2013 Smart Structures/ NDE

—
Technical Program

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SPIE®

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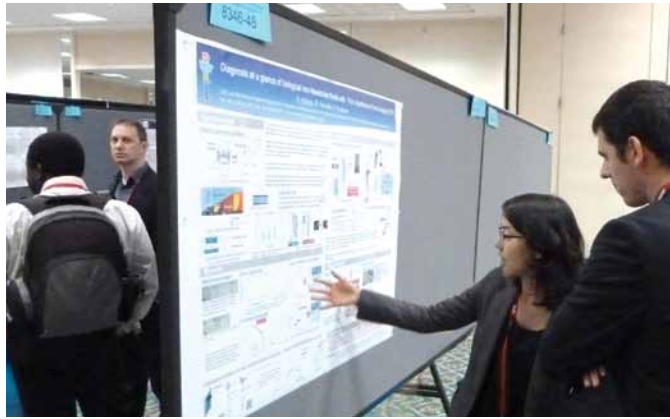and Convention Center
San Diego, California, USA

www.spie.org/ssndeconf

Conferences & Course
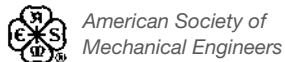10–14 March 2013

Exhibition
12–13 March 2013

Welcome

The Organizing Committee of the SPIE 20th 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 (USA)

Norman Wereley,
Univ. of Maryland,
College Park (USA)

Symposium Co-chairs

Victor Giurgiutiu,
Univ. of South Carolina
(USA)

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

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Jet Propulsion Lab.
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CELEBRATING
20 YEARS
SPIE SMART STRUCTURES/NDE

SPIE
Smart Structures/NDE
Technical Program

Conferences & Courses: 10–14 March 2013 · Exhibition: 12–13 March 2013
Town & Country Resort and Convention Center, San Diego, California, USA

Contents

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2013 Promotional Partners:
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Technical Conferences

Daily Schedule

	Sunday	Monday	Tuesday	Wednesday	Thursday
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		Plenary Presentation: **Perspectives on the characterization and modeling of shape memory alloys for smart structures applications** *(Lagoudas),* 8:30 to 9:15 am, p. 4	*Plenary Presentation:* **Ultrasonic and electro-magnetic waves for NDE and SHM: experiment and modelling** *(Kundu)* 8:25 to 9:10 am, p. 4	Plenary Presentation: **Pneumatic Artificial Muscles** *(Wereley),* 8:25 to 9:10 am, p. 4	
		Commercializing Innovative Solutions Inspired by Nature *(Stambaugh),* 9:15 to 10:00 am, p. 6-7	**Poster Viewing,** 10:00 am to 4:00 pm, p. 3	**Special Session on Non-contact Sensing and Excitation,** 9:30 am to 12:20 pm, p. 3	
		EAPAD Keynote Presentation *(Howell),* 10:30 to 11:10 am, p. 3	**Lunch with the Experts—A Student Networking Event,** 12:30 to 1:30 pm, p. 3	**Poster Viewing,** 10:00 am to 4:00 pm, p. 3	
		All Symposium Welcome Reception, 6:00 to 7:30 pm, p. 3	**Best Student Paper Session,** 2:00 pm to 5:00 pm, p. 3		
			Poster Session/Reception, 6:00 to 7:30 pm, p. 3		
			EXHIBITION, p. 11 10:00 am to 4:00 pm; 6:00 to 7:30 pm	**EXHIBITION**, p. 11 10:00 am to 4:00 pm	
Conferences + Course	**SC634 Electroactive Polymer Actuators and Devices,** 1:30 am to 5:30 pm, p. 5	Conf. 8686 **Bioinspiration, Biomimetics, and Bioreplication III** *(Martin-Palma)* p. 14–38			
		Conf. 8687 **Electroactive Polymer Actuators and Devices (EAPAD) XV** *(Bar-Cohen)* p. 14–46			
		Conf. 8688 **Active and Passive Smart Structures and Integrated Systems VII** *(Sodano)* p. 14–48			
		Conf. 8689 **Behavior and Mechanics of Multifunctional Materials and Composites VII** *(Goulbourne)* p. 14–44			
		Conf. 8690 **Industrial and Commercial Applications of Smart Structures Technologies VII** *(Farinholt)* p. 14–22			
		Conf. 8691 **Nano-, Bio-, Info-Tech Sensors and Systems** *(Varadan)* p. 15–44			
		Conf. 8692 **Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems** *(Lynch)* p. 15–48			
		Conf. 8693 **Smart Sensor Phenomena, Technology, Networks, and Systems Integration VI** *(Peters)* p. 15–37			
		Conf. 8694 **Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security VII** *(Yu)* p. 15°47			
		Conf. 8695 **Health Monitoring of Structural and Biological Systems VII** *(Kundu)* p. 15–48			

Special and Technical Events

EAPAD Keynote Presentation

Town & Country Ballroom

Monday 11 March . . . . 10:30 to 11:10 am

Compliant mechanisms: an ideal opportunity for integrated sensors and actuators

Larry L. Howell, Brigham Young Univ. (United States)

Abstract: Compliant mechanisms provide alternate solutions for transferring or transforming motion, force, or energy. Rather than using traditional components like bearings and hinges, compliant mechanisms rely on the deflection of flexible members for their mobility. The functionality of future compliant mechanisms may be enhanced by embedding sensors and actuators, resulting in monolithic devices capable of complex tasks. Compliant mechanisms show promise for addressing needs that are not easily solved through traditional approaches. These include medical implants that closely mimic the biological systems that they replace, mechanical devices in the micro and nano size scales, and hyper-compact devices for space craft.

Biography: **Larry L Howell** is a Professor and past chair of the Department of Mechanical Engineering at Brigham Young University (BYU), where he holds a University Professorship. Prof. Howell received his Ph.D. degree from Purdue University in 1993. Prior to joining BYU he was a visiting professor at Purdue University, a finite element analysis consultant for Engineering Methods, Inc., and an engineer on the design of the YF-22 (the prototype for the U.S. Air Force F-22). He is a Fellow of ASME, past chair of the ASME Mechanisms & Robotics Committee, and past associate editor for the Journal of Mechanical Design. He is the recipient of the ASME Mechanisms & Robotics Award, an NSF CAREER Award, the ASME Design Automation Conference Best Paper Award, BYU Technology Transfer Award, and the Maeser Research Award. Prof. Howell's patents and technical publications focus on compliant mechanisms and he is the author of the book Compliant Mechanisms published by John Wiley & Sons.

All Symposium Welcome Reception

Tiki Pavilion

Monday 11 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.

Lunch with the Experts—A Student Networking Event

Windsor

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

Open to Student Attendees

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. Seating is limited and will be granted on a first-come, first-served basis.

Posters

Golden Ballroom

Tuesday 12 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 12 March . . . . 10:00 am to 4:00 pm
Wednesday 13 March . . . . 10:00 am to 4:00 pm

Best Student Paper Session

Royal Palm One

Tuesday 12 March. . . . . 2:00 pm to 5:00 pm

Finalists for the SPIE/ASME Best Student Paper Awards will present their papers in this special session on Tuesday afternoon. Awards will be announced on Wednesday morning before the plenary session.

Special Session on Non-contact Sensing and Excitation

Pacific Salon Seven

Wednesday 13 March . . . . 9:30 am to 12:20 pm

This special session will feature a collection of topical presentations. The session will be held as a part of the conference Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems (8692). For detailed author and abstract information, please refer to conference 8692.

SS/NDE Awards

Town & Country Ballroom

Monday-Thursday 11-14 March . . . . 8:00 am to 5:00 pm

Awards will be presented throughout the week at the plenary sessions. These include:

- 2013 SSM Lifetime Achievement Awards
- 2013 NDE Lifetime Achievement Award
- ASME Gary Anderson Early Achievement Award
- Smart Structures Product Implementation Award
- SPIE/ASME Best Student Paper Award
- ASME Best Paper Award

Plenary Sessions · *Town & Country Ballroom*

Plenary sessions will consist of opening remarks, award presentations, and plenary presentations.

Monday · 8:15 to 8:30 am

SPIE Fellow Recognition

Monday · 8:30 to 9:15 am

Perspectives on the characterization and modeling of shape memory alloys for smart structures applications

Dimitris Lagoudas, Texas A&M Univ. (United States)

Abstract: This presentation provides an overview of past and present multifunctional materials research at the Texas Institute for Intelligent Materials and Structures at Texas A&M University. Various research areas related to shape memory materials are introduced, including characterization, constitutive modeling, numerical analysis, and multifunctional component integration. A focused discussion regarding the evolution of constitutive modeling frameworks over the past twenty years is provided, as well as an overview of early shape memory alloy (SMA) research efforts, the "trial and error" period, and rarely discussed setbacks that nearly ended research in this area. Example results from SMA engineering problems are described, some considering coupled physical phenomena. Finally, current challenges will be outlined, while future directions for the use and integration of shape memory materials in smart structures will be proposed.

   Biography: **Dimitris C. Lagoudas** is the holder of the John and Bea Slattery Chair in Aerospace Engineering and is the Senior Associate Dean for Research at Texas A&M Engineering. His research team is recognized internationally in the area of modeling and characterization of SMAs. The models that his research group developed have been implemented into FEA frameworks and utilized by industrial and governmental entities as well as academic institutions worldwide.

9:15 to 10:00 am

Biomimicry, Bioinspiration, and the San Diego Zoo

See details, page 6-7.

Tuesday · 8:00 to 8:25 am

- **Smart Structures Product Implementation Award**

- **NDE and SSM Lifetime Achievement Award Presentations**

8:25 to 9:10 am

Ultrasonic and electro-magnetic waves for NDE and SHM: experiment and modelling

Tribikram Kundu, Univ. of Arizona

Abstract: Use of ultrasonic and electromagnetic waves is continuously increasing for nondestructive evaluation (NDE) and structural health monitoring (SHM). guided waves have become popular for NDE/SHM applications because they can propagate long distances and reach regions that are difficult to access. Recent advances in NDE and SHM using ultrasonic guided waves and electromagnetic waves will be discussed. Wave propagation in complex structures are difficult to model analytically or numerically by the popular finite element method. A mesh-free technique called the distributed point source method has been developed for solving such problems and will be presented in addition to the experimental results.

