to 11:50 am</p> <p style="text-align: center;">Aircraft, MAV/UAV, and Morphing Systems II</p> <p>10:50 am: An algorithm to optimize the morphing parameters in structures, Amin M. Motlagh, William W. Clark, Univ. of Pittsburgh (USA) [8341-35]</p> <p>11:10 am: Material characterisation for morphing purposes in order to match flight requirements, Sebastian M. Geier, Markus Kintscher, Peter Wierach, Michael Sinapius, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [8341-37]</p> <p>11:30 am: Experimental validation of simultaneous gust alleviation and energy harvesting for multifunctional composite wing spars, Ya Wang, Virginia Polytechnic Institute and State Univ. (USA) [8341-102]</p> <p>Lunch/Exhibition Break 11:50 am to 1:40 pm</p>	<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Royal Palm II Wed. 11:10 am to 12:30 pm</p> <p style="text-align: center;">SMP: Modeling</p> <p>11:10 am: Analysis of the shape-recovery performance of thermally-activated shape-memory polymer composite with microstructural heterogeneities, Masaaki Nishikawa, Masaki Hojo, Kyoto Univ. (Japan) [8342-35]</p> <p>11:30 am: Tailoring the time-dependent recovery of shape memory polymers, Charly Azra, Christopher J. G. Plummer, Jan-Anders E. Månson, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [8342-36]</p> <p>11:50 am: A model for intrinsic activation of shape memory polymers via a microvascular network, Yali Li, Nakhiah C. Goulbourne, Univ. of Michigan (USA) [8342-37]</p> <p>12:10 pm: Qualitative separation of the phase transition temperature of solvent responsive shape-memory polymer by Flory-Huggins theory, Jinying Yin, Harbin Univ. of Science and Technology (China) [8342-38]</p> <p>Lunch/Exhibition Break 12:30 to 1:40 pm</p>	<p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Royal Palm III Wed. 10:30 am to 12:30 pm</p> <p style="text-align: center;">Fabrication and Characterization II</p> <p><i>Session Chair: Sechang Oh, Univ. of Arkansas (USA)</i></p> <p>10:30 am: Rhombohedral epitaxy of cubic Si/Ge/SiGe quantum well structures on trigonal c-plane sapphire, Shane T. Seaman, NASA Langley Research Ctr. (USA) and National Institute of Aerospace (USA); Sang H. Choi, NASA Langley Research Ctr. (USA); Hyun Jung Kim, Yeonjoon Park, National Institute of Aerospace (USA) [8344-32]</p> <p>10:50 am: Electromagnetic characterization of carbon nanotubes with defects and strain, Brahmanandam Javvaji, D. Roy Mahapatra, Indian Institute of Science (India) [8344-33]</p> <p>11:10 am: Hydrogen peroxide-sensitive membrane for optofluidic device manufacture, Prajakta Bhagwat, Saint Louis Univ. (USA); Chang-Soo Kim, Missouri Univ. of Science and Technology (USA); David B. Henthorn, Saint Louis Univ. (USA) [8344-34]</p> <p>11:30 am: Covalent functionalization of carbon nanotube in-situ grown on metal-silicon chip, Waqas Khalid, Johan Johansson, Niklas Bosaeus, Nina Kann, Bjorn O. Akerman, Bengt Norden, Chalmers Univ. of Technology (Sweden) ... [8344-35]</p> <p>11:50 am: Polymer degradation measurements using 3D SERS substrates decorated with gold nanoparticles, Larry C. Heaton, EngeniusMicro LLC (USA) [8344-36]</p> <p>12:10 pm: Preparation and characterization of nanocomposites with carbon nanotubes and core-shell type polyaniline for the conductive colloidal ink, Jungmin Lee, Vijay K. Varadan, Univ. of Arkansas (USA) [8344-37]</p> <p>Lunch/Exhibition Break 12:30 to 2:00 pm</p>

Conference 8345

Concurrent Sessions

SESSION 9a

Room: Pacific Salon IV-V
Wed. 10:50 am to 12:10 pm

Sensing Technologies for Wind Turbines

Session Chairs: **R. Andrew Swartz**, Michigan Technological Univ. (USA); **Francesco Lanza di Scalea**, Univ. of California, San Diego (USA)

10:50 am: **Probabilistic characterization of wind turbine demand envelopes for operational structural integrity assessment**, Antonio Velazquez Hernandez, Raymond A. Swartz, Michigan Technological Univ. (USA) [8345-55]

11:10 am: **Localization and quantitative depth estimation of defects in wind turbine blades using infrared thermography**, Arun Manohar, Jeffery D. Tippmann, Francesco Lanza di Scalea, Univ. of California, San Diego (USA) [8345-56]

11:30 am: **Deflection calculation of a composite wind turbine blade using finite difference method from measured strain**, Il-Bum Kwon, Ki-Sun Choi, Yong-Hak Huh, Dong-Jin Yoon, Korea Research Institute of Standards and Science (Korea, Republic of) [8345-57]

11:50 am: **Wind turbine inspection tests at UCSD**, Jeffery D. Tippmann, Arun Manohar, Francesco Lanza di Scalea, Univ. of California, San Diego (USA) [8345-58]

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

SESSION 9b

Room: Pacific Salon VI-VII
Wed. 10:50 am to 12:10 pm

Nano-engineered Sensors for SHM

Session Chairs: **Fuh-Gwo Yuan**, North Carolina State Univ. (USA); **Ming Wang**, Northeastern Univ. (USA)

10:50 am: *** Ultra-fast nano-oscillators based on carbon nanoscrolls for nano-scale energy harvesting and storage**, Zhao Zhang, Teng Li, Univ. of Maryland, College Park (USA) [8345-59]

11:10 am: **Smart photonic coating as a new visualization technique of strain deformation of metal plates**, Hiroshi Fudouzi, Tsutomu Sawada, National Institute for Materials Science (Japan); Yoshikazu Tanaka, Ichiro Ario, Hiroshima Univ. (Japan); Tsuyoshi Hyakutake, Itaru Nishizaki, Public Works Research Institute (Japan) . . [8345-60]

11:30 am: **Wireless sensor array based on DNA decorated single-walled carbon nanotubes for gas monitoring**, Yu Liu, Yi Zhang, Mehmet R. Dokmeci, Ming Wang, Northeastern Univ. (USA) [8345-61]

11:50 am: *** Strain gradient monitoring using a Ba_{0.67}Sr_{0.33}TiO₃ flexoelectric sensor**, Wenbin Huang, Fuh-Gwo Yuan, Xiaoning Jiang, North Carolina State Univ. (USA) [8345-62]

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

* Indicates paper that will also be presented in the NSF Poster Session, p. 33.

Conference 8346

SESSION 9

Room: Royal Palm IV
Wed. 10:50 to 11:50 am

Application of Sensors to Monuments of Cultural Heritage

Session Chair: **Antonia Moropoulou**, National Technical Univ. of Athens (Greece)

10:50 am: **Application of non-destructive techniques to assess the state of Hagia Sophia's mosaics**, Antonia Moropoulou, Asterios Karagiannis-Bakolas, Kyriakos C. Labropoulos, Nikolaos K. Katsiotis, Maria Karoglou, Ekaterini T. Delegou, National Technical Univ. of Athens (Greece) [8346-33]

11:10 am: **Investigation of the contribution possibilities of non-destructive methods of testing for the diagnosis and quality control of building materials with emphasis given on sustainable construction**, Nikolaos S. Katsiotis, National Technical Univ. of Athens (Greece); Theodoros E. Matikas, Univ. of Ioannina (Greece); Antonia Moropoulou, National Technical Univ. of Athens (Greece) [8346-34]

11:30 am: **Application of infrared thermometry and ultrasonic velocity for the investigation of the building materials of historic monuments of Dion, Greece**, Panagiotis Spathis, Aristotle Univ. of Thessaloniki (Greece) [8346-35]

Lunch/Exhibition Break 11:50 am to 1:20 pm

Conference 8347

Concurrent Sessions

SESSION 7a

Room: Royal Palm V
Wed. 10:50 am to 12:10 pm

Ultrasonic Technologies for NDE/SHM I

Session Chairs: **Xiaoning Jiang**, North Carolina State Univ. (USA); **Anthony D. Cinson**, Pacific Northwest National Lab. (USA)

10:50 am: **Obtaining more information from time-of-flight-diffraction measurements**, Stuart B. Palmer, Steve Dixon, Phil Petcher, The Univ. of Warwick (United Kingdom) [8347-35]

11:10 am: **A multipoint ultrasonic detection approach to fretting crack detection in an aircraft component**, Zhigang Sun, Kuo-Ting Wu, Cheng-Kuei Jen, Alain Blouin, National Research Council Canada (Canada); Nezhir Mrad, Defence Research and Development Canada, Ottawa (Canada); Hugo Bélanger, L-3 MAS (Canada) [8347-36]

11:30 am: **Waterless coupling of ultrasound from planar contact transducers to curved and irregular surfaces during non-destructive ultrasonic evaluations**, Kayte M. Denslow, Aaron A. Diaz, Mark Jones, Ryan M. Meyer, Anthony D. Cinson, Mondell Wells, Pacific Northwest National Lab. (USA) [8347-37]

11:50 am: **Acoustic emission based monitoring of surfaces subjected to friction**, Kassahun M. Asamene, Mannur Sundaresan, North Carolina A&T State Univ. (USA) [8347-38]

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

SESSION 7b

Room: Sunset
Wed. 10:50 am to 12:10 pm

Imaging-based NDE/SHM of Civil Infrastructure II

Session Chairs: **Shen-En Chen**, The Univ. of North Carolina at Charlotte (USA); **Lingyu Yu**, Univ. of South Carolina (USA)

10:50 am: **Scanning array radar system for bridge subsurface imaging**, Chieh-Ping Lai, Yu-Jiun Ren, LR Technologies, Inc. (USA); Tzu Yang Yu, Univ. of Massachusetts Lowell (USA) [8347-39]

11:10 am: **Highway speed ground penetrating radar system developments**, Dryver R. Huston, Tian Xia, Anbu Venkatachalam, Xianlei Xu, The Univ. of Vermont (USA) [8347-40]

11:30 am: **Extended defect diagnosis using time-reversal tomography technique**, Shuntao Liu, Fuh-Gwo Yuan, North Carolina State Univ. (USA) [8347-41]

11:50 am: **Civil infrastructure damage detection and condition monitoring with digital image correlation photogrammetry**, Timothy E. Schmidt, John Tyson, Trilion Quality Systems (USA); Christopher Niezrecki, Peter Avitabile, Univ. of Massachusetts Lowell (USA) [8347-42]

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

Conference 8348

SESSION 9

Room: Royal Palm I
Wed. 10:50 am to 12:10 pm

Civil Infrastructure I: Building Monitoring

Session Chairs: **Shivan Haran**, Arkansas State Univ. (USA); **Henrique L. Reis**, Univ. of Illinois at Urbana-Champaign (USA)

10:50 am: **Estimation of changes in modal parameters of a seismically isolated building during the 2011 off the Pacific Coast of Tohoku Earthquake**, Tomoo Saito, Shimizu Corp. (Japan) [8348-69]

11:10 am: **Synergistic combination of systems for structural health monitoring and earthquake early warning for structural health prognosis and diagnosis**, Stephen Wu, James L. Beck, California Institute of Technology (USA) [8348-70]

11:30 am: **Earthquake damage detection of MDOF structure using fractal dimension and analytical mode decomposition**, Dongwang Tao, Hui Li, Harbin Institute of Technology (China) [8348-71]

11:50 am: **On the effect of material and geometrical uncertainties in structural health monitoring**, Hessamodin Teimouri, Abbas S. Milani, Rudolf J. Seethaler, The Univ. of British Columbia (Canada) [8348-72]

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

Conference 8339	Conference 8340	Conference 8341	Conference 8342	Conference 8344
<p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Royal Palm VI Wed. 1:40 to 3:20 pm</p> <p style="text-align: center;">Adhesion/Surfaces II <i>Session Chair: Stanislav Gorb, Christian-Albrechts-Univ. zu Kiel (Germany)</i></p> <p>1:40 pm: Biomimetic approach for multi-responsive water microdroplet adhesions on a superhydrophobic surface, Akihito Takahashi, Tohoku Univ. (Japan); Daisuke Ishii, Tohoku Univ. (Japan) and CREST, JST (Japan); Hiroshi Yabu, Tohoku Univ. (Japan); Masatsugu Shimomura, Tohoku Univ. (Japan) and CREST, JST (Japan) [8339-30]</p> <p>2:00 pm: Biomimetic superhydrophobic surfaces having gradients of a droplet adhesion property prepared by self-organization, Daisuke Ishii, Masatsugu Shimomura, Hiroshi Yabu, Tohoku Univ. (Japan) [8339-31]</p> <p>2:20 pm: Printed superhydrophobic surfaces that exhibit ratchet-like slip angle anisotropy, Mark Barahman, Alan M. Lyons, College of Staten Island (USA) [8339-32]</p> <p>2:40 pm: Anisotropic frictional properties in snakes, Martina Benz, Alexander Kovalev, Univ. of Kiel (Germany); Stanislav Gorb, Christian-Albrechts-Univ. zu Kiel (Germany) [8339-33]</p> <p>3:00 pm: Fabrication of wettability-patterned biomimetic surfaces for water-collection and water transportation, Yuji Hirai, Tohoku Univ. (Japan) and CREST, JST (Japan); Hiroshi Yabu, Tohoku Univ. (Japan); Yasutaka Matsuo, Kuniharu Ijiri, Hokkaido Univ. (Japan) and CREST, JST (Japan); Masatsugu Shimomura, Tohoku Univ. (Japan) and CREST, JST (Japan) [8339-34]</p> <p>Conference End.</p>	<p style="text-align: center;">SESSION 8</p> <p style="text-align: center;">Room: Town & Country Ballroom Wed. 1:30 to 3:10 pm</p> <p style="text-align: center;">Dielectric Elastomers <i>Session Chairs: Qibing Pei, Univ. of California, Los Angeles (USA); Jonathan Clark, The Florida State Univ. (USA)</i></p> <p>1:30 pm: Six-axis capacitive force/torque sensor based on dielectric elastomer, Hyouk Ryeol Choi, Ja Choon Koo, Hyungpil Moon, Dae Gyeong Kim, Sungkyunkwan Univ. (Korea, Republic of) [8340-31]</p> <p>1:50 pm: Novel DEA materials by chemical grafting of silicone networks on molecular level, Hartmut Krueger, Bjoern Kusmaul, Michael Wegener, Fraunhofer-Institut für Angewandte Polymerforschung (Germany); Sebastian Risse, Guggi Kofod, Univ. Potsdam (Germany) [8340-32]</p> <p>2:10 pm: Modeling and characterization of stiffness controlled robotic legs using dielectric elastomers, Jason Newton, Jeffrey T. Morton, Jonathan Clark, William S. Oates, Florida Ctr. for Advanced Aero-Propulsion (USA) [8340-33]</p> <p>2:30 pm: A framework to investigate instabilities of homogeneous and composite dielectric elastomer actuators, Massimiliano Gei, Stefania Colonnelli, Roberta Springhetti, Univ. degli Studi di Trento (Italy) [8340-34]</p> <p>2:50 pm: Complex 3D motion of a planner dielectric elastomer actuator with distributed stiffeners, William Lai, Ashraf F. Bastawros, Wei Hong, Iowa State Univ. (USA) [8340-35]</p> <p>Coffee Break 3:10 to 3:40 pm</p>	<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 10a</p> <p style="text-align: center;">Room: Sunrise Wed. 1:40 to 3:20 pm</p> <p style="text-align: center;">Modeling, Simulation, Signal Processing, and Control of Integrated Systems I</p> <p>1:40 pm: Piezoelectric low net passive stiffness (LNPS) flutter test vane, Ryan Barnhart, Ronald M. Barrett, The Univ. of Kansas (USA) [8341-38]</p> <p>2:00 pm: Mechanical and vibration testing of carbon fiber composite material with embedded piezoelectric sensors, Kirsten P. Duffy, The Univ. of Toledo (USA); Bradley A. Lerch, Nathan G. Wilmoth, NASA Glenn Research Ctr. (USA); Nicholas Kray, Gregory Gemeinhardt, GE Aviation Systems (USA) [8341-39]</p> <p>2:20 pm: Vibroacoustic studies on sounding rocket bulkheads, Jeffrey L. Comrie, South Dakota School of Mines and Technology (USA) [8341-40]</p> <p>2:40 pm: Development of smart seismic bridge bearing using fiber optic Bragg-grating sensors, Sung-Jin Chang, Nam-Sik Kim, Pusan National Univ. (Korea, Republic of) [8341-41]</p> <p>3:00 pm: Mathematical modelling of postbuckling in slender beam column for active stabilisation control with respect to uncertainty, Georg C. Enss, Technische Univ. Darmstadt (Germany); Roland Platz, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany); Holger Hanselka, Technische Univ. Darmstadt (Germany) and Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) [8341-42]</p> <p>Coffee Break 3:20 to 3:50 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 10b</p> <p style="text-align: center;">Room: Towne Wed. 1:40 to 3:20 pm</p> <p style="text-align: center;">Energy Harvesting and Scavenging III: General Energy Harvesting II</p> <p>1:40 pm: Performance of a shear-mode piezoelectric energy harvester, Mustafa H. Arafa, The American Univ. in Cairo (Egypt); Wael N. Akl, Ain Shams Univ. (Egypt); Osama J. Aldrahem, King Saud Univ. (Saudi Arabia); Amr M. Baz, Univ. of Maryland, College Park (USA) [8341-43]</p> <p>2:00 pm: Stabilization of a wide-band nonlinear vibration energy harvester by using a nonlinear self-excitation circuit, Arata Masuda, Atsuko Senda, Tatsuya Sanada, Kyoto Institute of Technology (Japan) [8341-44]</p> <p>2:20 pm: Energy harvesting device for power generation onboard gravity-dropped weapons, Jahangir S. Rastegar, Richard T. Murray, Omnitek Partners, LLC (USA); Matthew Bridge, Air Force Research Lab. (USA) [8341-45]</p> <p>2:40 pm: Improved pen harvester for powering a pulse rate sensor, Patrick Heitzmann, Leibniz Univ. Hannover (Germany); Vishwas N. Bedekar, Univ. of Arkansas (USA); Anthony Marin, Virginia Polytechnic Institute and State Univ. (USA); Jens Twiefel, Leibniz Univ. Hannover (Germany); Shashank Priya, Virginia Polytechnic Institute and State Univ. (USA) [8341-46]</p> <p>3:00 pm: Analysis of a multiple-DOF system for piezoelectric energy harvesting, Lihua Tang, Yaowen Yang, Hao Wu, Nanyang Technological Univ. (Singapore) . . . [8341-47]</p> <p>Coffee Break 3:20 to 3:50 pm</p> </div> </div>	<p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Royal Palm II Wed. 1:40 to 3:40 pm</p> <p style="text-align: center;">SMP Composites</p> <p>1:40 pm: The relationship between constituent properties and bending actuation of shape memory composites, Pedro Cortes, Youngstown State Univ. (USA); Amber J. W. McClung, Air Force Research Lab. (USA); Jonathan Sakulich, Purdue Univ. (USA); Jeffery W. Baur, Air Force Research Lab. (USA) [8342-39]</p> <p>2:00 pm: Conductivity of graphene oxide thin films on a shape memory polymer (SMP) substrate during SMP programming and recovery, Gautam Naik, Zhongbi Chen, Sridhar Krishnaswamy, Northwestern Univ. (USA) [8342-40]</p> <p>2:20 pm: Experimental and analysis of shape memory polymer composite tube, Yijin Chen, Jian Sun, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [8342-41]</p> <p>2:40 pm: Analyses the local buckling of double films bonded to fiber reinforced shape memory polymer, Qiao Tan, Jinsong Leng, Harbin Institute of Technology (China) [8342-42]</p> <p>3:00 pm: Significantly improving electromagnetic performance of nanopaper and its shape-memory nanocomposite by aligned carbon nanotubes, Haibao Lu, Harbin Institute of Technology (China) [8342-43]</p> <p>3:20 pm: Electro-active spandex reinforced shape memory composites incorporating carbon nanotubes, Jian Sun, Yanyi Xu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [8342-30]</p> <p>Coffee Break 3:40 to 4:10 pm</p>	<p style="text-align: center;">SESSION 13</p> <p style="text-align: center;">Room: Royal Palm III Wed. 2:00 to 3:20 pm</p> <p style="text-align: center;">Fabrication and Characterization III <i>Session Chair: Hyun-U Ko, Inha Univ. (Korea, Republic of)</i></p> <p>2:00 pm: Porous CNTs/chitosan composite with lamellar structure prepared by ice-templating, Jia Yan, Baoqiang Qiu, Zhanjun Wu, Dalian Univ. of Technology (China) [8344-38]</p> <p>2:20 pm: Paper-like ZnO-cellulose hybrid nanocomposite: fabrication and its applications, Hyun-U Ko, Inha Univ. (Korea, Republic of); Joo-Hyung Kim, Chosun Univ. (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) [8344-39]</p> <p>2:40 pm: Synthesis and characterization of functionalized magnetic nanoparticles, Dipti Biswal, Brianna N. Peeples, Aswini K. Pradhan, Norfolk State Univ. (USA) [8344-40]</p> <p>3:00 pm: Effectiveness of multiple pulses on flow index of electroporation, Bashir I. Morshed, Univ. of Memphis (USA); Maitam Shams, Carleton Univ. (Canada); Tofy Mussivand, Univ. of Ottawa Heart Institute (Canada) [8344-41]</p> <p>Coffee Break 3:20 to 3:40 pm</p>

Conference 8345

Concurrent Sessions

SESSION 10a

Room: Pacific Salon IV-V
Wed. 1:40 to 3:20 pm

Intelligent Sensing and NDE

Session Chairs: **Gun-Jin Yun**, The Univ. of Akron (USA); **Seunghye Park**, Sungkyunkwan Univ. (Korea, Republic of)

1:40 pm: **Manufacturing of flexible strain sensors using conductive polymeric materials and direct writing technology for monitoring of structures**, Jae-Won Choi, Morteza Vatani, Kye-Shin Lee, Gun-Jin Yun, The Univ. of Akron (USA) [8345-63]

2:00 pm: **Magnetic flux leakage based steel cable NDE operated on a cable climbing robot**, Seunghye Park, Ju-Won Kim, Changgil Lee, Sungkyunkwan Univ. (Korea, Republic of); Jong-Jae Lee, Sejong Univ. (Korea, Republic of); Su-Yeol Park, KPM (Korea, Republic of) [8345-64]

2:20 pm: **Structural behavior of concrete box bridge using embedded FBG sensors**, Wonseok Chung, Kyung Hee Univ. (Korea, Republic of); Donghoon Kang, Korea Railroad Research Institute (Korea, Republic of) [8345-65]

2:40 pm: **Hybrid structural health monitoring using wireless multi-scale sensors**, Shinae Jang, Sushil Dahal, Gustavo K. Contreras, Jonathan Fitch, Jonathan Karamavros, Rajeev Bansal, Univ. of Connecticut (USA) [8345-66]

3:00 pm: **Application of three dimensional electromechanical impedance model for damage assessment of plate**, Venu Gopal M. Annamdas, Birla Institute of Technology and Science, Pilani (India) and Nanyang Technological Univ. (Singapore); Yaowen Yang, Nanyang Technological Univ. (Singapore); Seunghye Park, Sungkyunkwan Univ. (Korea, Republic of) [8345-67]

Coffee Break 3:20 to 3:50 pm

SESSION 10b

Room: Pacific Salon VI-VII
Wed. 1:40 to 3:20 pm

Advance Sensing Systems for Civil Structures

Session Chairs: **Ki-Soo Kim**, Hongik Univ. (Korea, Republic of); **Mohammad Reza Jahanshahi**, The Univ. of Southern California (USA)

1:40 pm: **Robust vision-based crack thickness quantification for condition assessment of structures**, Mohammad Reza Jahanshahi, Sami F. Masri, The Univ. of Southern California (USA) [8345-68]

2:00 pm: **An interferometric radar for displacement measurement and its application in civil engineering structures**, Di Su, Tomonori Nagayama, Zhen Sun, Yozo Fujino, The Univ. of Tokyo (Japan) [8345-69]

2:20 pm: **Partially stripped fiber optic sensor packages applied to large infrastructures**, Ki Soo Kim, Hongik Univ. (Korea, Republic of) [8345-70]

2:40 pm: **Ultra low-power corrosion-enabled sensor node**, Scott A. Ouellette, Michael D. Todd, Univ. of California, San Diego (USA) [8345-71]

3:00 pm: **Piezoelectric impedance based strength and elastic modulus gain monitoring in concrete**, Zhigang Guo, Zhi Sun, Tongji Univ. (China) [8345-72]

Coffee Break 3:20 to 3:50 pm

Conference 8346

SESSION 10

Room: Royal Palm IV
Wed. 1:20 to 3:20 pm

Sensors for Structural Health Monitoring I

Session Chair: **Mark R. Woike**, NASA Glenn Research Ctr. (USA)

1:20 pm: **Critical and subcritical damage monitoring of bonded composite repairs using innovative non-destructive techniques (Invited Paper)**, Alkiviadis S. Paipetis, Sotirios A. Grammatikos, Evangelos Z. Kordatos, Dimitrios G. Aggelis, Theodoros E. Matikas, Univ. of Ioannina (Greece) [8346-36]

2:00 pm: **Environmental barrier coating (EBC) durability modeling using a progressive failure analysis approach**, Ali Abdul-Aziz, NASA Glenn Research Ctr. (USA); Mohit Grag, Galib Abumeri, AlphaSTAR Corp. (USA); Ramakrishna T. Bhatt, Joseph E. Grady, NASA Glenn Research Ctr. (USA) [8346-37]

2:20 pm: **Numerical analysis for structural health monitoring of a damaged composite panel using PZT actuators and sensors**, Akshata H. Nagabhushana, Michelle D. Spiegel, Stephen A. Adu, Nicholas Hayes, Donald T. Paul, Kanchan G. Trivedi, Benjamin Fairbee, Hao Zheng, Ashley V. Gerrity, Sushma Kotru, Samit Roy, Mark E. Barkey, Susan L. Burkett, The Univ. of Alabama (USA) [8346-38]