   Biography: **Tribikram Kundu** of University of Arizona received his PhD from UCLA. His research is on NDE/SHM. He has supervised 31 PhD and 21 MS students, published 280 technical papers, 140 in journals, 2 text books, and edited 5 research monographs. He is a fellow of ASME, ASCE and SPIE. He was awarded the Humboldt Research Prize (the Senior Scientist Award) from Germany in 2003 and Humboldt Fellowship earlier. He is recipient of the NDE Life Time Achievement Award from SPIE and Structural Health Monitoring Person of the Year from the SHM Journal. He has several invited professorships from Europe and Asia.

Wednesday · 8:00 to 8:25 am

- **SPIE/ASME Best Student Paper Award**
- **ASME Best Paper Award**
- **ASME Gary Anderson Early Achievement Award**

8:25 to 9:10 am

Bioinspired pneumatic artificial muscle actuator system design for aerospace and robotics applications

Norman Wereley, Univ. of Maryland, College Park

Abstract: Pneumatic Artificial Muscles (PAMs) were conceived by Gaylord in the 1950s, and have since been investigated for use in prosthetic and robotic devices, morphing and nastic structures, and aerospace applications. Only recently, however, have PAMs been seriously considered for aerospace applications. PAMs possess many attractive characteristics for implementation in these areas. They are simple, lightweight actuators that produce high levels of force and large, usable stroke at moderate actuation pressures (<620 kPa). The advantages of PAM actuators extend beyond their high performance levels. PAMs are naturally compliant and are highly tolerant to misalignment and impulsive loading. First, the advantages and disadvantages of PAMs relative to other smart material-based actuation technologies is discussed in terms of block force, free contraction, specific actuation force and work. This lecture also discusses applications of such PAMS to aerospace systems including space robotics for manipulator and end effectors, trailing edge flaps in helicopter rotor blades and miniaturized actuators for micro-air vehicles.

   Biography: **Norman Wereley's** research interests are in dynamics and control of smart structures applied to helicopters, robotics, as well as aerospace and automotive systems. He also has a strong focus on active and passive vibration isolation, shock mitigation, and actuation systems. Dr. Wereley has published over 150 journal articles, 11 book chapters, and over 250 conference articles. Dr. Wereley is an inventor on thirteen patents and over a dozen patents pending. Dr. Wereley is Editor of the Journal of Intelligent Material Systems and Structures and associate editor of Smart Materials and Structures and AIAA Journal. He is Chair of the 2013 SPIE SS/NDE symposium. He is the recipient of the AIAA National Capital Section Engineer of the Year (2009), AIAA Sustained Service Award (2011), the AHS Harry T. Jensen Award (2011), and the ASME Adaptive Structures and Materials Systems Best Paper Award in Structural Dynamics and Control (2004, 2012). Dr. Wereley is the recipient of the ASME Adaptive Structures and Material Systems Prize (2012) and is a Fellow of AIAA, ASME, and the Institute of Physics.

Thursday · 8:25 to 9:10 am

Heterointegration of smart systems by co-integration of materials and processes

Karlheinz Bock, Fraunhofer Research Institution for Modular Solid State Technologies EMFT

Abstract: In this decade of human-and-environment-centered applications the demands of multi-functionality, high performance and sustainability underlie the need for integrated interdisciplinary approaches for systems integration. The co-development of materials and processes for specific application and service scenarios plays a generic role and gains importance at present. Smart structures i.e. adaptive materials, multi-functional foil systems or 3D integration of electronic modules are presented as examples for such an interdisciplinary merge of physical, biological and chemical functions towards a cross-science approach for heterointegration of systems at present. In future the construction for example of robots or cars will experience for example large area sensing, merging with the localized actuators and/or the electro-mechanical drives as well as the metal and compound materials based housing towards integrated smart structural elements, like skin, nerves, muscles, organs and bones in a biological being. This enables many advantages from lightweight miniaturized construction and sustainability over lower energy consumption to much higher performance leading to extended systems functionality.

Biography: **Karlheinz Bock** studied electronics and communication engineering at the University of Saarbrücken, Germany. In 1994 he achieved the Dr.-Ing. degree in RF microelectronics from the University of Darmstadt, Germany. Since January 2001 he is with the Fraunhofer Institute for Reliability and Microintegration IZM in Munich (since 2010 renamed Fraunhofer Research Institution for Modular Solid State Technologies EMFT), Germany, as head of the Polytronic and Multi-Functional Systems department working on the development of thin and flexible systems and technologies as well as chemical and biological sensors and bio-analytical systems. Since March 2008 he also serves as Professor of Polytronic Microsystems at the University of Berlin (TU Berlin).

SPIE Course

Electroactive Polymer Actuators and Devices
SC634

Course level: Introductory
CEU .65 $335 / $385 USD
Sunday 1:30 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://ndeaa.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

Biomimicry, Bioinspiration, and the San Diego Zoo

SAN DIEGO ZOO GLOBAL
BIOINSPIRATION

SPIE and the SS/NDE symposium have partnered with the San Diego Zoo to promote the value of bioinspired engineering. This project is connected with conference 8686, Bioinspiration, Biomimetics, and Bioreplication, chaired by Raúl J. Martín-Palma, Univ. Autónoma de Madrid (Spain) and Akhlesh Lakhtakia, The Pennsylvania State Univ. (United States).

The San Diego Zoo aims to become a key center in the biomimicry movement; collaborating with regional, national, and global organizations to build San Diego into a global hub for biomimicry education, awareness, research, and applications. They hope that one day all designers, engineers, researchers, and more will turn to their facilities as a living design center to inspire students, researchers, entrepreneurs, investors, and companies to learn about and apply nature's existing design to mitigate design problems faced by humankind.

This represents a paradigm shift in the world of engineering and design, and we are very excited to have the San Diego Zoo as an active partner in this effort. When engineers, botanists, and zoologists get together, there is a special kind of magic. That is part of the reason that we refer to this discovery practice as 'bioinspiration'. Engineers are captivated by natural structures on every level, so this collaboration between SPIE and the San Diego Zoo will continue to fulfill a harmonious relationship for the future of biologically inspired design and engineering. It also raises awareness about the need for protection and conservation of these incredible plants and animals that we depend on for so much.

Town & Country Ballroom
Monday · 9:15 to 9:35 am

Commercializing Innovative Solutions Inspired by Nature

Larry Stambaugh, Managing Director, Centre for Bioinspiration at San Diego Zoo Global

Nature represents an extraordinary source for bold, transformative innovation. Yet there is a translational gap between biology and the development of engineered solutions we can use in the world. Larry Stambaugh will address how the Centre for Bioinspiration is taking inspiration from the nearly 4 billion years of adaptations in nature to develop innovative products and services. As an incubator, the Centre brings together private, public and academic organizations to effectively develop nature's intelligence for the sustainable advancement of mankind, wildlife, and habitats.

Biography: **Larry Stambaugh** is the Managing Director at the Centre for Bioinspiration for the San Diego Zoo Global. He joined the Zoo to establish the Centre that will develop the genius of nearly 4 billion years of adaptations in animals and plants into innovative products and services. The Centre is also developing an incubator model that can be connected around the world to bring together private, public and academic organizations to effectively develop nature's intelligence for the sustainable advancement of mankind, animals, aquatic life and plants. Innovations from the Centre are expected to span the full spectrum of uses by mankind including sustainable materials, life science therapeutics, diagnostics and medical devices, energy, architecture, mathematical algorithms, organizational development, high technology, and many others.

4 Billion Years and Running

Animal Ambassador

A representative from the San Diego Zoo will introduce the audience to an 'animal ambassador' and explain some of the unique features that can provide inspiration for the work of engineers. Because of the unique nature of animal presentations, the specific animal will remain a mystery until the day of the event.
   For more information about the SD Zoo Biomimicry project, please see their website: http://www.sandiegozoo.org/conservation/biomimicry/

2011 featured a presentation about an alligator named 'Laveau'.

Dr. Alison B. Flatau
University of Maryland

Alison Flatau, Prof. of Aerospace Engineering, at the Univ. of Maryland, is a long-standing supporter of SS/NDE: she has served as a conference chair, as well as a symposium chair. Alison has been a plenary speaker, and she was also the recipient of the 2010 SPIE Smart Structures and Materials Lifetime Achievement Award. She speaks here about the 'new' movement that surrounds bioinspired design.

2012 featured 'Shaman', a Great Horned Owl whose serrated feathers allow silent flight for nighttime predation. Engineers have developed the The Shinkansen Bullet Train with a nose based on a Kingfisher beak, and serrated fins based on owl feathers. These designs help to reduce noise in urban settings.
   Sunni Robertson from the San Diego Zoo demonstrates some of the unique qualities of Shaman's physical structures at the 2012 SS/NDE event.

15th Annual EAP-in-Action Session Demonstration

Part of Conference 8687

Monday 11 March · 4:30 to 5:45 pm · *Town & Country Ballroom*

Session Chair:
Yoseph Bar-Cohen,
Jet Propulsion Lab.

Smart Push Button with Shape Memory Gel (Japan)

Hidemitsu Furukawa, Jin Gong, Soft and Wet Matter Engineering Laboratory (SWEL), Yamagata University (Japan)
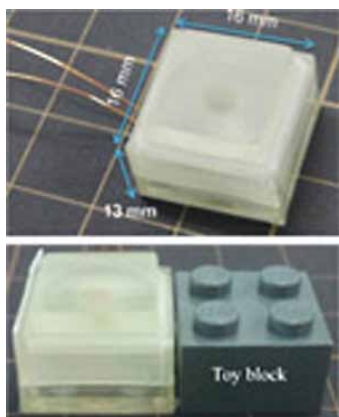
A smart push button is designed by using shape memory gel as a contact disc. The push button has the similar small size as a toy block, and it's on/off switch function can be smartly controlled by temperature.