2:40 pm: **An optimal sensor configuration strategy for decentralized structural damage detection**, Madhuka Jayawardhana, Xinqun Zhu, Ranjith Liyanapathirana, Univ. of Western Sydney (Australia) [8346-39]

3:00 pm: **Investigation of a moiré based crack detection technique for propulsion health monitoring**, Mark R. Woike, Gustave C. Fralick, Ali Abdul-Aziz, John D. Wrbanek, NASA Glenn Research Ctr. (USA) . [8346-40]

Coffee Break 3:20 to 3:50 pm

Conference 8347

Concurrent Sessions

SESSION 8a

Room: Royal Palm V
Wed. 1:40 to 3:00 pm

Ultrasonic Technologies for NDE/SHM II

Session Chairs: **Xiaoning Jiang**, North Carolina State Univ. (USA); **Anthony D. Cinson**, Pacific Northwest National Lab. (USA)

1:40 pm: **Experimental comparison of 2D arrays topologies for SHM of planar structures**, Lukasz Ambrozinski, Pawel Packo, AGH Univ. of Science and Technology (Poland); Tadeusz Stepinski, Uppsala Univ. (Sweden); Tadeusz Uhl, AGH Univ. of Science and Technology (Poland) [8347-43]

2:00 pm: **Monitoring corrosion in prestressed concrete beams using acoustic emission technique**, Mohamed K. ElBatanouny, Jese Mangual, William Velez, Paul Ziehl, Fabio Matta, Univ. of South Carolina (USA); Miguel Gonzalez, MISTRAS Group, Inc. (USA) [8347-92]

2:20 pm: **Anti-symmetric flexural modes propagating along a wedge tip with a defect**, Che-Hua Yang, Yu-Hong Chen, Tai Chieh Wu, National Taipei Univ. of Technology (Taiwan) [8347-45]

2:40 pm: **Ultrasonic phased array sound field mapping through large-bore coarse grained cast austenitic stainless steel (CASS) piping materials**, Anthony D. Cinson, Susan Crawford, Matthew Prowant, Aaron A. Diaz, Michael T. Anderson, Pacific Northwest National Lab. (USA) [8347-46]

Coffee Break 3:20 to 3:50 pm

SESSION 8b

Room: Sunset
Wed. 1:40 to 3:20 pm

Road Surface Technologies

Session Chairs: **Tzu Yang Yu**, Univ. of Massachusetts Lowell (USA); **Yang Wang**, Georgia Institute of Technology (USA)

1:40 pm: **Numerical simulations of mechanical properties of innovative pothole patching materials featuring high toughness, low viscosity nano-molecular resins**, Kuo-Yao Yuan, Wei Yuan, Jiann-Wen Ju, Jenn-Ming Yang, Wei Kao, Larry Carlson, Univ. of California, Los Angeles (USA) [8347-47]

2:00 pm: **Dielectric dispersion of cement paste and cement mortar specimens in the frequency range of 0.5GHz to 2GHz**, Tzu-Yang Yu, Seyed R. Madarshahian, Univ. of Massachusetts Lowell (USA) . . . [8347-48]

2:20 pm: **High-toughness, low-viscosity DCPD resins for reinforcing pothole patching materials**, Wei Yuan, Jenn-Ming Yang, Univ. of California, Los Angeles (USA) [8347-49]

2:40 pm: **Automatic road surface defect detection from grayscale images**, Sindhu Ghanta, Ralf Birken, Jennifer Dy, Northeastern Univ. (USA) [8347-50]

3:00 pm: **Statistical analysis of acoustic measurement for assessing pavement surface condition**, Yiying Zhang, Xin Ma, Northeastern Univ. (USA); J. Gregory McDaniel, Jr., Boston Univ. (USA); Ming L. Wang, Northeastern Univ. (USA) . . [8347-51]

Coffee Break 3:20 to 3:50 pm

Conference 8348

SESSION 10

Room: Royal Palm I
Wed. 1:40 to 3:20 pm

Metamaterials II

Session Chairs: **Guoliang Huang**, Univ. of Arkansas at Little Rock (USA); **Amr M. Baz**, Univ. of Maryland, College Park (USA)

1:40 pm: **Experimental performance of an active acoustic metamaterial with simultaneously programmable density and bulk modulus**, Amr M. Baz, Univ. of Maryland, College Park (USA); Wael Akl, Ain Shams Univ. (Egypt) [8348-73]

2:00 pm: **A chiral elastic metamaterial: theory and experiment**, Guoliang Huang, Xiaoning Liu, Univ. of Arkansas at Little Rock (USA); Gengkai Hu, Beijing Institute of Technology (China) [8348-74]

2:20 pm: **An approximate method for controlling solid elastic waves by transformation media**, Jin Hu, Zheng Chang, Gengkai Hu, Beijing Institute of Technology (China) [8348-75]

2:40 pm: **Multi-displacement continuum modeling of wave propagation in two-dimensional chiral metamaterials**, Guoliang Huang, Aiping Liu, Univ. of Arkansas at Little Rock (USA); Gengkai Hu, Beijing Institute of Technology (China) [8348-76]

3:00 pm: **Thin-plate metamaterials: physics and applications**, Pei Li, Xiaoming Zhou, Shanshan Yao, Beijing Institute of Technology (China); Guoliang Huang, Univ. of Arkansas at Little Rock (USA); Gengkai Hu, Beijing Institute of Technology (China) . . . [8348-77]

Coffee Break 3:20 to 3:50 pm

Wednesday · 14 March

Conference 8340	Conference 8341	Conference 8342	Conference 8344
<p>SESSION 9</p> <p>Room: Town & Country Ballroom Wed. 3:40 to 6:00 pm</p> <p>Electronics and Electrodes <i>Session Chairs: Gabor M. Kovacs</i>, EMPA (Switzerland); <i>Takushi Sugino</i>, National Institute of Advanced Industrial Science and Technology (Japan)</p> <p>3:40 pm: Compliant electrodes for large strain actuation (<i>Invited Paper</i>), Sungrul Yun, Qibing Pei, Univ. of California, Los Angeles (USA) [8340-36]</p> <p>4:00 pm: Super-compliant metallic electrodes for electroactive polymer actuators, Florian Habrard, Jörg Patscheider, Gabor M. Kovacs, EMPA (Switzerland) [8340-37]</p> <p>4:20 pm: Highly stretchable silver film electrodes for dielectric elastomer actuators in excess of 100% areal strain, Sze Hsien Low, Gih-Keong Lau, Nanyang Technological Univ. (Singapore) [8340-38]</p> <p>4:40 pm: Transferring electrical energy between dielectric elastomer actuators, Ho Cheong Lo, Todd A. Gisby, Thomas G. McKay, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) [8340-39]</p> <p>5:00 pm: Self-clearing dielectric elastomer actuators using charcoal-powder electrodes, Gih-Keong Lau, Soo Lim Chua, Nanyang Technological Univ. (Singapore) [8340-40]</p> <p>5:20 pm: Low-voltage bending actuators from carbide-derived carbon improved with gold foil, Janno Torop, Univ. of Tartu (Estonia); Takushi Sugino, Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan); Alar Jänes, Enn Lust, Univ. of Tartu (Estonia); Mati Arulepp, Skeleton Technologies OÜ (Estonia); Alvo Aabloom, Univ. of Tartu (Estonia) [8340-41]</p> <p>5:40 pm: Bidirectional power electronics for driving dielectric elastomer transducers, Lars Eitzen, Christian Graf, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) [8340-42]</p>	<p>SESSION 11</p> <p>Room: Sunrise Wed. 3:50 to 5:30 pm</p> <p>Modeling, Simulation, Signal Processing, and Control of Integrated Systems II</p> <p>3:50 pm: Seismic fragility assessment of concrete bridge pier reinforced with shape memory alloy considering residual displacement, A. H. M. Muntasir Billah, M. Shahría Alam, The Univ. of British Columbia (Canada) [8341-48]</p> <p>4:10 pm: Design of piezoresistive-based sensors with distribution of piezoresistive material through topology optimization, Luis A. Motta Mello, Emilio C. N. Silva, Escola Politécnica da Univ. de São Paulo (Brazil) [8341-49]</p> <p>4:30 pm: Vibration reduction on a nonlinear flexible structure through resonant control and disturbance estimator, Francesco Ripamonti, Gabriele Cazzulani, Ferruccio Resta, Politecnico di Milano (Italy) [8341-50]</p> <p>4:50 pm: Semi-active control of a scaled building structure with a magnetorheological elastomer isolator device, Majid Behrooz, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (USA) [8341-51]</p> <p>5:10 pm: Measurement of strain distribution of smart materials by electron Moiré method, Satoshi Kishimoto, National Institute for Materials Science (Japan); Hiroshi Asanuma, Chiba Univ. (Japan); Yoshihisa Tanaka, National Institute for Materials Science (Japan); Yutaka Kagawa, The Univ. of Tokyo (Japan) and National Institute for Materials Science (Japan) [8341-52]</p>	<p>SESSION 11</p> <p>Room: Royal Palm II Wed. 4:10 to 5:30 pm</p> <p>Magneto-active Materials</p> <p>4:10 pm: Mechanisms of stiffening effect in magneto-rheological elastomers, Yi Han, Wei Hong, Iowa State Univ. (USA); LeAnn E. Faidley, Wartburg College (USA) [8342-86]</p> <p>4:30 pm: The effect of axial demagnetization on the predicted voltage output of a MSMA power harvester, Constantin Ciocanel, Heidi Feigenbaum, Nickholaus Bruno, Alex Waldauer, Northern Arizona Univ. (USA) [8342-86]</p> <p>4:50 pm: Magneto-thermo-mechanical characterization of NiMn based metamagnetic shape memory alloys under high fields, Ali S. Turabi, Peizhen Li, Parth Parekh, Haluk E. Karaca, Burak Basaran, Univ. of Kentucky (USA) [8342-47]</p> <p>5:10 pm: Ultra low-power computing with multiferroic nanomagnets, Jayasimha Atulasimha, Supriyo Bandyopadhyay, Virginia Commonwealth Univ. (USA) [8342-48]</p>	<p>SESSION 14</p> <p>Room: Royal Palm III Wed. 3:40 to 5:00 pm</p> <p>Fabrication and Characterization IV</p> <p><i>Session Chair: Linfeng Chen</i>, Univ. of Arkansas (USA)</p> <p>3:40 pm: Thermal effects of X-band microwaves on skin tissues, Kyo D. Song, Hargsoon Yoon, Norfolk State Univ. (USA); Kunik Lee, Turner-Fairbank Highway Research Ctr. (USA); Jaehwan Kim, Inha Univ. (Korea, Republic of); Sang H. Choi, NASA Langley Research Ctr. (USA) [8344-42]</p> <p>4:00 pm: Microfluidics on compliant substrates: foldable and bendable devices and system packaging, Bonnie L. Gray, Simon Fraser Univ. (Canada) [8344-43]</p> <p>4:20 pm: Fabrication of IDT electrode onto cellulose electro-active paper by inkjet printing, Seongcheol Mun, Hyejun Jung, Jaehwan Kim, Inha Univ. (Korea, Republic of) [8344-44]</p> <p>4:40 pm: Development of a phase modulation plasmon resonance image detection system based on time-stepped quadrature phase shifting method, Shu-Sheng Lee, Tsung-Yen Huang, National Taiwan Ocean Univ. (Taiwan) [8344-45]</p>

Conference 8345

Concurrent Sessions

SESSION 11a

Room: Pacific Salon IV-V
Wed. 3:50 to 5:30 pm

Next-Generation Sensing Systems for SHM: Algorithms

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

3:50 pm: **Application of higher order SVD to vibration-based system identification and damage detection**, Shu-Hsien Chao, Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) [8345-73]

4:10 pm: **Vision-based 6-DOF displacement measurement of structures with a planar marker**, Donghwa Lee, Hyun Myung, KAIST (Korea, Republic of) [8345-74]

4:30 pm: **Numerical modeling of guided waves in pipe-like structures**, Jung-Wuk Hong, Jingjun Shen, Michigan State Univ. (USA) [8345-75]

4:50 pm: **ViSP (visually servoed paired structured light system) for measuring structural displacement**, Haemin Jeon, Jae-Uk Shin, Hyun Myung, KAIST (Korea, Republic of) [8345-76]

5:10 pm: **Computer vision based structural health monitoring of civil infrastructure systems: review and example applications**, F. Necati Catbas, Univ. of Central Florida (USA); Mustafa Gul, Univ. of Alberta (Canada) [8345-77]

SESSION 11b

Room: Pacific Salon VI-VII
Wed. 3:50 to 5:30 pm

Smart Structure Technology for Aerospace Systems

Session Chairs: **Yoseph Bar-Cohen**, Jet Propulsion Lab. (USA); **Amr M. Baz**, Univ. of Maryland, College Park (USA)

3:50 pm: **Deep drilling and sampling via the wireline that is piezoelectric actuated percussive and EM rotary auto-gopher**, Yoseph Bar-Cohen, Mircea Badescu, Stewart Sherrit, Jet Propulsion Lab. (USA); Kris Zacny, Honeybee Robotics (Albania); Gale L. Paulsen, Honeybee Robotics (USA); Luther Beegle, Xiaoqi Bao, Jet Propulsion Lab. (USA) [8345-78]