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

Iain Anderson, Andrew Lo, Thomas McKay, Daniel Xu, Biomimetics Laboratory, New Zealand
www.abi.auckland.ac.nz/biomimetics

(1) 8 channel capacitive sensing unit

Multi-degree-of-freedom robots that could one day mimic the octopus will require multi-degree-of-freedom sensing. A device will be demonstrated using the latest in-house developed sensing electronics to provide multi-degree-of-freedom sensing. This sensing unit can simultaneously capture the capacitance of 8 independent sensors.
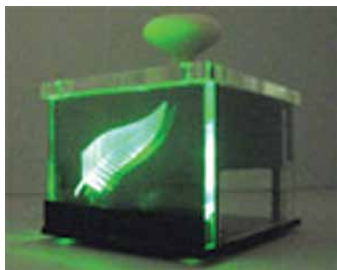
(2) A hand-held dielectric elastomer generator: Some new developments in artificial muscle portable energy harvesting will be demonstrated.

(3) The four channel Artificial Muscle Control Unit (www.biomimeticslab.com)

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

(4) The Self-Sensing Unit (www.biomimeticslab.com)

Get real-time sensory feedback from your artificial muscles, characterize new EAP materials and develop new products with the Biomimetics Lab's Self-Sensing Unit (SSU)!

(5) High voltage surprise!

Do you like high voltages? Come to EAP-in-action; you might see something shocking!

High-speed silicone DEAs (Switzerland)

S. Rosset, L. Maffli, S. Akbari, J. Shintake, S. Araromi, A. Poulin, and **H. Shea,** EPFL, Switzerland

μm- to cm-scale dielectric elastomer actuators will be presented, which, thanks to the use of silicone membranes and silicone-carbon electrodes, operate at speeds up to several kHz, limited by device resonance frequency. Applications range from soft robotics to tissue engineering.

## ViviTouch Audio: Take the Power of Live Music Anywhere (USA)

Al Zarrabi and **Art Muir,** ViviTouch

This demo will showcase how ViviTouch actuators are now applying EAP technology in a brand new way to the portable headphone category.

Electro-Active Polymer Based Variable Stiffness Mechanism for Dynamic Robotic Locomotion (USA)

Jason Newton, Jonathan Clark, William S. Oates, Florida A&M University, Florida State University, College of Engineering
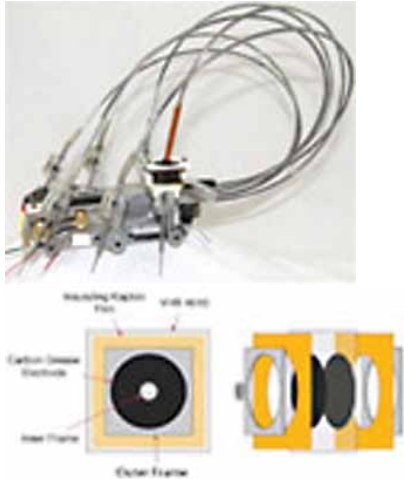
Small, light-weight EAP-based variable stiffness mechanisms will be demonstrated to alter the leg compliance of the high-speed, autonomous, hexapedal robot iSprawl. In addition to showing the effect of run-time alteration of the passive leg properties on the robot's running performance, the development of the membrane-based mechanism and some preliminary characterization results will be described.

Torsional and Tensile Carbon Nanotube Hybrid Yarn Muscles (USA)

Marcio Lima, Na Li, Monica Jung de Andrade, Carter S. Haines, Ray H. Baughman, NanoTech Institute, University of Texas at Dallas
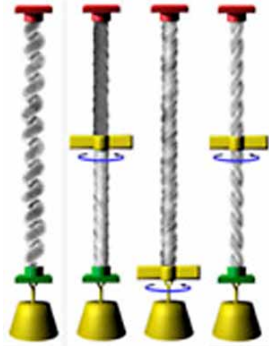
Electrolyte-free carbon nanotube based artificial muscles have been designed to provide fast torsional and tensile actuation. As recently published in the journal Science [Lima et al, 2012], these muscles can spin a rotor at an average 11,500 revolutions/minute (20 times higher than previously demonstrated for an artificial muscle) and provide up to 27.9 kW/kg of mechanical power density during muscle contraction (85 times higher than for natural skeletal muscle). More than a million cycles of tensile and torsional actuation have been performed without a significant loss of performance. These actuators can operate from cryogenic temperatures to 2500°C. Demonstrations include torsional rotors and contractile muscles exemplifying large stroke and high rate performance.

## Bistable electroactive polymers (BSEP) and refreshable Braille display devices (USA)

Xiaofan Niu, Xinguo Yang, Paul Brochu, Hristiyan Stoyanov, Sungryul Yun, Zhibin Yu, and **Qibing Pei,** University of California, Los Angeles
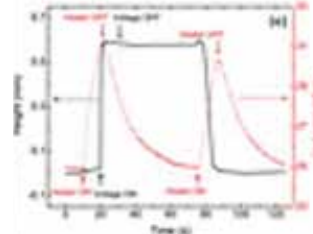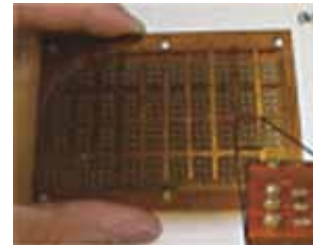
A new bistable electroactive polymer has been developed via a prestrain-free synthesis. The actuation stability has been significantly improved. High-performance bistable electroactive polymer actuators and a refreshable Braille display device will be demonstrated.

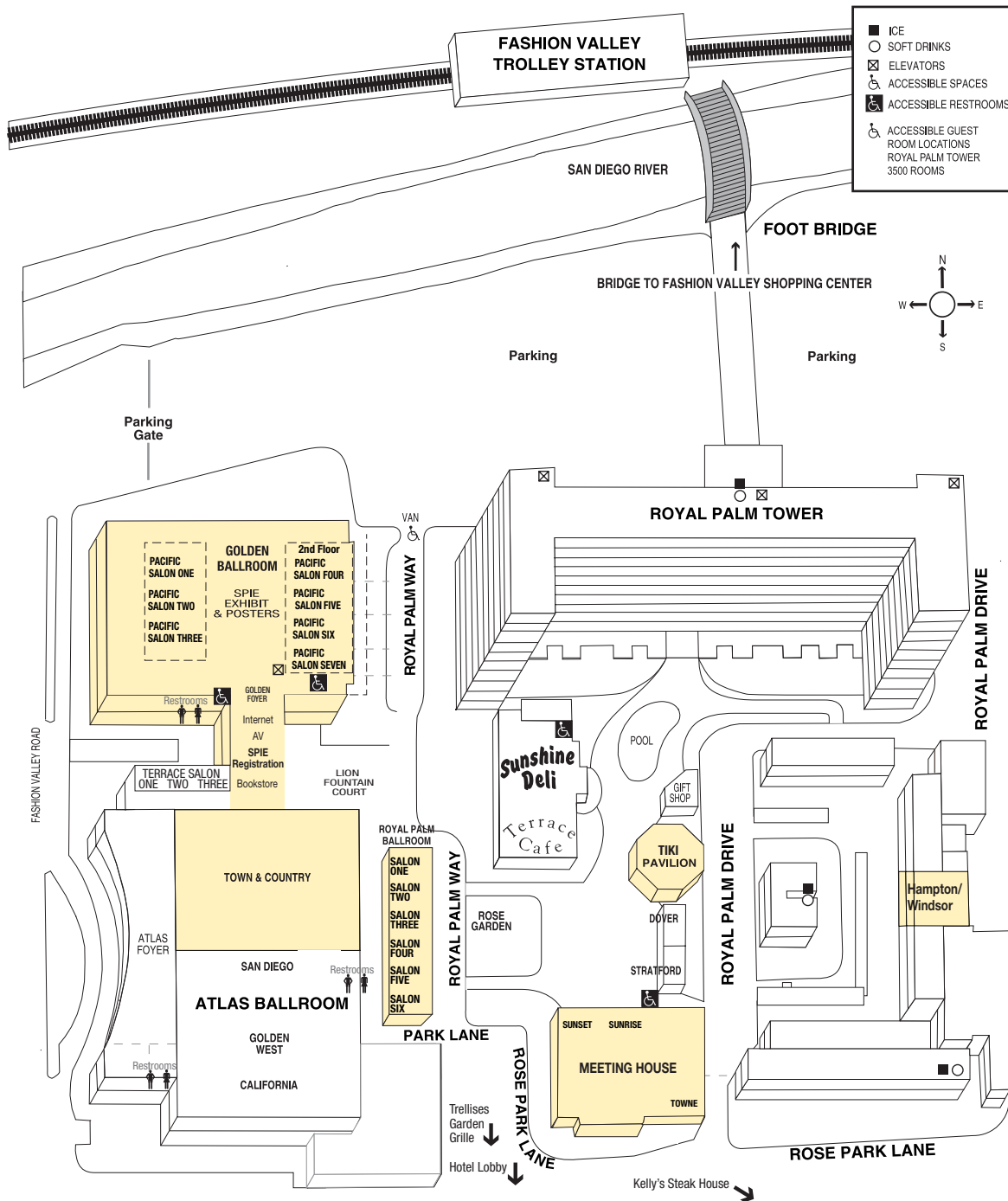## Electrically Driven Mechanochemical Actuators

Lenore Rasmussen, Ras Labs, LLC
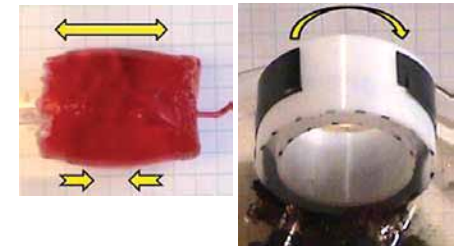
Using Carbon infused contractile EAP, a demonstration will be made showing an electrically driven mechano-chemical actuators. Driven by 50 V or less, these actuators will perform rotational and push-pull motions with minimal generation of heat or noise.

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EXHIBITION
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Golden Ballroom · **12–13 March 2013**

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

spie.org/ss13exhibition

Conference Session Schedule

	Conf. 8686	Conf. 8687	Conf. 8688	Conf. 8689	Conf. 8690	Conf. 8691	Conf. 8692			Conf. 8693	Conf. 8694	Conf. 8695	

Monday

Time	8686	8687	8688	8689	8690	8691	8692a	8692b	8692c	8693	8694	8695a	8695b
8:15 am	Plenary Session												
10:30 am	Keynote Session / Actuators	EAP as Emerging Actuators	Energy Harvesting and Scavenging: General I	Piezoelectric Composites	Smart Structures Technologies for Control	Keynote Session / Point-of Care Health Monitoring	Keynote Session			Fiber Bragg Grating Sensor Networks	NDE/SHM for Composites	Guided Waves for SHM: Composites I	Civil Engineering Applications: Bridges and Buildings
12:30 pm	Lunch Break												
1:30 pm	Underwater Propulsion / Fabrication	Electro-chemo-mechanical Actuators and Mechano-chemo-electrical Sensors	Energy Harvesting and Scavenging: Circuitry	Ferroelectric Materials	Enabling Technologies for Embedded Sensing	Keynote Session / Nanosensors and Systems I	Nanofabricated Sensors for SHM	Health Monitoring of Concrete Structures		Temperature Sensing	Corrosion and Health Monitoring of Civil Infrastructures	Guided Waves for SHM: Composites II	Issues and Practical Considerations Related to SHM I
4:00 pm	Surfaces	EAP-in-Action	Energy Harvesting and Scavenging: Broadband Techniques	Smart Material Systems	Aerospace Applications	Smart Electronics	Monitoring and Control of Seismically Excited Structures	Damage Localization using NDE Methods		Distributed Sensor Information Processing		Guided Waves for SHM: Nonlinear Ultrasonics	Issues and Practical Consideration Related to SHM II

Tuesday

Time	8686	8687	8688	8689	8690	8691	8692a	8692b	8692c	8693	8694	8695a	8695b
8:00 am	Plenary Session												
9:30 am	Sensors I	Actuator for Soft Robotic or for Biomedical Applications	Biological-inspired Systems and Bio-MEMS	Active Polymers I	Automotive Applications	Nano – Micro Systems I	Statistical Learning for Smart Structures	SHM of Laminated Composite Structures	Advance Sensors based on Micro- and Nanotechnologies	Sensors for Composites Testing I	Radar/Microwave NDE	Optical Techniques for SHM	SHM for Pipes
11:00 am	Sensors II		Energy Harvesting and Scavenging: General II	Active Polymers II		Nano – Micro Systems II / Keynote Session				Sensors for Composites Testing II		Guided Waves for SHM: Localization Issues	SHM for Biomedical Applications I
1:00 pm	Lunch Break												
2:00 pm	Sensors III	Energy Harvesting I	Modeling, Simulation, Optimization, Signal Processing, Control, and Design of Integra	Shape Memory Polymers		Nano-Micro Systems III	Application of Wireless Sensor for SHM	Next-Gen Sensors and Sensing Technologies	Acoustic Emission and Ultrasound Sensors		Fiber Optic Sensors in NDE/SHM	Guided Waves for SHM: Distributed Sensors and Sensor Network	SHM for Railway Track, Energy Harvesting, and Other Issues
4:00 pm	Optics / Biomedical Applications	Energy Harvesting II	Passive and Active Vibration Isolation Systems I	Shape Memory Polymer Composites		Flexible Nano-and Microsystems	Advances in Energy Harvesting Technologies	Monitoring and Analysis of Wind Turbine Systems	Sensors for Turbine Engines		Radioactive NDE	Guided Waves for SHM: Modeling Aspects	Novel Instrumentation for Sensing and Actuation

Conference Session Schedule

Conf. 8686 | Conf. 8687 | Conf. 8688 | Conf. 8689 | Conf. 8691 | Conf. 8692 | Conf. 8693 | Conf. 8694 | Conf. 8695

Wednesday

Time	8686	8687	8687	8688	8689	8691	8692	8692	8692	8693	8694	8694	8695
8:00 am	Plenary Session (all conferences)												
9:30 am	Flight I	Dielectric Elastomers EAP I	Nanotubes and and the Use of Nanoparticles	Magneto Rheological Systems I	Shape Memory Alloys: Experimental	Microwave, RF Nanomaterials	Non-contact Sensing and Excitation I	Guided Wave Methods for Pipeline SHM		Optical Based Imaging	Vibration-Based SHM/NDE I	NDE/SHM for Aerospace Materials	SHM for Composite Materials
11:00 am	Flight II			SMA- and Piezo-Based Materials and Systems	Magneto-Active Materials	Fabrication and Characterization I			Advances in Optical Sensors	New Sensor Technologies		Damage Detection Algorithms	Guided Waves for SHM: Temperature and Texture Issues
1:00 pm	Lunch/Exhibition Break												
2:00 pm	Miscellaneous Studies	Dielectric Elastomers EAP II	IPMC	Aircraft, MAV/UAV and Morphing Systems	SMA: Modeling and Characterization I	Keynote Session / Fabrication and Characterization II	Advances in Fiber Optic Sensors for Damage Detection	Advances in Transducers for Acoustics and Ultrasonics		SHM/NDE for Bridges		Modeling and Simulation in NDE/SHM	SHM for Biomedical Applications II
4:00 pm		Field-activated EAP	Novel	Magneto Rheological Systems II	SMA: Modeling and Characterization II	Fabrication and Characterization III	SHM of Civil Infrastructure Systems I	Image Sensing Technologies for SHM				Wireless SHM	Metamaterial

Thursday

Time	8686	8687	8687	8688	8689	8691	8692	8692	8692	8693	8694	8694	8695
8:00 am	Plenary Session (all conferences)												
9:30 am	Application of EAP	Electrodes and Control	Energy Harvesting and Scavenging: General III	Modeling of Energy Harvesting Systems I	Active Composites I	Metamaterials and Optical Nanostructures	Non-contact Sensing and Excitation II	SHM of Aerospace Structures			Vibration-Based SHM/NDE II	Thermal NDE	SHM based on Nonlinear Techniques
11:00 am		Field-actuated EAP	Modeling of Energy Harvesting Systems II		Multifunctional Structural Composites	Nano-Micro Systems		Sensing and Control Solutions for Machinery				Electrical and Magnetic NDE	Guided Wave for SHM: Sensing, Excitation and Related Issues
1:00 pm	Lunch/Exhibition Break												
2:00 pm	Application of EAP: Focus on Sensors	Conductive and Ionic	Adaptive Systems and Strategies	Passive and Active Vibration Isolation Systems II			Advances in System Identification Methods	Actuators and Novel Control Solutions		Remote Sensing Technologies		NDE for Nuclear Facilities	Vibration Based SHM Systems
4:00 pm			Passive and Active Vibration Isolation Systems III				Self-Sensing Cementitious Composites	SHM of Civil Infrastructure Systems II					Signal Processing for SHM

Technical Conferences

Conference 8686

Bioinspiration, Biomimetics, and Bioreplication III

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Conference 8687

Electroactive Polymer Actuators and Devices (EAPAD) XV

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Conference 8688

Active and Passive Smart Structures and Integrated Systems VII

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Conference 8689

Behavior and Mechanics of Multifunctional Materials and Composites VII

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Industrial and Commercial Applications of Smart Structures Technologies VII

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Conference 8692
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Conference 8693
Sunday–Thursday 10–14 March 2013
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Conference 8694
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Conference 8695
Monday–Thursday 11–14 March 2013
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Nano-, Bio-, Info-Tech Sensors and Systems

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

Conference Chair: **Kara J. Peters,** North Carolina State Univ. (United States)

Conference Co-Chairs: **Wolfgang Ecke,** Institut für Photonische Technologien e.V. (Germany); **Theodoros E. Matikas,** Univ. of Ioannina (Greece)

Program Committee: **Farhad Ansari,** Univ. of Illinois at Chicago (United States); **George Y. Baaklini,** NASA Glenn Research Ctr. (United States); **Horst J. Baier,** Technische Univ. München (Germany); **Curtis E. Banks,** NASA Marshall Space Flight Ctr. (United States); **Xiaoyi Bao,** Univ. of Ottawa (Canada); **Hartmut Bartelt,** Institut für Photonische Technologien e.V. (Germany); **Rolf Brönnimann,** EMPA (Switzerland); **Brian Culshaw,** Univ. of Strathclyde (United Kingdom); **Chiara Daraio,** California Institute of Technology (United States); **Gerald Gerlach,** Technische Univ. Dresden (Germany); **Wolfgang R. Habel,** Bundesanstalt für Materialforschung und -prüfung (Germany); **Daniele Inaudi,** Smartec S.A. (Switzerland); **Kerop D. Janoyan,** Clarkson Univ. (United States); **YeonWan Koh,** FIBERPRO, Inc. (Korea, Republic of); **Silvio E. Kruger,** National Research Council Canada (Canada); **Jinsong Leng,** Harbin Institute of Technology (China); **Alexis Mendez,** MCH Engineering LLC (United States); **Norbert G. Meyendorf,** Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (United States); **Bernd Michel,** Fraunhofer-Institut für Elektronische Nanosysteme (Germany); **Jeff W. Miller,** Micron Optics, Inc. (United States); **Marc Nikles,** Omnisens S.A. (Switzerland); **Ioannis E. Psarobas,** Univ. of Patras (Greece); **Richard Selfridge,** Brigham Young Univ. (United States); **Nobuo Takeda,** The Univ. of Tokyo (Japan); **Roderick C. Tennyson; Michael D. Todd,** Univ. of California, San Diego (United States); **Eric Udd,** Columbia Gorge Research (United States); **Zhishen Wu,** Ibaraki Univ. (Japan); **Chung-Bang Yun,** Ulsan National Institute of Science and Technology (Korea, Republic of); **Zhi Zhou,** Dalian Univ. of Technology (China); **Leszek Jaroszewicz,** Military University of Technology (Poland)