4:10 pm: **Single piezo-actuator rotary-hammering (SPaRH) drill**, Stewart Sherrit, Lukas Domm, Xiaoqi Bao, Yoseph Bar-Cohen, Zensheu Chang, Mircea Badescu, Jet Propulsion Lab. (USA) [8345-79]

4:30 pm: **Miniaturization of planar horn motors**, Stewart Sherrit, Patrick N. Ostlund, Zensheu Chang, Xiaoqi Bao, Yoseph Bar-Cohen, Mircea Badescu, Jet Propulsion Lab. (USA) [8345-80]

4:50 pm: **High temperature piezoelectric drill**, Xiaoqi Bao, Yoseph Bar-Cohen, Stewart Sherrit, Mircea Badescu, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Thomas R. Shrout, The Pennsylvania State Univ. (USA) [8345-81]

5:10 pm: **Sensor applications for structural diagnostics and prognostics in aerospace systems**, Anindya Ghoshal, James T. Ayers, Mulugeta A. Haile, Michael Shiao, U.S. Army Research Lab. (USA) [8345-82]

Conference 8346

SESSION 11

Room: Royal Palm IV
Wed. 3:50 to 5:50 pm

Sensors for Structural Health Monitoring II

Session Chair: **Ali Abdul-Aziz**, NASA Glenn Research Ctr. (USA)

3:50 pm: **Turbine engine disk rotor health monitoring assessment using spin tests data**, Ali Abdul-Aziz, Mark R. Woike, George Y. Baaklini, James Bodis, NASA Glenn Research Ctr. (USA) [8346-41]

4:10 pm: **Real-time characterization of damage in metal matrix composites using IR thermography**, Evangelos Z. Kordatos, Theodore E. Matikas, Univ. of Ioannina (Greece) [8346-42]

4:30 pm: **Application of compressed sensing in full-field structural health monitoring**, Mulugeta A. Haile, Anindya Ghoshal, U.S. Army Research Lab. (USA) [8346-43]

4:50 pm: **The application of compressed sensing to long-term acoustic emission-based structural health monitoring**, Alessandro Cattaneo, Politecnico di Milano (Italy); David L. Mascarenhas, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (USA) [8346-44]

5:10 pm: **Low-velocity impact damage identification using a novel current injection thermographic technique**, Alkiviadis S. Paipetis, Sotirios A. Grammatikos, Evangelos Z. Kordatos, Theodore E. Matikas, Univ. of Ioannina (Greece) [8346-45]

5:30 pm: **Sensor topologies for application of strain energy damage diagnostics and prognostication**, Timothy Kernicky, Matthew J. Whelan, The Univ. of North Carolina at Charlotte (USA) [8346-46]

Conference End.

Conference 8347

Concurrent Sessions

SESSION 9a

Room: Royal Palm V
Wed. 3:50 to 5:30 pm

Vibration and Impedance-based NDE/SHM

Session Chairs: **Paul Ziehl**, Univ. of South Carolina (USA); **Franklin Moon**, Drexel Univ. (USA)

3:50 pm: **Real-time aircraft structural damage identification with flight condition variations**, Jiann-Shiun Lew, Tennessee State Univ. (USA); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) [8347-52]

4:10 pm: **Damage visualization enhancement by the wave field filtering and processing**, Wieslaw M. Ostachowicz, Pawel Kudela, Maciej Radzienski, The Szwedzki Institute of Fluid-Flow Machinery (Poland) [8347-53]

4:30 pm: **Nonlinear self-sensing impedance-based fatigue crack detection under a low-frequency vibration**, Changgil Lee, Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of) [8347-54]

4:50 pm: **Impedance measurement to monitor fresh concrete property using bender elements**, Jinying Zhu, Yi-Te Tsai, Xiaowei Dai, The Univ. of Texas at Austin (USA); Jinbiao Cai, Zhejiang Univ. (China) [8347-55]

5:10 pm: **Piezoelectric accelerometer for high temperature (1300°C) sensing**, Giovanni Salazar, Kyungrim Kim, Xiaoning Jiang, North Carolina State Univ. (USA); Shujun Zhang, The Pennsylvania State Univ. (USA) [8347-56]

SESSION 9b

Room: Sunset
Wed. 3:50 to 5:10 pm

X-ray, Fiber Optic and Thermal Technologies

Session Chairs: **Franklin Moon**, Drexel Univ. (USA); **Juan D. Valencia**, Pacific Northwest National Lab. (USA)

3:50 pm: **Image processing for the laser spot thermography of composite materials**, Ambra Vandone, Piervincenzo Rizzo, Univ. of Pittsburgh (USA); Marcello Vanali, Politecnico di Milano (Italy) [8347-57]

4:10 pm: **Compton imaging tomography for single-sided NDE/NDT of large and complex structures**, Victor Grubsky, Volodymyr Romanov, Edward Patton, Tomasz P. Jansson, Physical Optics Corp. (USA) [8347-58]

4:30 pm: **High-speed full-spectrum interrogation of fiber Bragg grating sensor application in reducing sensor strain sensitivity**, Nikola Stan, Spencer Chadderdon, Richard Selfridge, Stephen Schultz, Brigham Young Univ. (USA) [8347-60]

4:50 pm: **Recent progress on fiber optic distributed sensing for structural health monitoring using stimulated Brillouin and coherent Rayleigh (SBCR) interrogation method**, Kwang Suh, Jeff Bush, Optiphase, Inc. (USA) [8347-61]

Conference 8348

SESSION 11

Room: Royal Palm I
Wed. 3:50 to 6:10 pm

Civil Infrastructure II: Bridge Monitoring

Session Chairs: **Piervincenzo Rizzo**, Univ. of Pittsburgh (USA); **Michael D. Todd**, Univ. of California, San Diego (USA)

3:50 pm: **Probability-based bridge health monitoring strategy considering environmental effects**, Shinae Jang, Univ. of Connecticut (USA) [8348-79]

4:10 pm: **An impedance-based approach for detection and quantification of damage in cracked plates and loose bolts in bridge structures**, Masoud Rabei, Impact Technologies (USA) [8348-80]

4:30 pm: **Flexibility-based damage detection for in-service highway bridge**, Sushil Dahal, Shinae Jang, Priscilla O. Mensah-Bonsu, Univ. of Connecticut (USA) [8348-81]

4:50 pm: **Evaluation of bridge span by recovered stiffness data obtained with moving vehicle loadings**, Chia-Chi Cheng, Chih-Peng Yu, Ying-Tsu Ke, Keng-Tsang Hsu, Chaoyang Univ. of Technology (Taiwan) [8348-82]

5:10 pm: **Dynamic assessment of steel-concrete composite structures using dynamic response sensitivity**, Xinqun Zhu, Univ. of Western Sydney (Australia) [8348-83]

5:30 pm: **Recovery of lost data for wireless sensor network used in structural health monitoring**, Yuequan Bao, Hui Li, Xiaodan Sun, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) [8348-84]

5:50 pm: **Visualization of active crack on bridge in use by mechanoluminescent sensor**, Nao Terasaki, Chenshu Li, Ling Zhang, Chengzhou Li, Daisuke Ono, Masayoshi Tsubai, Naohiro Ueno, Chaonan Xu, National Institute of Advanced Industrial Science and Technology (Japan) . [8348-85]

Conference 8340

Conference 8341

Conference 8342

Announcements, Awards, and Plenary Presentation

Pacific Salon III

8:10 to 8:20 am

SPIE/ASME Best Student Paper Awards

Smart Structures Product Implementation Award



Plenary Presentation · 8:20 to 9:05 am

Shape Memory Polymer-Based Smart Composites: Future's Materials for Shape Changing

Jinsong Leng, Harbin Institute of Technology (China)

See page 5 for presentation details.

Concurrent Sessions

SESSION 10a

Room: Pacific Salon III
Thurs. 9:10 to 10:10 am

Sensors

Session Chairs: Ja Choon Koo, Sungkyunkwan Univ. (Korea, Republic of); Jinsong Leng, Harbin Institute of Technology (China)

9:10 am: **Carbon-polymer-ionic liquid composite as a motion sensor**, Indrek Must, Friedrich Kaasik, Urmas Johanson, Andres Punning, Alvo Aabloo, Univ. of Tartu (Estonia) [8340-43]

9:30 am: **Microfabrication of IPMC cilia for bio-inspired flow sensing**, Hong Lei, Wen Li, Xiaobo Tan, Michigan State Univ. (USA) [8340-44]

9:50 am: **Simultaneous sensing characteristics of a biomimetic polypyrrole based triple layer actuator exchanging cations**, Francisco G. Córdova, Laura Valero, Univ. Politécnica de Cartagena (Spain); Yahya A. Ismail, Univ. of Nizwa (Oman); Toribio Fernández Otero, Univ. Politécnica de Cartagena (Spain)[8340-45]
Coffee Break 10:10 to 10:40 am

SESSION 10b

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

Characterization

Session Chairs: Lenore Rasmussen, Ras Labs., LLC (USA); Patrick Keller, Institut Curie (France)

9:10 am: **Large amplitude oscillatory measurements as mechanical characterization methods for soft elastomers**, Anca Gabriela Bejenariu, Anne Ladegaard Skov, Kaustav Goswami, Technical Univ. of Denmark (Denmark) [8340-46]

9:30 am: **Oscillatory dynamics of a flexoelectric membrane in viscoelastic media**, Alejandro D. Rey, Milad Abou Dakka, Edston E. H. Valencia, McGill Univ. (Canada) [8340-47]

9:50 am: **Biodegradable poly(lactic acid)/ multi-walled carbon nanotube composites and its potential application for electroactive shape memory actuator**, Mohan Raja, King Saud Univ. (Saudi Arabia) [8340-48]
Coffee Break 10:10 to 10:40 am

Concurrent Sessions

SESSION 12a

Room: Sunrise
Thurs. 9:20 to 10:20 am

Energy Harvesting and Scavenging III: General Energy Harvesting III

9:20 am: **The concurrent suppression of and energy harvesting from surface vibrations: experimental investigations**, Ryan Harne, Virginia Polytechnic Institute and State Univ. (USA) [8341-53]

9:40 am: **Multimodal vibration harvester combining inductive and piezoelectric mechanisms**, Anthony Marin, Shashank Priya, Virginia Polytechnic Institute and State Univ. (USA) [8341-54]

10:00 am: **Novel motion-doubling mechanism for improved piezoelectric energy-harvesting performance**, Jahangir S. Rastegar, Richard T. Murray, Omnitek Partners, LLC (USA); Carlos M. Pereira, U.S. Army Armament Research, Development and Engineering Ctr. (USA) [8341-55]

Coffee Break 10:20 to 10:50 am

SESSION 12b

Room: Towne
Thurs. 9:20 to 10:20 am

SMA- and Piezo-based Materials and Systems I

9:20 am: **Smart hybrid SMA-steel rotary dampers**, Chuang-Sheng W. Yang, Georgia Institute of Technology (USA) [8341-56]

9:40 am: **Multifunctional smart material system (MSMS) using shape memory alloys and shape memory polymers**, Ashwin Rao, Pritha Ghosh, Arun Srinivasa, Texas A&M Univ. (USA) [8341-57]

10:00 am: **Reducing vibration in carbon fiber structures with piezoelectric actuators and fiber Bragg grating sensors**, Simone Cinquemani, Lorenzo Comolli, Gabriele Cazzulani, Andrea Gardella, Politecnico di Milano (Italy) [8341-58]

Coffee Break 10:20 to 10:50 am

SESSION 12

Room: Royal Palm II
Thurs. 9:20 to 10:20 am

CNT-based Multifunctional Materials

9:20 am: **Analytic and computational multi-scale micromechanics piezoresistive models for fuzzy fiber composite material**, Xiang Ren, Gary D. Seidel, Virginia Polytechnic Institute and State Univ. (USA) [8342-49]

9:40 am: **Investigation of aligned carbon nanotube architectures to understand the actuation mechanism**, Sebastian M. Geier, Thorsten Mahrholz, Johannes Riemenschneider, Peter Wierach, Michael Sinapius, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [8342-50]

10:00 am: **Enhanced multifunctional properties of nanocomposites using MWCNTs**, Yingtao Liu, Masoud Yekani Fard, Aditi Chattopadhyay, Arizona State Univ. (USA) [8342-51]

Coffee Break 10:20 to 10:50 am

Announcements, Awards, and Plenary Presentation

Pacific Salon III

8:10 to 8:20 am

**SPIE/ASME Best Student Paper Awards
Smart Structures Product Implementation Award**



Plenary Presentation · 8:20 to 9:05 am

Shape Memory Polymer-Based Smart Composites: Future's Materials for Shape Changing

Jinsong Leng, Harbin Institute of Technology (China)

See page 5 for presentation details.