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

Conference Chair: **Tzu Yang Yu,** Univ. of Massachusetts Lowell (United States)

Conference Co-Chairs: **Andrew L. Gyekenyesi,** NASA Glenn Research Ctr. (United States); **Peter J. Shull,** The Pennsylvania State Univ. (United States); **Aaron A. Diaz,** Pacific Northwest National Lab. (United States); **H. Felix Wu,** Univ. of North Texas (United States)

Program Committee: **A. Emin Aktan,** Drexel Univ. (United States); **Sreenivas Alampalli,** New York State Dept. of Transportation (United States); **Farhad Ansari,** Univ. of Illinois at Chicago (United States); **Perumalsamy N. Balaguru,** Rutgers, The State Univ. of New Jersey (United States); **Radu Barsan,** Redfern Integrated Optics, Inc. (United States); **Shawn J. Beard,** Acellent Technologies, Inc. (United States); **Aditi Chattopadhyay,** Arizona State Univ. (United States); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Shen-En Chen,** The Univ. of North Carolina at Charlotte (United States); **Maria Q. Feng,** Columbia Univ. (United States); **Masoud Ghandehari,** Polytechnic Institute of New York Univ. (United States); **Hamid Ghasemi,** Federal Highway Administration (United States); **Valery F. Godinez-Azcuaga,** MISTRAS Group, Inc. (United States); **Nenad Gucunski,** Rutgers, The State Univ. of New Jersey (United States); **Frank R. Huston,** The Univ. of Vermont (United States); **Frank Jalinoos,** Federal Highway Administration (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Simon Laflamme,** Iowa State Univ. (United States); **Jerome Peter Lynch,** Univ. of Michigan (United States); **Theodoros E. Matikas,** Univ. of Ioannina (Greece); **W. Allen Marr,** Geocomp Corp. (United States); **Paul Mlakar,** U.S. Army Engineer Research and Development Ctr. (United States); **Franklin L. Moon,** Drexel Univ. (United States); **Amir A. Mosavi,** SC Solutions, Inc. (United States); **Piotr Omenzetter,** The Univ. of Auckland (New Zealand); **Pradeep Ramuhalli,** Pacific Northwest National Lab. (United States); **Akira Sasamoto,** National Institute of Advanced Industrial Science and Technology (Japan); **Masanobu Shinozuka,** Univ. of California, Irvine (United States); **Kurt Silvers,** Pacific Northwest National Lab. (United States); **Caesar Singh,** U.S. Dept. of Transportation (United States); **Bernhard R. Tittmann,** The Pennsylvania State Univ. (United States); **Dietmar W. Vogel,** Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Yan Wan,** Univ. of North Texas (United States); **Ming Wang,** Northeastern Univ. (United States); **Yang Wang,** Georgia Institute of Technology (United States); **Sharon L. Wood,** The Univ. of Texas at Austin (United States); **Lingyu Yu,** Univ. of South Carolina (United States); **Xiong Yu,** Case Western Reserve Univ. (United States); **Fuh-Gwo Yuan,** North Carolina State Univ. (United States); **Ying Zhang,** Georgia Institute of Technology (United States); **Jinying Zhu,** The Univ. of Texas at Austin (United States); **Mourad Zeghal,** Rensselaer Polytechnic Institute (United States); **Paul H. Ziehl,** Univ. of South Carolina (United States)

Health Monitoring of Structural and Biological Systems VII

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

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

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

Monday · 11 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8690

Announcements, Awards, Plenary Presentations · *Town & Country Ballroom*

8:15 to 8:30 am
SPIE Fellow Recognition

Plenary Presentation · 8:30 to 9:15 am

Perspectives on the characterization and modeling of shape memory alloys for smart structures applications

Dimitris Lagoudas, Texas A&M Univ. (United States)

Plenary Presentation · 9:15 to 10:00 am

Commercializing Innovative Solutions Inspired by Nature

Larry Stambaugh, Centre for Bioinspiration, San Diego Zoo Global (United States)

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

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

10:30 am: **Biomimetic textiles** *(Keynote Presentation)*, Michael S. Ellison, Clemson Univ. (United States) . . . . [8686-1]

Session 1

Room: Towne
Mon 11:30 am to 12:30 pm

Actuators
Session Chair: **M. Ellison,** Clemson Univ. (United States)

11:30 am: **Bioinspired hydraulic control systems**, Michael A. Meller, Ephrahim Garcia, Cornell Univ. (United States) . . . . [8686-2]

11:50 am: **Nonlinear analysis of quasi-static response of pneumatic artificial muscles for agonistic and antagonistic actuation modes**, Ryan Robinson, Norman M. Wereley, Univ. of Maryland College Park (United States); Curt S. Kothera, Techno-Sciences Inc. (United States) . . . . [8686-3]

12:10 pm: **Characterization and modeling of geometric variations in McKibben pneumatic artificial muscles**, Erick J. Ball, Yong Lin, Ephrahim Garcia, Cornell Univ. (United States) . . . . [8686-4]

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

Session 1

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

EAP as Emerging Actuators
Session Chairs: **Yoseph Bar-Cohen,** Jet Propulsion Lab. (United States); **Siegfried G. Bauer,** Johannes Kepler Univ. Linz (Austria)

10:30 am: **Compliant mechanisms: ideal opportunity for integrated sensors and actuators** *(Keynote Presentation)*, Larry L. Howell, Brigham Young Univ. (United States) . . . . [8687-1]

11:10 am: **High-performance electrolyte-free torsional and tensile carbon nanotube hybrid muscles** *(Invited Paper)*, Márcio D. Lima, The Univ. of Texas at Dallas (United States); Na Li, The Univ. of Texas at Dallas (United States) and Nankai Univ. (China); Mônica J. Andrade, Shaoli Fang, Jiyoung Oh, The Univ. of Texas at Dallas (United States); Geoffrey M. Spinks, Univ. of Wollongong (Australia); Mikhail E. Kozlov, Carter S. Haines, Dongseok Suh, The Univ. of Texas at Dallas (United States); Javad Foroughi, Univ. of Wollongong (Australia); Seon-Jeong Kim, Hanyang Univ. (Korea, Republic of); Yongsheng Chen, Nankai Univ. (China); Taylor Ware, The Univ. of Texas at Dallas (United States); Min Kyoon Shin, Hanyang Univ. (Korea, Republic of); Leonardo D. Machado, Univ. Estadual de Campinas (Brazil); Alexandre F. Fonseca, Univ. Estadual de São Paulo (Brazil); John D. Madden, The Univ. of British Columbia (Canada); Walter E. Voit, The Univ. of Texas at Dallas (United States); Douglas S. Galvão, Univ. Estadual de Campinas (Brazil); Ray H. Baughman, The Univ. of Texas at Dallas (United States) . . . . [8687-2]

11:50 am: **A unified model of actuation in ionic electroactive polymers**, John D. Madden, The Univ. of British Columbia (Canada) . . . . [8687-3]

Lunch Break . . . . Mon 12:10 pm to 1:30 pm

Session 1

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

Energy Harvesting and Scavenging: General I
Session Chairs: **Henry A. Sodano,** Univ. of Florida (United States); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China)

10:30 am: **Frequency-tunable vibratory energy harvester for powering consumer electronics**, Xiyuan Liu, Mohammed F. Daqaq, Clemson Univ. (United States) . . . . [8688-1]

10:50 am: **Steady-state dynamics of a two degree-of-freedom bistable oscillator for energy harvesting**, Ryan L. Harne, Manoj Thota, Kon-Well Wang, Univ. of Michigan (United States) . . . . [8688-2]

11:10 am: **Design and performance enhancement of hydraulic-pressure energy harvesting systems**, Ellen A. Skow, Kenneth A. Cunefare, Alper Erturk, Georgia Institute of Technology (United States)[8688-3]

11:30 am: **Piezoelectric PVDF film energy harvester for powering a wireless sensor system**, Enrico Bischur, Norbert Schwesinger, Technische Univ. München (Germany) . . . . [8688-4]

Lunch Break . . . . Mon 11:50 pm to 1:30 pm

Session 1

Room: Royal Palm Four
Mon 10:30 am to 11:50 am

Piezoelectric Composites
Session Chairs: **Nakhiah C. Goulbourne,** Univ. of Michigan (United States); **Hani E. Naguib,** Univ. of Toronto (Canada)

10:30 am: **Ultrahigh-energy density and fast discharge nanocomposite capacitors** *(Invited Paper)*, Haixiong Tang, Henry A. Sodano, Univ. of Florida (United States) . . . . [8689-1]

11:10 am: **Non-uniform electric field and nonlinear piezoelectric behavior in active fiber composites**, Hassene Ben Atitallah, Zoubeida Ounaies, Pennsylvania State Univ. (United States); Anastasia Muliana, Texas A&M Univ. (United States). . . [8689-2]

11:30 am: **Analysis of the impedance resonance of piezoelectric multi-fiber composites**, Stewart Sherrit, Samuel C. Bradford, Jet Propulsion Lab. (United States); Ashot Djrbashian, Glendale Community College (United States) . . . . [8689-3]

Lunch Break . . . . Mon 11:50 am to 1:30 pm

Session 1

Room: Royal Palm One
Mon 10:30 am to 11:50 am

Smart Structures Technologies for Control
Session Chair: **Gyuhae Park,** Los Alamos National Lab. (United States)

10:30 am: **Active structures to reduce torsional vibrations**, Michael Matthias, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) . . . . [8690-1]

10:50 am: **Magnetostrictive aluminum composite with electrically tunable stiffness**, Justin Scheidler, Marcelo J. Dapino, The Ohio State Univ. (United States) . . . . [8690-2]

11:10 am: **Active damping for wind-tunnel aeroelastic models of large civil structures**, Gabriele Cazzulani, Francesco Ripamonti, Daniele Rocchi, Tullio Balduzzi, Politecnico di Milano (Italy) . . . . [8690-3]

11:30 am: **Miniature multifunctional high-performance three-axis positioning and scanning platform**, Dragan Avirovik, Virginia Polytechnic Institute and State Univ. (United States); Digant Dave, The Univ. of Texas at Arlington (United States); Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8690-4]

Lunch Break . . . . Mon 11:50 am to 1:30 pm

Monday · 11 March

Conference 8691	Conference 8692	Conference 8693	Conference 8694	Conference 8695

Announcements, Awards, Plenary Presentations · *Town & Country Ballroom*

8:15 to 8:30 am
SPIE Fellow Recognition

Plenary Presentation · 8:30 to 9:15 am

Perspectives on the characterization and modeling of shape memory alloys for smart structures applications

Dimitris Lagoudas, Texas A&M Univ. (United States)

Plenary Presentation · 9:15 to 10:00 am

Commercializing Innovative Solutions Inspired by Nature

Larry Stambaugh, Centre for Bioinspiration, San Diego Zoo Global (United States)

Conference 8691

Session 1

Room: Royal Palm Three
Mon 10:30 am to 11:10 am

Keynote Session

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

10:30 am: **Development of sensing techniques for weaponry health monitoring** *(Keynote Presentation)*, Ebonee A. Walker, Eugene Edwards, Paul B. Ruffin, Christina L. Brantley, U.S. Army Research, Development and Engineering Command (United States) . . . .[8691-1]

Session 2

Room: Royal Palm Three
Mon 11:10 am to 12:10 pm

Point-of Care Health Monitoring

Session Chair: **Vijay K. Varadan,** Univ. of Arkansas (United States), Pennsylvania State Univ. {United States)

11:10 am: **Nano-particle coating based point-of-care diagnostic system**, Xiao Qun Zhou, Institute for Infocomm Research (Singapore); Weihua Hu, Chang Ming Li, Nanyang Technological Univ. (Singapore). . . . .[8691-2]

11:30 am: **Wireless health monitoring helmet for football players to diagnose concussion and track fatigue**, Sechang Oh, Prashanth S. Kumar, Hyeokjun Kwon, Pratyush Rai, Vijay K. Varadan, Univ. of Arkansas (United States) . . . . [8691-3]

11:50 am: **E-bra for monitoring pericardial effusion: a dancing heart**, Vijay K. Varadan, Univ. of Arkansas (United States). . .[8691-4]

Conference 8692

Session 1

Room: Pacific Salon Seven
Mon 10:30 am to 11:50 am

Keynote Session

Session Chair: **Chung-Bang Yun,** Ulsan National Institute of Science and Technology (Korea, Republic of); **Kon-Well Wang,** Univ. of Michigan (United States); **Jerome Lynch,** Univ. of Michigan (United States)

10:30 am: **Structural health monitoring of large-scale structures: from diagnostics to prognostics**, Y. Q. Ni, The Hong Kong Polytechnic Univ. (Hong Kong, China)[8692-1]

11:10 am: **Sensing platforms for structural health monitoring**, Shijie Zheng, Northwestern Univ. (United States); Gautam Naik, Northwestern Univ. Ctr. for Quality Engineering (United States); Zhongbi Chen, Northwestern Univ. (United States); Yinian Zhu, Northwestern Univ. Ctr. for Quality Engineering (United States); Sridhar Krishnaswamy, Northwestern Univ. (United States) . . . .[8692-2]

Lunch Break . . . . . Mon 11:50 am to 1:00 pm

Conference 8693

Session 1

Room: Sunset
Mon 10:30 am to 12:10 pm

Fiber Bragg Grating Sensor Networks

Session Chair: **Kara J. Peters,** North Carolina State Univ. (United States)

10:30 am: **A locally-exact strain-to-displacement approach for shape reconstruction of slender objects using fiber Bragg gratings** *(Invited Paper)*, Michael D. Todd, Univ. of California, San Diego (United States); Christopher J. Stull, Los Alamos National Lab. (United States)[8693-1]

11:10 am: **Dynamic shape sensing using a fiber Bragg grating mesh**, Douglas C. Bailey, Daniel T. Perry, Nikola Stan, Spencer Chadderdon, Stephen Schultz, Richard Selfridge, Brigham Young Univ. (United States) . . . .[8693-2]

11:30 am: **Filter-based interrogation unit for optical wavelength shift sensors**, Thomas Härtling, Roland Wuchrer, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) . . . .[8693-3]

11:50 am: **Plasmonic gradient structures of nanoparticle arrays for optical sensing applications**, Susan Derenko, Roland Wuchrer, Christiane Schuster, Thomas Härtling, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany). . . . .[8693-4]

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

Conference 8694

Session 1

Room: Royal Palm Five
Mon 10:30 am to 11:50 am

NDE/SHM for Composites

Session Chairs: **Xiaoning Jiang,** North Carolina State Univ. (United States); **Yang Wang,** Georgia Institute of Technology (United States)

10:30 am: **The influence of multimode failures in composites on the characteristics of elastic waves**, Lu Zhang, Harbin Institute of Technology (China); Didem Ozevin, Univ. of Illinois at Chicago (United States) . . . .[8694-1]

10:50 am: **Stiffness matrix determination of composite materials using Lamb-wave group velocity measurements**, Osvaldas Putkis, Anthony J. Croxford, Univ. of Bristol (United Kingdom) . . . .[8694-2]

11:10 am: **Monitoring damage development around stress raisers in carbon/epoxy laminates**, Letchuman Sripragash, Chantly D. Smith, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) . . . .[8694-3]

11:30 am: **Nondestructive and independent-of-fabrication-processes method to characterize residual stress within composite micromachined beams**, Adrian A. Rendon-Hernandez, Sergio O. Martinez-Chapa, Sergio Camacho-León, Tecnológico de Monterrey (Mexico) [8694-4]

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

Conference 8695

Concurrent Sessions

Session 1

Room: Royal Palm Two
Mon 10:30 am to 12:30 pm

Guided Waves for SHM: Composites I

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

10:30 am: **Monitoring of corrosion damage using high-frequency guided ultrasonic waves**, Paul Fromme, Univ. College London (United Kingdom) . . . . [8695-1]

10:50 am: **Characterization of Lamb wave attenuation mechanisms**, Daniel Schmidt, Deutsches Zentrum für L.uft- und Raumfahrt e.V. (Germany). . . . . [8695-2]

11:10 am: **Structural health monitoring and damage prognosis in composite repaired structures through the excitation of guided ultrasonic waves**, Sofia Pavlopoulou, Keith Worden, Constantinos Soutis, The Univ. of Sheffield (United Kingdom). . . . . [8695-3]

11:30 am: **Lamb Waves in a Honeycomb Composite Sandwich Plate**, Fabrizio Ricci, Univ. degli Studi di Napoli Federico II (Italy); Ajit K. Mal, Himadri S. Samajder, Harsh K. Baid, Univ. of California, Los Angeles (United States) . . . . [8695-4]

11:50 am: **Phased array design for optimized directivity behaviour in guided wave applications**, Andreas Dantele, PROFACTOR GmbH (Austria); Harald Steiner, Austrian Academy of Sciences (Austria); Johannes Korak, Christoph Feyrer, Helmut Wernick, PROFACTOR GmbH (Austria) . . . . . . [8695-5]

12:10 pm: **Detection of impact damage in composite panels using guided ultrasonic waves**, Bibi Murat, Paul Fromme, Univ. College London (United Kingdom). . . [8695-6]

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

Session 2

Room: Royal Palm Six
Mon 10:30 am to 12:30 pm

Civil Engineering Applications: Bridges and Buildings

Session Chair: **Henrique L. Reis,** Univ. of Illinois at Urbana-Champaign (United States)

10:30 am: **Structural Health Monitoring of Bridges using Digital Image Correlation**, Christopher Nonis, Christopher Niezrecki, Tzu-Yang Yu, Univ. of Massachusetts Lowell (United States); Timothy E. Schmidt, Trilion Quality Systems (United States); Shafique Ahmed, Che-Fu Su, Univ. of Massachusetts Lowell (United States) . . . . [8695-7]

10:50 am: **Real-time structural health monitoring of live loads on a flat commercial roof**, Ok-Youn Yu, Stacy Moore, Appalachian State Univ. (United States). . . . .[8695-8]

11:10 am: **Applications of inter-digitized transducers (IDTs) for structural health monitoring (SHM) of bridge structures**, Jeong-Kwan Na, Sean T. Gleeson, Edison Welding Institute (United States) . . . .[8695-9]

11:30 am: **Site-Specific Live Load Factor Calibration for Weigh-in-Motion Sites with especially heavy traffic volume**, Hua Zhao, Hunan Univ. (China); Shiyong He, Guilin Economy Construction Investment Cooperation (China). . . . . [8695-10]

11:50 am: **Damage identification utilizing dynamic deflection of bridge structure under vehicle loading**, Zhen Sun, Yozo Fujino, The Univ. of Tokyo (Japan). . [8695-11]

12:10 pm: **Structural Health Monitoring of a Large Span Cable Structures based on FBG sensors**, Yuxin Zhang, Shanghai Normal Univ. (China) . . . .[8695-12]

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

Monday · 11 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8690

Session 2

Room: Towne
Mon 1:30 pm to 2:50 pm

Underwater Propulsion

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

1:30 pm: **Analysis of fish and bioinspired robotic fish swimming together in a water tunnel** *(Invited Paper)*, Giovanni Polverino, Andrea Facci, Paul T. Phamduy, Marco Drago, Kamran Khan, Lu Yang, Maurizio Porfiri, Polytechnic Institute of New York Univ. (United States) . . . . [8686-5]