SESSION 15

**Room: Royal Palm III
Thurs. 9:10 to 10:10 am**

Applications I

Session Chair: Jungmin Lee, Univ. of Arkansas (USA)

9:10 am: **Ultrasonic matrix array transducer made of PMN-PT single crystals for volumetric imaging** (*Invited Paper*), Yongrae Roh, Sunghag Kim, Hochan Park, Kyungpook National Univ. (Korea, Republic of) [8344-46]

9:50 am: **Determination of effective boundaries and material properties of SRR-rod and fishnet metamaterials**, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan); Feng-Ju Hsieh, Univ. of Washington (USA) [8344-47]
Coffee Break. 10:10 to 10:30 am

Concurrent Sessions

SESSION 12a

**Room: Pacific Salon IV-V
Thurs. 9:20 to 10:20 am**

Embedded Sensing In Blades

Session Chairs: Douglas E. Adams, Purdue Univ. (USA); Chengying Xu, Univ. of Central Florida (USA)

9:20 am: **Vibration analysis of a smart helicopter blade with piezoelectric actuated trailing edge flaps**, Ozge Ozdemir Ozgumus, Metin O. Kaya, Istanbul Teknik Univ. (Turkey) [8345-83]

9:40 am: **Optimal topology and experimental evaluation of piezoelectric materials for actively shunted GE polymer matrix fiber composite blades**, Benjamin B. Choi, NASA Glenn Research Ctr. (USA); Kirsten P. Duffy, The Univ. of Toledo (USA); Jeffrey L. Kauffman, The Pennsylvania State Univ. (USA) [8345-84]

10:00 am: **Optimal placement of piezoelectric plates for active vibration control of gas turbine blades: experimental results**, Fabio Botta, Univ. degli Studi di Roma Tre (Italy); Christoph Schwingshackl, Daniele Dini, Luca Di Mare, Imperial College London (United Kingdom); Giovanni Cerri, Univ. degli Studi di Roma Tre (Italy) [8345-85]
Coffee Break. 10:20 to 10:50 am

SESSION 12b

**Room: Pacific Salon VI-VII
Thurs. 9:20 to 10:20 am**

Smart Structures and Monitoring I

Session Chairs: Branko Glisic, Princeton Univ. (USA); Matteo Pozzi, Univ. of California, Berkeley (USA)

9:20 am: **The impact of monitoring on decision making**, Branko Glisic, Sigrid Adriaenssens, Princeton Univ. (USA); Daniele Zonta, Univ. degli Studi di Trento (Italy) [8345-86]

9:40 am: **Non parametric estimation of the value of information for monitoring systems**, Matteo Pozzi, Armen Der Kiureghian, Univ. of California, Berkeley (USA) [8345-87]

10:00 am: **Application of Cu-Al-Mn superelastic alloy bars as reinforcement elements in concrete beams**, Kshitij C. Shrestha, Yoshikazu Araki, Kyoto Univ. (Japan); Takuya Nagae, National Research Institute for Earth Science and Disaster Prevention (Japan); Hayato Yano, Yuji Koetaka, Kyoto Univ. (Japan); Toshihiro Omori, Yuji Sutou, Ryosuke Kainuma, Kiyohito Ishida, Tohoku Univ. (Japan) [8345-88]
Coffee Break. 10:20 to 10:50 am

Concurrent Sessions

SESSION 10a

**Room: Royal Palm V
Thurs. 9:20 to 10:20 am**

Strain-Based SHM for Civil Infrastructure

Session Chairs: Akira Sasamoto, National Institute of Advanced Industrial Science and Technology (Japan); Pei-Chen Su, Nanyang Technological Univ. (Singapore)

9:20 am: **Large-scale surface strain gauge for health monitoring of civil structures**, Simon Lafflamme, Iowa State Univ. (USA); Matthais Kolloosche, Guggi Kofod, Univ. Potsdam (Germany) [8347-62]

9:40 am: **Long-term gage reliability for structural health monitoring of steel bridges**, Vasilis Samaras, Jeremiah Fasl, Matt Reichenbach, Todd Helwig, Sharon L. Wood, The Univ. of Texas at Austin (USA); Karl H. Frank, Hirschfeld Industries (USA) [8347-63]

10:00 am: **Development of a wireless strain node and the software required to monitor fracture-critical bridges**, Jeremiah D. Fasl, Vasilis Samaras, Matthew Reichenbach, Todd A. Helwig, Sharon L. Wood, The Univ. of Texas at Austin (USA); David Potter, National Instruments Corp. (USA); Richard Lindenberg, Wiss, Janney, Elstner Associates, Inc. (USA); Karl Frank, Hirschfeld Industries (USA) [8347-64]
Coffee Break. 10:20 to 10:50 am

SESSION 10b

**Room: Sunset
Thurs. 9:20 to 10:20 am**

Acoustic Emission and Ultrasonic-based NDE/SHM of Civil Infrastructure I

Session Chairs: Ying Zhang, Georgia Institute of Technology (USA); Lingyu Yu, Univ. of South Carolina (USA)

9:20 am: **Characterization of AE from fatigue crack growth in steel bridge components**, Felipe Mejia, Navid Nemati, Antonio Nanni, Univ. of Miami (USA) [8347-65]

9:40 am: **Acoustic emission noise assessment of loaded members in laboratory and field environments**, Tala Shokri, Navid Nemati, Antonio Nanni, Univ. of Miami (USA) [8347-66]

10:00 am: **Multi-physics modeling of sensor-structure interaction for quantitative acoustic emission**, Zahra Heidary, Didem Ozevin, Univ. of Illinois at Chicago (USA) [8347-67]
Coffee Break. 10:20 to 10:50 am

SESSION 12

**Room: Royal Palm I
Thurs. 9:20 to 10:20 am**

Nonlinear Techniques for SHM

Session Chairs: Victor Giurgiutiu, Univ. of South Carolina (USA); Daniel Guyomar, Institut National des Sciences Appliquées de Lyon (France)

9:20 am: **Predictive simulation of nonlinear ultrasonics**, Yanfeng Shen, Victor Giurgiutiu, Univ. of South Carolina (USA) [8348-86]

9:40 am: **Identification of nonlinearities for damage inspection of thin-walled structures**, Pengjin F. Pai, Univ. of Missouri-Columbia (USA) [8348-87]

10:00 am: **Sensor location analysis for nonlinear acoustics based damage detection in composite structures**, Andrzej Klepka, Wieslaw J. Staszewski, AGH Univ. of Science and Technology (Poland); Francesco Aymerich, Univ. degli Studi di Cagliari (Italy); Tadeusz Uhl, AGH Univ. of Science and Technology (Poland). [8348-88]
Coffee Break. 10:20 to 10:50 am

Conference 8340

Concurrent Sessions

SESSION 11a

Room: Pacific Salon III
Thurs. 10:40 am to 12:20 pm

Applications I

Session Chairs: **Hyouk Ryeol Choi**, Sungkyunkwan Univ. (Korea, Republic of); **Edwin W. H. Jager**, Linköping Univ. (Sweden)

10:40 am: **Electroactive polymer based force sensor for robotic fingertip tactile sensing** (*Invited Paper*), Baek-chul Kim, Hokyun Won, Y. Lee, Jae-Do Nam, Hyungpil Moon, Hyouk Ryeol Choi, Ja Choon Koo, Sungkyunkwan Univ. (Korea, Republic of) [8340-49]

11:20 am: **Acoustic transducer for automotive applications based on dielectric elastomers**, Christian Graf, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany); Wei Lange-Mao, Daniel Jendritza, Johnson Controls GmbH (Germany) [8340-50]

11:40 am: **Active high temperature polymers and polymer nanocomposites for aerospace applications**, Mitra Yoonessi, NASA Glenn Research Ctr. (USA); John Peck, The Univ. of Akron (USA); Bradley A. Lerch, NASA Glenn Research Ctr. (USA); Ying Shi, Robert Weiss, The Univ. of Akron (USA); Gokhan Hatipoglu, Yang Liu, Qiming M. Zhang, The Pennsylvania State Univ. (USA); Dean Tigelaar, Michael A. Meador, NASA Glenn Research Ctr. (USA) [8340-51]

12:00 am: **Design and optimization of small-sized actuator for driving optical lens with different shapes based on IPMCs**, Yanjie Wang, Hualing Chen, Bin Luo, Zicai Zhu, Xi'an Jiaotong Univ. (China) [8340-52]

Lunch Break 12:20 to 1:30 pm

SESSION 11b

Room: Royal Palm IV
Thurs. 10:40 am to 12:20 pm

Active Polymers: Liquid Crystals, Etc.

Session Chairs: **Alejandro D. Rey**, McGill Univ. (Canada); **Jadranka Travas-Sejdic**, The Univ. of Auckland (New Zealand)

10:40 am: **Enhanced IPMC actuation by thermal cycling**, Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Kazuto Takashima, Kyushu Institute of Technology (Japan); Toshiharu Mukai, RIKEN (Japan) [8340-91]

11:00 am: **Novel approach to enhancement of mechanical and electrical properties of carbon nanotube yarn**, Javad Foroughi, Geoff M. Spinks, Gordon G. Wallace, Univ. of Wollongong (Australia); Seon-Jeong Kim, Hanyang Univ. (Korea, Republic of); Ray Baughman, The Univ. of Texas at Dallas (USA); Farzad Safaei, Univ. of Wollongong (Australia) [8340-98]

11:20 am: **Hydraulic actuated artificial muscles**, Rashi Tiwari, Mike A. Meller, Caris Moses, Karl B. Wajcs, Ismael Reveles, Ephraim Garcia, Cornell Univ. (USA) [8340-54]

11:40 am: **Synthesis and characterization of multiwalled carbon nanotube/IPMC actuator for imitating locomotion of gecko's toes**, Qingsong He, Min Yu, Yan Ding, Dongjie Guo, Zhendong Dai, Nanjing Univ. of Aeronautics and Astronautics (China) [8340-55]

12:00 am: **Tracking electrical and mechanical energy currents in dielectric elastomer generators to assess the aptitude of special elastomers for energy harvesting**, Rainer Kaltseis, Johannes Kepler Univ. Linz (Austria); Christoph Keplinger, Harvard Univ. (USA) and Johannes Kepler Univ. Linz (Austria); Richard Baumgartner, Martin Kaltenbrunner, Johannes Kepler Univ. Linz (Austria); Tiefeng Li, Zhejiang Univ. (China) and Harvard Univ. (USA); Philip Mächler, Reinhard Schwödiouer, Johannes Kepler Univ. Linz (Austria); Zhigang Suo, Harvard Univ. (USA); Siegfried Bauer, Johannes Kepler Univ. Linz (Austria) [8340-56]

Lunch Break 12:20 to 1:30 pm

Conference 8341

Concurrent Sessions

SESSION 13a

Room: Sunrise
Thurs. 10:50 am to 12:10 pm

Micro and Nano Integrated Systems

10:50 am: **Design and analysis of a 10GHz VCO using MEMS inductor**, Nazuhusna Khalid, Jugdutt J. Singh, Kriyang Shah, La Trobe Univ. (Australia) [8341-59]

11:10 am: **Design and analysis of film bulk acoustic wave resonator in Ku-band frequency range for wireless communication**, Nurul Izza Mohd Nor, Kriyang V. Shah, Jugdutt J. Singh, La Trobe Univ. (Australia); Zaliman Sauli, Univ. Malaysia Perlis (Malaysia) [8341-60]

11:30 am: **Homogenization and micromechanical analysis of piezo-fiber reinforced composites**, Srikant S. Padhee, Indian Institute of Science (India) [8341-61]

11:50 am: **Photo-responsive gel actuator developed with scanning microscopic light scattering**, Hidemitsu Furukawa, Yamagata Univ. (Japan); Mayumi Yoshikawa, Kyoko Yamada, Toshiyuki Watanabe, Tokyo Univ. of Agriculture and Technology (Japan); Ruri Hidema, Yamagata Univ. (Japan); Kazuyuki Horie, The Univ. of Tokyo (Japan) [8341-62]

Lunch Break 12:10 to 1:40 pm

SESSION 13b

Room: Towne
Thurs. 10:50 am to 12:10 pm

SMA- and Piezo-based Materials and Systems II

10:50 am: **Power enhancement of piezoelectric transformers by adding thermal pad**, Yu-Hao Su, Yuan-Ping Liu, Dejan Vasic, Francois Costa, Ecole Normale Supérieure de Cachan (France) . . . [8341-63]

11:10 am: **Piezoelectric sensors for non-linear systems identification in mechanical applications vibration suppression**, Francesco Ripamonti, Gabriele Cazzulani, Ferruccio Resta, Politecnico di Milano (Italy) [8341-64]

11:30 am: **Development of a d33 mode piezo-composite generating element**, Jun Zhao, Zhefeng Xuan, Nam-Seo Goo, Konkuk Univ. (Korea, Republic of) [8341-65]

11:50 am: **Experimental study on repair of a notched beam with piezoelectric patches**, Nan Wu, Q. Wang, Univ. of Manitoba (Canada) [8341-66]

Lunch Break 12:10 to 1:40 pm

Conference 8342

SESSION 13

Room: Royal Palm II
Thurs. 10:50 am to 12:10 pm

SMA: Experimental

10:50 am: **Effects of copper addition and annealing temperature on transition temperature of Ni-Ti shape memory alloys**, Alex Villanueva, Shashank Priya, Virginia Polytechnic Institute and State Univ. (USA) [8342-52]

11:10 am: **Stress-induced tuning of ultrasonic additive manufacturing Al-NiTi composites**, Ryan M. Hahnen, Marcelo J. Dapino, The Ohio State Univ. (USA) [8342-53]

11:30 am: **An innovative approach to achieve self centering and ductility of cement mortar beams through randomly distributed pseudo-elastic shape memory alloy fibers**, N. Shajil, Sivakumar M. Srinivasan, Manu Santhanam, Indian Institute of Technology Madras (India) [8342-54]

11:50 am: **Shape memory behavior of high strength NiTiHfPd alloys**, Emre Acar, Sayed Saghaian, Haluk E. Karaca, Univ. of Kentucky (USA) [8342-55]

Lunch Break 12:10 to 1:40 pm

Conference 8344

SESSION 16

Room: Royal Palm III
Thurs. 10:30 am to 12:30 pm

Applications II

Session Chair: Hyunjung Kim, National Institute of Aerospace (USA)

10:30 am: **Nondestructive technology for the assessment of dental implant stability**, Aydin Tabrizi, Bruk Berhanu, Piervincenzo Rizzo, Mark W. Ochs, Univ. of Pittsburgh (USA) [8344-48]

10:50 am: **Capacitive micromachined ultrasonic matrix array transducer for volumetric imaging in real time**, Yongrae Roh, Sunghag Kim, Kyungpook National Univ. (Korea, Republic of); Jong Keun Song, Kyung Il Cho, Youngil Kim, Seungheun Lee, Baehyung Kim, Dongwook Kim, Samsung Advanced Institute of Technology (Korea, Republic of) [8344-49]

11:10 am: **Medical CT image reconstruction accuracy in the presence of metal objects using x-rays up to 1MeV with x-ray targets of Beryllium, Carbon, Aluminum, Copper, and Tungsten**, James E. Clayton, Varian Medical Systems, Inc. (USA) [8344-50]

11:30 am: **Investigation of a coplanar strip dipole rectenna elements for microwave power transmission: simulation and experiment**, Sang Yeol Yang, Inha Univ. (Korea, Republic of); Kyo D. Song, Hargsoon Yoon, Norfolk State Univ. (USA); Jaehwan Kim, Inha Univ. (Korea, Republic of) [8344-51]

11:50 am: **Predicting brain tissue deformation around an implantable electrode due to dynamic micromotion**, Michael Polanco, Old Dominion Univ. (USA); Hargsoon Yoon, Norfolk State Univ. (USA); Keejoo Lee, Old Dominion Univ. (USA) [8344-52]

12:10 pm: **Size dependence of the electrochemical properties of hematite particles and their applications in lithium ion batteries**, Linfeng Chen, Gaojun Wang, Gyanesh N. Mathur, Vijay K. Varadan, Univ. of Arkansas (USA) [8344-53]

Conference End.

Conference 8345

Concurrent Sessions

SESSION 13a

Room: Pacific Salon IV-V
Thurs. 10:50 am to 12:10 pm

Structural Vibration Control

Session Chair: Paul Reynolds, The Univ. of Sheffield (United Kingdom)

10:50 am: **Tunable liquid dampers with multi cells for wind vibration control of tall buildings**, Dong-Ik Kim, Kyung-Won Min, Dankook Univ. (Korea, Republic of); Ji-Hun Park, Univ. of Incheon (Korea, Republic of); Hye-Ri Lee, I'ST Co. Ltd. (Korea, Republic of) [8345-89]

11:10 am: **Exploring efficiencies of SISO, multi-SISO, SIMO, and MIMO AVC schemes for floor vibration control**, Donald S. Nyawako, Paul Reynolds, Malcolm J. Hudson, The Univ. of Sheffield (United Kingdom) [8345-90]

11:30 am: **Development and testing of a newly proposed continuously variable stiffness/damping device for vibration control**, Kenneth K. Walsh, Kyle D. Grunpnhof, Ohio Univ. (USA) [8345-91]

11:50 am: **A framework for advanced methods of control of human-induced vibrations**, Paul Reynolds, The Univ. of Sheffield (United Kingdom) [8345-92]

Lunch Break 12:10 to 1:40 pm

SESSION 13b

Room: Pacific Salon VI-VII
Thurs. 10:50 am to 12:10 pm

Smart Structures and Monitoring II

Session Chairs: Akira Mita, Keio Univ. (Japan); Piotr Omenzetter, The Univ. of Auckland (New Zealand)

10:50 am: **Assessment of dynamic and long term performance of an innovative multi-story timber building via structural monitoring**, Piotr Omenzetter, Hugh Morris, The Univ. of Auckland (New Zealand) [8345-93]

11:10 am: **Sensor agent robot with servo-accelerometer for structural health monitoring**, Nobukazu Lee, Akira Mita, Keio Univ. (Japan) [8345-94]

11:30 am: **Active evacuation guidance using sensor agent robot**, Daiki Ise, Akira Mita, Keio Univ. (Japan) [8345-95]

11:50 am: **Estimation of uncomfortable feeling based on observation of unconscious behavior of residents for homeostasis control**, Mami Takase, Akira Mita, Keio Univ. (Japan) [8345-96]

Lunch Break 12:10 to 1:40 pm

Conference 8347

Concurrent Sessions

SESSION 11a

Room: Royal Palm V
Thurs. 10:50 am to 12:10 pm

SHM Systems for Civil Infrastructure I

Session Chairs: Valery F. Godinez-Azcua, MISTRAS Group, Inc. (USA); Akira Sasamoto, National Institute of Advanced Industrial Science and Technology (Japan)

10:50 am: **Status in the development of self-powered wireless sensor node for structural health monitoring and prognosis**, Valery F. Godinez-Azcua, MISTRAS Group, Inc. (USA); Justin R. Farmer, Virginia Polytechnic Institute and State Univ. (USA); Paul Ziehl, Victor Giurgiutiu, Univ. of South Carolina (USA); Antonio Nanni, Univ. of Miami (USA); Daniel J. Inman, Univ. of Michigan (USA) ... [8347-68]

11:10 am: **Dynamic decision-making for sustainable infrastructure integrating life cycle assessment, wireless structural monitoring systems, and system optimization**, Michael D. Lepech, Stanford Univ. (USA) [8347-69]

11:30 am: **Incorporating structural health monitoring and decision making concepts in bridge management framework**, Sharada Alampalli, Prospect Solutions, LLC (USA) [8347-70]

11:50 am: **Distributed cyberinfrastructure tools for automated condition assessment of civil infrastructure systems**, Yilan Zhang, Masahiro Kurata, Jerome P. Lynch, Univ. of Michigan (USA); Gwendolyn van der Linden, Hassan Sederat, SC Solutions, Inc. (USA) [8347-71]

Lunch Break 12:10 to 1:40 pm

SESSION 11b

Room: Sunset
Thurs. 10:50 am to 12:10 pm

Acoustic Emission and Ultrasonic-based NDE/SHM of Civil Infrastructure II

Session Chairs: Ying Zhang, Georgia Institute of Technology (USA); Pei-Chen Su, Nanyang Technological Univ. (Singapore)

10:50 am: **Signal identification in acoustic emission monitoring of fatigue cracking in steel bridges**, Jianguo Yu, Paul Ziehl, Univ. of South Carolina (USA); Adrian Pollock, MISTRAS Group, Inc. (USA) [8347-72]

11:10 am: **Comparative study of active and passive sensing with AE and PWAS transducers**, Lingyu Yu, Victor Giurgiutiu, Jianguo Yu, Paul Ziehl, Yanfeng Shen, Liuxian Zhao, Univ. of South Carolina (USA) [8347-73]

11:30 am: **Improvements in air-coupled sensing of concrete structures**, Jinying Zhu, Yi-Te Tsai, Xiaowei Dai, Michael Haberman, The Univ. of Texas at Austin (USA) [8347-74]

11:50 am: **Measurement of pore size distribution in concrete by advanced ultrasonic analyses**, Ye Sun, Xiong Yu, Case Western Reserve Univ. (USA) [8347-75]

Lunch Break 12:10 to 1:40 pm

Conference 8348

SESSION 13

Room: Royal Palm I
Thurs. 10:50 am to 12:10 pm

Optical Devices and Techniques for SHM

Session Chairs: Daniel Guyomar, Institut National des Sciences Appliquées de Lyon (France); Piervincenzo Rizzo, Univ. of Pittsburgh (USA)

10:50 am: **Dynamic fiber Bragg grating strain sensing with wavelength-locked tunable fiber ring laser**, Yinian Zhu, Sridhar Krishnaswamy, Northwestern Univ. (USA) [8348-89]

11:10 am: **Dynamic characteristics of a wind turbine blade using 3D digital image correlation**, Javad Baqersad, Christopher Niezrecki, Peter Avitabile, Jennifer Carr, Troy Lundstrom, Univ. of Massachusetts Lowell (USA) [8348-90]

11:30 am: **In-situ acousto-ultrasonic monitoring of crack propagation in Al₂O₃ alloy**, Prashanth Abraham Vanniamparambil, Antonios Koutsos, Ivan Bartoli, Kavan Hazeli, Raghavendra Saralaya, Daniel Servansky, Jefferson Cuadra, Eric Schwartz, Drexel Univ. (USA) [8348-91]

11:50 am: **Metal detector using a polymeric fiberoptic magnetostriction sensor**, Wei-Chih Wang, Univ. of Washington (USA) and National Cheng Kung Univ. (Taiwan); Wei-Shu Hua, Wen-Jong Wu, National Taiwan Univ. (Taiwan) [8348-92]

Lunch Break 12:10 to 1:40 pm

Conference 8340

Concurrent Sessions

SESSION 12a

Room: Pacific Salon III
Thurs. 1:30 to 3:10 pm

Applications II

Session Chairs: Todd A. Gisby, The Univ. of Auckland (New Zealand); Kwang Jin Kim, Univ. of Nevada, Reno (USA)

1:30 pm: **Contractile electroactive materials and actuators**, Lenore Rasmussen, Ras Labs., LLC (USA); Lewis D. Meixler, Charles Gentile, Princeton Plasma Physics Lab. (USA) [8340-57]

1:50 pm: **Multi-layer beam with variable stiffness based on electroactive polymers**, Markus Henke, Jörg Sorber, Gerald Gerlach, Technische Univ. Dresden (Germany) [8340-58]

2:10 pm: **A bio-inspired bell kinematics design of a jellyfish robot using ionic polymer metal composites actuators**, Joseph Najem, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (USA) [8340-59]

2:30 pm: **Stretching cells with DEAs**, Samin Akbari, Herbert Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [8340-60]

2:50 pm: **Smart artificial muscles for soft machines**, Todd A. Gisby, Tony C. H. Tse, Benjamin M. O'Brien, Iain A. Anderson, The Univ. of Auckland (New Zealand) [8340-61]

SESSION 12b

Room: Royal Palm IV
Thurs. 1:30 to 3:30 pm

Energy Harvesting

Session Chairs: Christoph Keplinger, Harvard Univ. (USA); Thomas G. McKay, The Univ. of Auckland (New Zealand)

1:30 pm: **Efficiency prediction of energy harvesters of IPMCs based on the streaming potential method**, Yanjie Wang, Hualing Chen, Bin Luo, Zicai Zhu, Xi'an Jiaotong Univ. (China) [8340-62]

1:50 pm: **Energy harvesting with dielectric elastomer generators based on natural rubber**, Christoph Keplinger, Harvard Univ. (USA) and Johannes Kepler Univ. Linz (Austria); Rainer Kaltseis, Richard Baumgartner, Johannes Kepler Univ. Linz (Austria); Soo Jin Adrian Koh, Institute of High Performance Computing (Singapore) and National Univ. of Singapore (Singapore); Reinhard Schwödlaier, Ingrid Graz, Johannes Kepler Univ. Linz (Austria); Tiefeng Li, Zhejiang Univ. (China) and Harvard Univ. (USA); Zhigang Suo, Harvard Univ. (USA); Siegfried Bauer, Johannes Kepler Univ. Linz (Austria) [8340-63]

2:10 pm: **Dielectric elastomer energy harvesting undergoing polarization saturation**, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [8340-64]

2:30 pm: **Efficiency limits of dielectric elastomer energy harvesters**, Paul Brochu, Hristiyan Stoyanov, Qibing Pei, Univ. of California, Los Angeles (USA) [8340-65]

2:50 pm: **Modeling guided design of dielectric elastomer generators and actuators**, Tiefeng Li, Shaoxing Qu, Zhejiang Univ. (China); Christoph Keplinger, Rainer Kaltseis, Richard Baumgartner, Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria); Zhigang Suo, Harvard Univ. (USA); Wei Yang, Zhejiang Univ. (China) [8340-66]

3:10 pm: **Self-priming dielectric elastomer generator design**, 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) [8340-67]

Conference End.