2:10 pm: **Enhanced propulsion from converging radial velocity in jellyfish jetting**, Michael Krieg, Doug Lipinski, Kamran Mohseni, Univ. of Florida (United States) . . . . [8686-6]

2:30 pm: **Effect of oral and tentacle structure on the propulsion and feeding of bio-inspired Mastigias papua robot**, Tyler Michael, Alex Villanueva, Pavlos P. Vlachos, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8686-7]

Session 3

Room: Towne
Mon 2:50 pm to 3:30 pm

Fabrication

Session Chair: **Maurizio Porfiri,** Polytechnic Institute of New York Univ. (United States)

2:50 pm: **Solution-based techniques for bioreplication** *(Invited Paper)*, Michael H. Bartl, The Univ. of Utah (United States) . . . . [8686-8]

Coffee Break. . . . . .Mon 3:10 pm to 4:00 pm

Session 2

Room: Town & Country Ballroom
Mon 1:30 pm to 3:10 pm

Electro-chemo-mechanical Actuators and Mechano-chemo-electrical Sensors

Session Chairs: **Toribio Fernández Otero,** Univ. Politécnica de Cartagena (Spain); **Qibing Pei,** Univ. of California, Los Angeles (United States)

1:30 pm: **Reactive actuators and sensors integrated in one device: mimicking brain-muscles feedback communication** *(Invited Paper)*, Toribio Fernández Otero, Jose G. Martinez, Univ. Politécnica de Cartagena (Spain). [8687-4]

2:10 pm: **Self-sensing ionic electromechanically active actuator with patterned carbon electrodes**, Karl Kruusamäe, Friedrich Kaasik, Andres Punning, Alvo Aabloo, Univ. of Tartu (Estonia) . . . . [8687-5]

2:30 pm: **Fabrication and characterization of a two-dimensional IPMC sensor**, Hong Lei, Xiaobo Tan, Michigan State Univ. (United States) . . . . [8687-6]

2:50 pm: **Conducting polymers are simultaneous sensing actuators**, Fransisco G. Córdova, Univ. Politécnica de Cartagena (Spain); Yahya A. Ismail, Univ. of Nizwa (Oman); Jose G. Martinez, Univ. Politécnica de Cartagena (Spain); Ahmad S. Al Harrasi, Univ. of Nizwa (Oman); Toribio Fernández Otero, Univ. Politécnica de Cartagena (Spain) . . . . [8687-7]

Coffee Break. . . . . .Mon 3:10 pm to 4:00 pm

Session 2

Room: Sunrise
Mon 1:30 pm to 3:10 pm

Energy Harvesting and Scavenging: Circuitry

Session Chairs: **Ephrahim Garcia,** Cornell Univ. (United States); **Lei Zuo,** Stony Brook Univ. (United States)

1:30 pm: **Piezoelectric array of oscillators with respective electrical rectification**, I-Ching Lien, Yi-Chung Shu, National Taiwan Univ. (Taiwan) . [8688-5]

1:50 pm: **Investigating synchronized switching in aeroelastic flutter energy harvesting**, Matthew J. Bryant, Alexander D. Schlichting, Ephrahim Garcia, Cornell Univ. (United States) . . . . [8688-6]

2:10 pm: **Influence of the topology for a networked SSHI piezoelectric harvesting configuration**, Yang Li, Daniel Guyomar, Claude Richard, Institut National des Sciences Appliquées de Lyon (France) . . [8688-7]

2:30 pm: **Review of power electronics for energy harvesting systems**, Peng Li, Lei Zuo, Stony Brook Univ. (United States). . . . . [8688-8]

2:50 pm: **Practical implementation of piezoelectric energy harvesting synchronized switching schemes**, Alexander D. Schlichting, Ephrahim Garcia, Cornell Univ. (United States) . . . . [8688-9]

Coffee Break. . . . . .Mon 3:10 pm to 4:00 pm

Session 2

Room: Royal Palm Four
Mon 1:30 pm to 3:10 pm

Ferroelectric Materials

Session Chairs: **Zoubeida Ounaies,** The Pennsylvania State Univ. (United States); **Henry A. Sodano,** Univ. of Florida (United States)

1:30 pm: **A quantum informed continuum model for ferroelectric and flexoelectric materials** *(Invited Paper)*, William S. Oates, The Florida State Univ. (United States) . . . . [8689-4]

2:10 pm: **Effect of stress loading on large field dielectric loss in lanthanum-doped lad zirconate titanate (Pb0.92La0.08(Zr0.65Ti0.35)0.98O3)**, John A. Gallagher, Hwan Ryul Jo, Christopher S. Lynch, Univ. of California, Los Angeles (United States) . . . [8689-5]

2:30 pm: **Experimental characterization of interdigitated electrode designs**, David M. Pisani, Christopher Lynch, Univ. of California, Los Angeles (United States) . . . . [8689-6]

2:50 pm: **Electric-field induced antiferroelectric to ferroelectric phase transformation in the modified PZT system and the effects of compositional modifications**, Hwan Ryul Jo, Christopher S. Lynch, Univ. of California, Los Angeles (United States)[8689-7]

Coffee Break. . . . . .Mon 3:10 pm to 4:00 pm

Session 2

Room: Royal Palm One
Mon 1:30 pm to 3:10 pm

Enabling Technologies for Embedded Sensing

Session Chair: **Kevin M. Farinholt,** Commonwealth Ctr. for Advanced Manufacturing (United States)

1:30 pm: **High-strain measurement using fiber Bragg grating sensors**, Gang Wang, Ken Zuo, William Roush, The Univ. of Alabama in Huntsville (United States); Vahid Sotoudeh, Richard Blake, Joey Costa, Fereydoun Faridian, Behzad Moslehi, Levy Oblea, Intelligent Fiber Optic Systems Corp. (United States) . . . . [8690-5]

1:50 pm: **Three-axis distributed fiber optic strain measurement in 3D woven composite structures**, Matt Castellucci, Evan M. Lally, Sandra Klute, Luna Innovations Inc. (United States); David Lowry, NASA Johnson Space Ctr. (United States). . . . . [8690-6]

2:10 pm: **Powering embedded electronics for wind-turbine monitoring using multi-source energy harvesting techniques**, Steven R. Anton, Stuart G. Taylor, Eric Y. Raby, Los Alamos National Lab. (United States); Kevin M. Farinholt, Commonwealth Ctr. for Advanced Manufacturing (United States) . . . [8690-7]

2:30 pm: **Multi-source energy harvesting for wireless SHM systems**, Mijin Choi, Chonbuk National Univ. (Korea, Republic of); Kevin M. Farinholt, Commonwealth Ctr. for Advanced Manufacturing (United States); Jung-Ryul Lee, Chonbuk National Univ. (Korea, Republic of); Gyuhae Park, Chonnam National Univ. (Korea, Republic of) . . . . [8690-8]

2:50 pm: **Piezoelectric wind turbine**, Ravi A. Kishore, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8690-9]

Coffee Break. . . . . .Mon 3:10 pm to 4:00 pm

Conference 8691	Conference 8692		Conference 8693	Conference 8694	Conference 8695	
Session 3	Concurrent Sessions		**Session 2**	**Session 2**	Concurrent Sessions	

Conference 8691

Session 3

Room: Royal Palm Three
Mon 1:30 pm to 2:10 pm

Keynote Session

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

1:30 pm: **200 years of electrical impedance spectroscopy (EIS) in healthcare : progress and challenges** (*Keynote Presentation*), Ajit Khosla, Simon Fraser Univ. (Canada) . . . . [8691-5]

Session 4

Room: Royal Palm Three
Mon 2:10 pm to 3:10 pm

Nanosensors and Systems I

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

2:10 pm: **Smart real-time cardiac diagnostic sensor systems for football players and soldiers under intense physical training**, Prashanth S. Kumar, Sechang Oh, Pratyush Rai, Hyeokjun Kwon, Vijay K. Varadan, Univ. of Arkansas (United States) . . . . [8691-6]

2:30 pm: **Micromotion-induced dynamic effects between a neuron probe and brain tissue**, Michael Polanco, Old Dominion Univ. (United States); Hargsoon Yoon, Norfolk State Univ. (United States); Sebastian Bawab, Old Dominion Univ. (United States) . . . . [8691-7]

2:50 pm: **Motion artifact removal algorithm by using ICA for e-bra: women ECG measurement system**, Hyeokjun Kwon, Sechang Oh, Prashanth S. Shyamkumar, Vijay K. Varadan, Univ. of Arkansas (United States) . . . . [8691-8]

Coffee Break. . . .Mon 3:10 to 4:00 pm

Conference 8692

Concurrent Sessions

Session 2

Room: Pacific Salon Seven
Mon 1:30 pm to 3:10 pm

Nanofabricated Sensors for SHM

Session Chairs: **Sridhar Krishnaswamy,** Northwestern Univ. (United States); **Alison B. Flatau,** Univ. of Maryland, College Park (United States)

1:30 pm: **An analysis of fabrication methods for embedding particles sensors into a composite structure**, Dustin L. Spayde, Oliver J. Myers, Mississippi State Univ. (United States) . . . . [8692-3]

1:50 pm: **Integrated strain sensor for damage detection using shape-memory polymer and carbon nanotubes**, Yingtao Liu, Arizona State Univ. (United States); Abhishek Rajadas, McClintock High School (United States) and Peggy Payne Academy (United States); Aditi Chattopadhyay, Arizona State Univ. (United States) . . . . [8692-4]

2:10 pm: **Simultaneously monitoring of electrical resistance and optical absorbance signals of an polyaniline membrane coated on an gold jacketed optical fiber for gas sensing**, Shiquan Tao, Shuai Shao, Yu Huang, West Texas A&M Univ. (United States) . . . . [8692-5]