Conference 8341

Concurrent Sessions

SESSION 14a

Room: Sunrise
Thurs. 1:40 to 2:20 pm

Energy Harvesting and Scavenging IV: Design of Energy Harvesting Systems

1:40 pm: **Two member piezoelectric structure for vibration energy harvesting**, Rameen Aryanpur, Robert D. White, Tufts Univ. (USA) [8341-67]

2:00 pm: **Optimized energy harvesting from mechanical vibrations through piezoelectric actuators, based on a synchronized switching technique**, Petros Tsampas, Innora Ltd. (Greece); Alexandros Nikolakakis, Giannis Roditis, Vasilis Papadimitriou, The Ctr. for Research and Technology, Thessaly (Greece); Panagiotis Chatzakos, Innora Ltd. (Greece); Tat-Hean Gan, TWI Ltd. (United Kingdom) [8341-70]

SESSION 14b

Room: Towne
Thurs. 1:40 to 3:00 pm

Magneto Rheological Systems II

1:40 pm: **Dynamic behavior of thick magnetorheological elastomers**, Norman Johnson, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (USA) [8341-72]

2:00 pm: **MRF actuators with reduced no-load losses**, Dirk G. Güth, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) [8341-73]

2:20 pm: **A bi-annular-gap magnetorheological energy absorber for shock and vibration mitigation**, Xian-Xu Bai, Chongqing Univ. (China); Norman M. Wereley, Young-Tai Choi, Univ. of Maryland, College Park (USA); Dai-Hua Wang, Chongqing Univ. (China) [8341-75]

2:40 pm: **Active vibration control through magnetostrictive layers**, Simone Cinquemani, Francesco Braghin, Ferruccio Resta, Politecnico di Milano (Italy) [8341-76]

Conference 8342

SESSION 14

Room: Royal Palm II
Thurs. 1:40 to 3:20 pm

SMA: Modeling and Characterization

1:40 pm: **Phenomenological modeling of induced transformation anisotropy in shape memory alloy actuators**, Alexis Solomou, Univ. of Patras (Greece); Darren J. Hartl, Dimitris C. Lagoudas, Texas A&M Univ. (USA); Dimitris Saravanos, Univ. of Patras (Greece) [8342-56]

2:00 pm: **Homogenized energy model for antagonistic shape memory alloy actuators**, John Crews, North Carolina State Univ. (USA); Stephen Furst, Univ. des Saarlandes (Germany); Ralph Smith, North Carolina State Univ. (USA) [8342-57]

2:20 pm: **A closed-form solution for superelastic shape memory alloy beams subjected to bending**, Reza Mirzaeifar, Reginald DesRoches, Arash Yavari, Ken Gall, Georgia Institute of Technology (USA) [8342-58]

2:40 pm: **Evolution of phase transformation and reorientation during stress arrest in shape memory alloys**, Vigel R. Russalian, Abhijit Bhattacharyya, Univ. of Arkansas at Little Rock (USA) [8342-59]

3:00 pm: **Effect of applied stresses on retained martensite accumulation in NiTi shape memory alloys**, Parikshith Kumar, Ken Cundiff, Texas A&M Univ. (USA); Celia Caer, Ecole Nationale d'Ingénieurs de Brest (France); Dimitris C. Lagoudas, Etienne Patoor, Texas A&M Univ. (USA) [8342-60]

Coffee Break 3:20 to 3:50 pm

Conference 8345

Concurrent Sessions

SESSION 14a

Room: Pacific Salon IV-V
Thurs. 1:40 to 3:00 pm

Multifunctional Materials for Smart Structures

Session Chairs: **Hong Susan Zhou**, Worcester Polytechnic Institute (USA); **Alison B. Flatau**, Univ. of Maryland, College Park (USA)

- 1:40 pm: **Sensing performance of electrically conductive suspension lines and capacitance sensor-embedded fabrics for parachutes**, Mark J. Damplo, Christopher Niezrecki, David Willis, Julie Chen, Eugene E. Niemi, Jr., Sanjeev Manohar, Univ. of Massachusetts Lowell (USA); Kenneth J. Desabrais, U.S. Army Natick Soldier Research, Development and Engineering Ctr. (USA)[8345-97]
- 2:00 pm: **MEMS-based spectral decomposition of acoustic signals**, Michael S. Kranz, Stanley Associates (USA); Tracy D. Hudson, U.S. Army Aviation and Missile Command (USA) . [8345-98]
- 2:20 pm: **In-situ non-contact damage detection in SMA reinforced CFRP**, Michele Meo, Univ. of Bath (United Kingdom) [8345-99]
- 2:40 pm: **Modeling of vibration damping in microfibrinous material**, Pregassen Soobramaney, George T. Flowers, Robert N. Dean, Jr., Auburn Univ. (USA) [8345-100]
- Coffee Break. :3:20 to 3:50 pm

SESSION 14b

Room: Pacific Salon VI-VII
Thurs. 1:40 to 3:20 pm

Advances in Fiber Optic Technology

Session Chairs: **Kara J. Peters**, North Carolina State Univ. (USA); **Branko Glisic**, Princeton Univ. (USA)

- 1:40 pm: **The connection technology based on high temperature silica fiber optic sensor**, Wei H. Xie, Harbin Institute of Technology (China) [8345-101]
- 2:00 pm: **Fiber optic shape sensing for monitoring of flexible structures**, Evan M. Lally, Matthew Reaves, Emily Horrell, Sandra M. Klute, Mark E. Froggatt, Luna Innovations Inc. (USA) [8345-102]
- 2:20 pm: *** Coaxial cable Bragg grating sensors for large strain measurement with high accuracy**, Jie Huang, Tao Wei, Xinwei Lan, Jun Fan, Hai Xiao, Missouri Univ. of Science and Technology (USA) [8345-103]
- 2:40 pm: **Enhancing active vibration control performances in a smart structure by using fiber Bragg gratings sensors**, Simone Cinquemani, Lorenzo Comolli, Andrea Gardella, Politecnico di Milano (Italy) [8345-104]
- 3:00 pm: **Structural health monitoring of CFRP airframe structures using fiber-optic-based strain mapping**, Ichiya Takahashi, Kazushi Sekine, Masami Kume, Hajime Takeya, Mitsubishi Electric Corp. (Japan); Yutaka Iwahori, Japan Aerospace Exploration Agency (Japan); Shu Minakuchi, Nobuo Takeda, The Univ. of Tokyo (Japan); Kiyoshi Enomoto, The Materials Process Technology Ctr. (Japan) [8345-105]
- Coffee Break. :3:20 to 3:50 pm

* Indicates paper that will also be presented in the NSF Poster Session, p. 33.

Conference 8347

SESSION 12

Room: Royal Palm V
Thurs. 1:40 to 3:20 pm

SHM Systems for Civil Infrastructure II

Session Chairs: **Genda Chen**, Missouri Univ. of Science and Technology (USA); **Jinying Zhu**, The Univ. of Texas at Austin (USA)

- 1:40 pm: **A web-based SDSS-aided visualization system for volunteer network sensing**, Shenen Chen, Yonghong Tong, Haitao Bian, Libin Bai, The Univ. of North Carolina at Charlotte (USA) [8347-76]
- 2:00 pm: **Probabilistic structural risk assessment for fatigue management using SHM**, Michael Shiao, Anindya Ghoshal, James Ayers, U.S. Army Research Lab. (USA) [8347-77]
- 2:20 pm: **Probabilistic load rating based on family of models approach for decision making**, F. Necati Catbas, Hasan B. Gokce, Univ. of Central Florida (USA) [8347-78]
- 2:40 pm: **Evaluation of risk metrics in structural health monitoring process**, Sreenivas Alampalli, New York State Dept. of Transportation (USA); Sharada Alampalli, Prospect Solutions, LLC (USA); Mohammed M. Ettouney, Weidlinger Associates, Inc. (USA) [8347-79]
- 3:00 pm: **Finite element model updating of a skewed highway bridge using a multivariable sensitivity-based optimization approach**, Amir A. Mosavi, Hassan Sedarat, SC Solutions, Inc. (USA); Masahiro Kurata, Sean O'connor, Univ. of Michigan (USA); Abbas Emami-Naeini, Vince Jacob, Alex Krivotat, SC Solutions, Inc. (USA); Jerome Lynch, Univ. of Michigan (USA) [8347-80]
- Coffee Break. :3:20 to 3:50 pm

Conference 8348

SESSION 14

Room: Royal Palm I
Thurs. 1:40 to 3:00 pm

Uncertainties in SHM and Pipe Monitoring

Session Chairs: **Henrique L. Reis**, Univ. of Illinois at Urbana-Champaign (USA); **Lingyu Yu**, Univ. of South Carolina (USA)

- 1:40 pm: **Sensor and measurement statistics in ultrasonic assessment of aerospace structures**, Andrei N. Zagrai, David Conrad, Daniel Meisner, New Mexico Institute of Mining and Technology (USA) [8348-93]
- 2:00 pm: **Semi Monte Carlo sampling approach for data normalization in statistical time-series-based damage identification**, Theanh Nguyen, Tommy H. T. Chan, David P. Thambiratnam, Queensland Univ. of Technology (Australia) [8348-94]
- 2:20 pm: **Detection and monitoring of axial cracks on cylindrical structures using torsional wave generated by piezoelectric macro-fiber composite**, Lin Cui, Say Ian Lim, Yu Liu, Miao Shi, Chee Kiong Soh, Nanyang Technological Univ. (Singapore) [8348-95]
- 2:40 pm: **Adaptive lossless image compression of oil pipelines**, Seyed Amir Seradji, Mohammad Mortazavi, Seyed Ghorshi, Sharif Univ. of Technology (Iran, Islamic Republic of) [8348-96]
- Conference End.

Conference 8341

SESSION 15

Room: Sunrise
Thurs. 2:20 to 3:20 pm

Passive and Active Vibration Isolation II

2:20 pm: **Multiband damping of resonant vibrating piezo-elastic structures by using digital adaptive passive shunting**, Helmut Wernick, Johannes Korak, Christoph Feyrer, PROFACTOR GmbH (Austria). [8341-77]

2:40 pm: **Integrated framework for jitter analysis combining disturbance, structure, vibration isolator, and optical model**, Dae Oen Lee, Jae San Yoon, Jae-Hung Han, KAIST (Korea, Republic of) [8341-78]

3:00 pm: **Development and performance study of a magnetic aerostatic vibration isolation platform**, Keng-Ning Chang, Kuang-Yuh Huang, National Taiwan Univ. (Taiwan). [8341-80]

Conference End.

Conference 8342

SESSION 15

Room: Royal Palm II
Thurs. 3:50 to 5:30 pm

Multifunctional Composites and Metamaterials

3:50 pm: **Development of thermoplastic coated multifunctional transmission elements**, Basile Golaz, Véronique Michaud, Jan-Anders E. Månson, Ecole Polytechnique Fédérale de Lausanne (Switzerland). [8342-61]

4:10 pm: **Noise and vibration mitigation in sandwich composite structures**, Jonghwan Suhr, James Sargjanis, Univ. of Delaware (USA). . . [8342-62]

4:30 pm: **Enhancement of impact-induced mechanoluminescence for structure health monitoring using swift heavy ion irradiation**, Tianzhuo Zhan, Kyushu Univ. (Japan); Chao-nan Xu, National Institute of Advanced Industrial Science and Technology (Japan) and Kyushu Univ. (Japan) and CREST, Japan Science and Technology Agency (JST) (Japan); Hiroshi Yamada, National Institute of Advanced Industrial Science and Technology (Japan) and Kyushu Univ. (Japan); Yujin Terasawa, Kyushu Univ. (Japan); Lin Zhang, National Institute of Advanced Industrial Science and Technology (Japan); Hiroshi Iwase, Masayoshi Kawai, High Energy Accelerator Research Organization (Japan) [8342-66]

4:50 pm: **Study on a new concept of multistable lattice structure**, Hong Fu Dai, Harbin Institute of Technology (China). [8342-63]

5:10 pm: **Conductivity and EMI shielding properties of electrospinning PANi/PEO/MWCNT fibrous membrane and its composite**, Zhichun Zhang, Xueyong Jiang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China). [8342-65]

Conference End.

Conference 8345

Concurrent Sessions

SESSION 15a

Room: Pacific Salon IV-V
Thurs. 3:50 to 5:30 pm

Next-Generation Sensing Systems for SHM: Applications

Session Chairs: Tomonori Nagayama, The Univ. of Tokyo (Japan); *Xiong Yu*, Case Western Reserve Univ. (USA)

3:50 pm: **A preliminary study on the use of optical navigation sensor for two dimensional crack propagation monitoring**, Chih-Chen Chang, Sin-Hang Man, Cheng Zhong Ng, Hassan Muhammad, Amine Bermak, Hong Kong Univ. of Science and Technology (Hong Kong, China) [8345-106]

4:10 pm: **Experimental study on impact force identification of ship-bridge collision using smart piezoelectric sensors**, Xiaowei Ye, Zhigang Guo, Yiqing Ni, Yang Chen, The Hong Kong Polytechnic Univ. (Hong Kong, China). [8345-107]

4:30 pm: **Damage detection of wind turbine blade with piezoelectric sensor array**, Yang Chen, Yiqing Ni, Xiaowei Ye, Hongxing Yang, Songye Zhu, The Hong Kong Polytechnic Univ. (Hong Kong, China). [8345-108]

4:50 pm: **Real-time monitoring of bridge scouring using ultrasonic sensing technology**, Biao Wu, Wenli Chen, Hui Li, Harbin Institute of Technology (China) [8345-109]

5:10 pm: **Dense vibration measurement of an arch-type bridge before and after its seismic retrofit using wireless smart sensors**, Tomonori Nagayama, The Univ. of Tokyo (Japan). [8345-110]

SESSION 15b

Room: Pacific Salon VI-VII
Thurs. 3:50 to 5:30 pm

Damage Assessment and Monitoring

Session Chairs: Akira Mita, Keio Univ. (Japan); *Xuefeng Zhao*, Dalian Univ. of Technology (China)

3:50 pm: **Damage diagnosis algorithm using a sequential change point detection method with an unknown distribution for damage**, Hae Young Noh, Ram Rajagopal, Anne S. Kiremidjian, Stanford Univ. (USA) [8345-111]

4:10 pm: *** Triboluminescence multifunctional cementitious composites with in-situ damage sensing capability**, David O. Olawale, Tarik J. Dickens, William G. Sullivan, Divyesh Bhakta, Okenwa O. Okoli, The Florida State Univ. (USA) . . . [8345-112]

4:30 pm: **Development of damage assessment package for building with isolation system and its application to 2011 Tohoku Earthquake**, Akira Mita, Ken Ichimura, Keio Univ. (Japan) [8345-113]

4:50 pm: **A novel kind of bridge scour monitoring system using thermal probes**, Xuefeng Zhao, Le Li, Qin Ba, Peng Gong, Jinping Ou, Dalian Univ. of Technology (China). [8345-114]

5:10 pm: **Inspection of wooden utility poles using a sonic/ultrasonic approach**, Adam Senalik, Megan McGovern, Univ. of Illinois at Urbana-Champaign (USA); Frank C. Beall, Univ. of California, Berkeley (USA); Henrique L. Reis, Univ. of Illinois at Urbana-Champaign (USA). [8345-115]

Conference End.

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SESSION 13

Room: Royal Palm V
Thurs. 3:50 to 4:50 pm

SHM Systems for Civil Infrastructure III

Session Chairs: Genda Chen, Missouri Univ. of Science and Technology (USA); *Jinying Zhu*, The Univ. of Texas at Austin (USA)

3:50 pm: **Nonlinear modeling of the vehicle/structure interaction on a skewed highway bridge using an iterative uncoupled approach**, Amir A. Mosavi, SC Solutions, Inc. (USA); Mainak Mitra, Univ. of Michigan (USA); Gwen van der Linden, SC Solutions, Inc. (USA); Tim Gordon, Univ. of Michigan (USA); Hassan Sedarat, Abbas Emami-Naeini, Vince Jacob, Alex Krimotat, SC Solutions, Inc. (USA); Jerome Lynch, Univ. of Michigan (USA) [8347-81]

4:10 pm: **Bridge scour monitoring with spatially distributed wireless smart rocks as field agents**, Genda Chen, David Pommerenke, Rosa Zheng, Missouri Univ. of Science and Technology (USA) [8347-82]

4:30 pm: **Bridge scour monitoring system: a pilot field evaluation**, Junliang Tao, Xinbao Yu, Xiong Yu, Case Western Reserve Univ. (USA) [8347-83]

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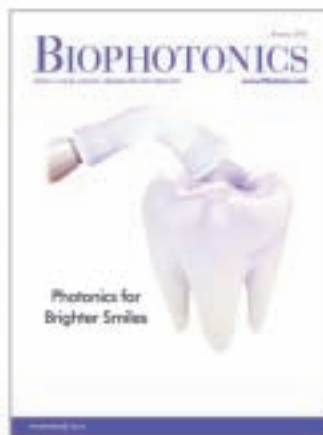
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Registration

Onsite Registration and Information Hours

Golden Foyer

Sunday 11 March	7:30 am to 4:00 pm
Monday 12 March	7:00 am to 5:15 pm
Tuesday 13 March	7:30 am to 4:00 pm, 5:30 to 7:00pm
Wednesday 14 March	7:45 am to 4:00 pm
Thursday 15 March	7:45 to 11:00 am

Exhibition Hours

Golden Ballroom

Tuesday 13 March	10:00 am to 4:00 pm, 5:30 to 7:00 pm
Wednesday 14 March	10:00 am to 4:00 pm

Course Materials Desk

Located at the SPIE Registration Desk, Golden Foyer

Open during Registration hours

- If you have registered to attend the course, please stop by the Course Materials Desk AFTER you pick up your badge.
- You must obtain your course notes to find out class location.

SPIE Receipts, Badge Corrections, Cashier

Golden Foyer

SPIE cashier can assist with registration payments, receipts and badge corrections.

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- **Badge Corrections** - Attendees who need a correction to their badge information onsite may do so at the SPIE Registration Desk. Please have your badge removed from the badge holder, marked with your changes, and ready to hand to the attendant upon approaching the counter.

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Sunday through Wednesday 7:00 am to 6:00 pm

Thursday 7:00 am to 1:30 pm

There will be multiple workstations allowing attendees to access their internet e-mail during the conference and several Ethernet connections to use with your personal laptop. There will be a 10-minute time limit per each person's internet session.

Internet Wireless Access

Guest rooms at The San Diego Town & Country Resort and Convention Center are equipped with high speed wireless internet. **This service is offered complimentary for guests staying at the Town & Country with Smart Structures 2012** Laptops will need an appropriate wireless card and access is available in all guest room areas. Please contact internet call center at Ext. 1234 to receive the WiFi password. Note: WiFi service is not available in or near meeting rooms.



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Coffee Breaks

Complimentary coffee will be served twice each day of the conference at approximately 10:00 am and 3:00 pm. Please check the individual technical conference listings for exact times and locations.

Sunday and Monday 10:00 am and 3:00 pm
Lions Fountain Court

Tuesday and Wednesday 10:00 am and 3:00 pm
Exhibition Hall, Golden Ballroom

Thursday 10:00 am and 3:00 pm
Lions Fountain Court

Desserts

Complimentary tickets for the dessert snacks will be included in conference attendee registration packets.

Tuesday and Wednesday 3:00 to 3:30 pm
Exhibition Hall, Golden Ballroom

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Author/Presenter Information _____

Audiovisual Desk / Preview Station

Golden Foyer

Sunday through Thursday 7:30 am to 5:00 pm
All conference rooms will have a computer workstation, LCD projector, screen, lapel microphone, and laser pointer.

All presenters are requested to come to the Speakers Check-In Room to confirm display settings of their presentations from their memory devices or laptops with the audiovisual equipment being used at this symposium.

Tuesday Poster/Exhibition Reception

Golden Ballroom/Exhibition Hall

Author Setup Time

Tuesday 13 March. 10:00 am to 4:00 pm

Tuesday Poster/Exhibition Reception

Tuesday 13 March. 6:00 to 7:30 pm

Extended Poster Viewing

Wednesday 14 March 10:00 am to 4:00 pm
Poster presenters must set up their posters during the designated time on the day of their assigned presentation.

- Paper numbers will be posted on the poster boards in numerical order; please find your paper number and post your poster in the designated space.
- A poster author or coauthor is required to stand by the poster during the scheduled poster session to answer questions from attendees.
- Presenters who have not placed their papers on their assigned board by the designated time on the day of their presentation will be considered a "no show" and their manuscript will not be published.
- Presenters must remove their posters immediately after the Wednesday viewing session.
- Posters not removed will be considered unwanted and will be discarded.
- SPIE assumes no responsibility for posters left up after the end of each poster session.

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In the Meeting Rooms and Poster Sessions: For copyright reasons, recordings of any kind are strictly prohibited without prior written consent of the presenter in any conference session, course or of posters presented. Each presenter being taped must file a signed written consent form. Individuals not complying with this policy will be asked to leave a given session and asked to surrender their film or recording media. Consent forms are available at the Speaker Check-In Desk.

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- We require that you to come to the Audiovisual Desk onsite and test your pointer on our power meter. If the pointer fails the safe power level you may not use the pointer at the conference. You will be required to sign a waiver releasing SPIE of any liability for use of potentially non-safe laser pointers.
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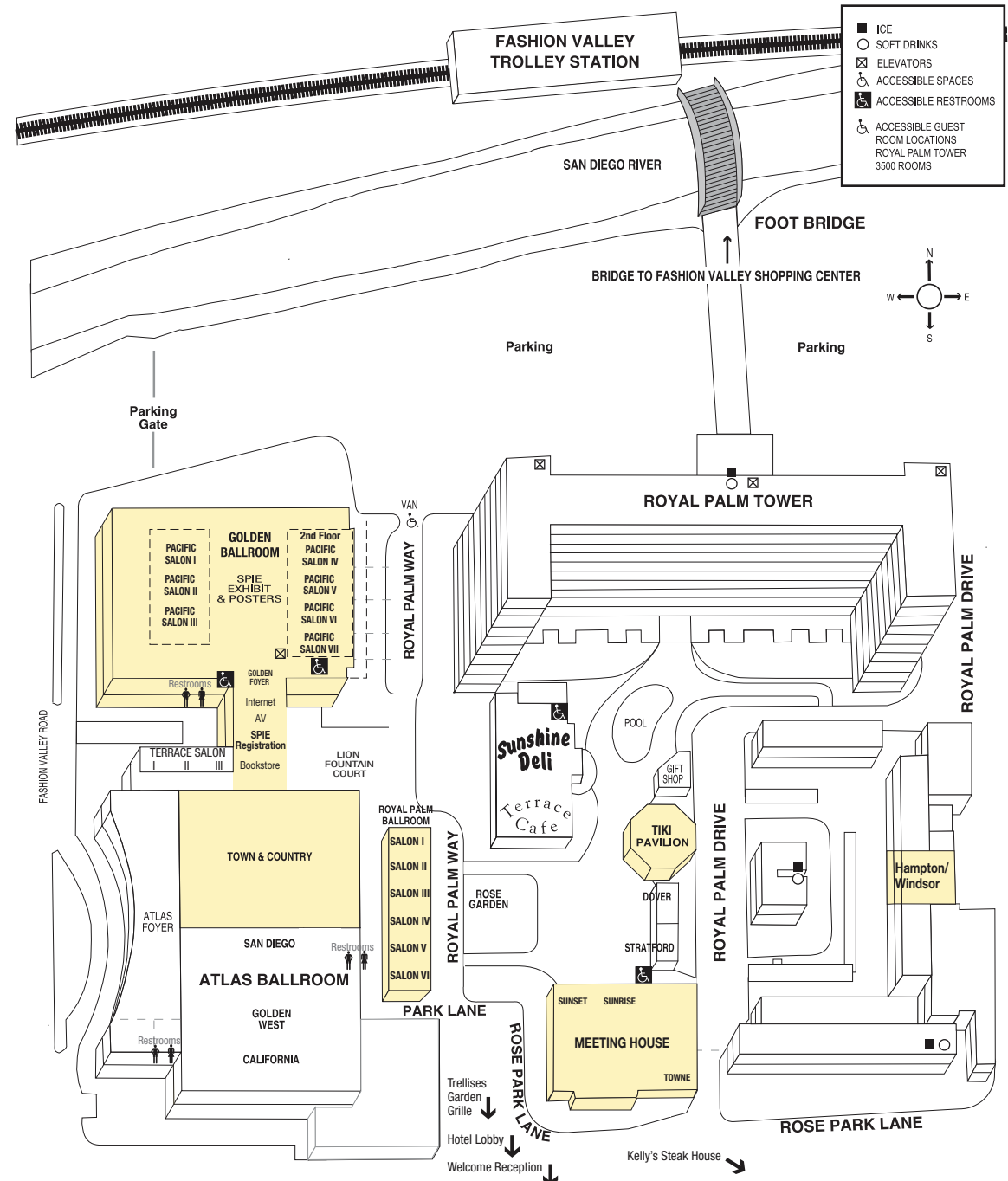
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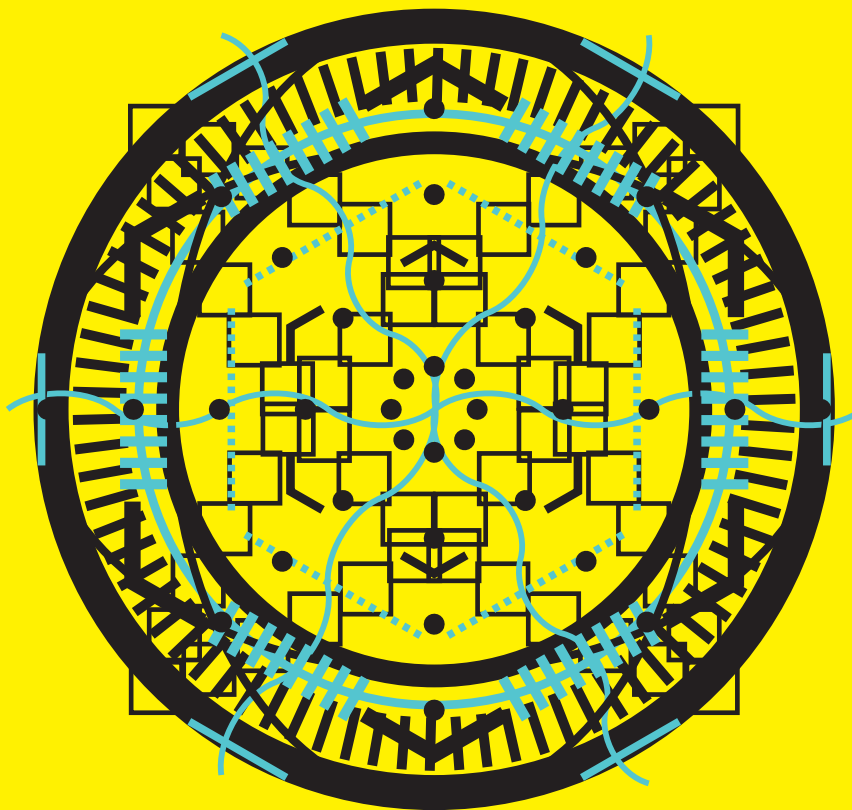
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12–13 March 2013

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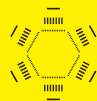
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