2:30 pm: **Effects of coating thickness of metal-coated optical fiber sensors on strain transfer**, Sang-Woo Kim, Min-Soo Jeong, Eun-Ho Kim, In Lee, KAIST (Korea, Republic of); Il-Bum Kwon, Korea Research Institute of Standards and Science (Korea, Republic of); Tae-Kyung Hwang, Agency for Defense Development (Korea, Republic of) . . . . [8692-6]

2:50 pm: **Graphene oxide nanosmart paint for structural health monitoring of composite structures**, Inpil Kang, Pukyong National Univ. (Korea, Republic of) . . . . [8692-7]

Coffee Break. . . Mon 3:10 to 4:00 pm

Session 3

Room: Pacific Salon Five
Mon 1:30 pm to 3:10 pm

Health Monitoring of Concrete Structures

Session Chairs: **Chin-Hsiung Loh,** National Taiwan Univ. (Taiwan); **Lingyu Yu,** Univ. of South Carolina Libraries (United States)

1:30 pm: **Vibration-based damage identification of reinforced concrete member using optical sensor array data**, Chin-Hsiung Loh, Chi-Hang Li, National Taiwan Univ. (Taiwan); Chi-Hang Li, National Taiwan Univ (Taiwan) . . . . [8692-8]

1:50 pm: **Gaussian mixture modeling of acoustic emissions for structural health monitoring of reinforced concrete structures**, Alireza Farhidzadeh, Ehsan Dehghan-Niri, Salvatore Salamone, Univ. at Buffalo (United States) . . . . [8692-9]

2:10 pm: **Hybrid networking sensing system for structural health monitoring of a concrete cable-stayed bridge**, Marco Torbol, Ulsan National Institute of Science and Technology (Korea, Republic of); Sehwan Kim, Ting-Chou Chien, Masanobu Shinozuka, Univ. of California, Irvine (United States) . . . . [8692-10]

2:30 pm: **A dual-mode imaging array for damage detection in concrete structures**, Lingyu Yu, Zhenhua Tian, Liuxian Zhao, Univ. of South Carolina (United Stat

2:50 pm: **A novel vehicle weigh-in-motion method by using smart aggregate array**, Shuang Hou, Lei Jinfang, Dalian Univ. of Technology (China) . . . . [8692-12]

Coffee Break. . . .Mon 3:10 to 4:00 pm

Conference 8693

Session 2

Room: Sunset
Mon 1:30 pm to 3:10 pm

Temperature Sensing

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

1:30 pm: **A combination of novel thermographic and electrical techniques for low-velocity impact damage identification in multifunctional composites** (*Invited Paper*), Alkiviades S. Paipetis, Sotirios A. Grammatikos, Evangelos Z. Kordatos, Theodoros E. Matikas, Univ. of Ioannina (Greece) . . . . [8693-5]

2:10 pm: **Hybrid imaging of damage progress in composites through thermal imaging and embedded sensing**, Sachin S. Pawar, Kara J. Peters, North Carolina State Univ. (United States) . . . . [8693-6]

2:30 pm: **Highly-localized thermal response measurements in composites using embedded fiber Bragg grating temperature sensors**, R. Brian Jenkins, Peter Joyce, Deborah M. Mechtel, Kyle Milden, Kyle Elam, Richard J. Watkins, U.S. Naval Academy (United States) . . . [8693-7]

2:50 pm: **Fabrication and thermal characteristics of metal-coated regenerated grating sensors for high-temperature sensing**, Yun Tu, Tung Shan Tu, Yi-Hua Qi, East China Univ. of Science and Technology (China) . . . . [8693-8]

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

Conference 8694

Session 2

Room: Royal Palm Five
Mon 1:30 pm to 5:20 pm

Corrosion and Health Monitoring of Civil Infrastructures

Session Chairs: **Ming L. Wang,** Northeastern Univ. (United States); **Ying Zhang,** Georgia Institute of Technology (United States)

1:30 pm: **Theoretical and experimental study on estimation of chloride content in concrete using electromagnetic wave**, Junichiro Nojima, Hiroki Ikeda, Toshiaki Mizobuchi, Hosei Univ. (Japan)[8694-5]

1:50 pm: **Early corrosion monitoring of prestressed concrete piles using acoustic emission**, William Velez, Fabio Matta, Paul H. Ziehl, Univ. of South Carolina (United States)[8694-6]

2:10 pm: **Real-world application and validation of vehicle-mounted pavement inspection system**, David M. Vines-Cavanaugh, Ming L. Wang, Northeastern Univ. (United States); J. Gregory McDaniel, Boston Univ. (United States); Chris Mickle, CDM (United States) . . . . [8694-7]

2:30 pm: **Evaluating road surface conditions using tire generated noise**, Yubo Zhao, Northeastern Univ. (United States); H. Felix. Wu, Univ. of North Texas (United States); J. Gregory McDaniel, Boston Univ. (United States); Ming L. Wang, Northeastern Univ. (United States) . . . . [8694-8]

2:50 pm: **Enhanced polymer nanocomposites for condition assessment of wind turbine blades**, Hussam S. Saleem, Mahendra Thunga, Iowa State Univ. (United States); Matthias Kollosche, Univ. Potsdam (Germany); Michael R. Kessler, Simon Laflamme, Iowa State Univ. (United States) . . . . [8694-9]

3:10 pm: **Structural condition assessment of offshore wind turbine monopile foundations using vibration monitoring data**, Hugo Gomez, Turel Gar, Dan Dolan, MMI Engineering (United States) . . . . [8694-10]

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

Conference 8695

Concurrent Sessions

Session 3

Room: Royal Palm Two
Mon 1:30 pm to 3:30 pm

Guided Waves for SHM: Composites II

1:30 pm: **Damage detection in reusable launch vehicle components using guided ultrasonic waves and 3-D laser vibrometry**, Wieslaw J. Staszewski, AGH Univ. of Science and Technology (Poland); David Barnoncel, EADS Astrium (France); Jochen Schell, Polytec GmbH (Germany); Patrick Peres, EADS Astrium (France) . . . . [8695-13]

1:50 pm: **Effect of Uncertainty in Material Properties on Optimal Layout of Sensor Network for Achieving Highest Probability of Damage Detection in Structures**, Kuldeep P. Lonkar, Vishnuvardhan Janapati, Fu-Kuo Chang, Stanford Univ. (United States) . . . . [8695-14]

2:10 pm: **SHM of Composite Structures Using Ultrasonic Guided Waves**, Fabrizio Ricci, Univ. degli Studi di Napoli Federico II (Italy); Ajit K. Mal, Harsh K. Baid, Univ. of California, Los Angeles (United States) . . . . [8695-15]

2:30 pm: **Predictive Modeling of PWAS-Coupled Shear Horizontal Waves**, Ayman M. Kamal, Bin Lin, Victor Giurgiutiu, Univ. of South Carolina (United States) . . . . [8695-16]

2:50 pm: **Lamb waves in disbonded sandwich structures**, Fabrizio Ricci, Univ. degli Studi di Napoli Federico II (Italy); Ajit K. Mal, Harsh K. Baid, Univ. of California, Los Angeles (United States) . . . . [8695-17]

3:10 pm: **A new temperature compensation method for guided wave-based structural health monitoring**, Yishou Wang, Dalian Univ of Technology (China); Lei Qiu, Nanjing Univ. of Aeronautics and Astronautics (China); Limin Gao, Xinlin P. Qing, Commercial Aircraft Corp. of China, Ltd. (China); Shenfang Yuan, Commercial Aircraft Corp. of China, Ltd. (China) and Nanjing Univ. of Aeronautics and Astronautics (China). . . . . . [8695-18]

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

Session 4

Room: Royal Palm Six
Mon 1:30 pm to 3:30 pm

Issues and Practical Considerations Related to SHM I

1:30 pm: **Automated extraction of damage features through genetic programming**, Dustin Y. Harvey, Michael D. Todd, Univ. of California, San Diego (United States) . [8695-19]

1:50 pm: **Technological challenges of developing wireless health and usage monitoring systems**, Chung Seng Ling, Stephen G. Burrow, Lindsay Clare, Dan Hewitt, David Barton, Univ. of Bristol (United Kingdom); Dan Wells, AgustaWestland (United Kingdom); Nicholas A. J. Lieven, Univ. of Bristol (United Kingdom) . . . . [8695-20]

2:10 pm: **Integrated Non-destructive Approach for Damage Detection and Quantification in Structural Components**, Prashanth A. Vanniamparambil, Jefferson Cuadra, Eric Schwartz, Antonios Kontsos, Ivan Bartoli, Fuad Khan, Drexel Univ. (United States) . . . . [8695-21]

2:30 pm: **Error analysis of the extended Kalman filter applied to the simultaneous localization and mapping problem**, Rubyca Jaai, Nikhil Chopra, Balakumar Balachandran, Univ. of Maryland, College Park (United States); Hamad Karki, The Petroleum Institute (United Arab Emirates). . . . . [8695-22]

2:50 pm: **Corrosion monitoring system for aircraft structures**, Giovanni F. Nino, QUEST Integrated, Inc. (United States) . . . . . . [8695-23]

3:10 pm: **A design method research of an extensometer on extreme conditions**, Jiuhong Jia, East China Univ. of Science and Technology (China) . . . . [8695-24]

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

Monday · 11 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8690

Conference 8686 — Session 4

Room: Towne
Mon 4:00 pm to 5:20 pm

Surfaces

Session Chair: **Michael H. Bartl,** The Univ. of Utah (United States)

4:00 pm: **Functionalization of biomaterials with metals by atomic layer deposition (ALD)** *(Invited Paper)*, Seung-Mo Lee, Korea Institute of Machinery and Materials (Korea, Republic of); Mato Knez, CIC nanoGUNE Consolider (Spain) . . . . [8686-9]

4:40 pm: **Biomimetic topologically and chemically tuned CVD-grown nanodiamond layers and their biointeractions**, Hans J. Fecht, Andrei P. Sommer, Ulm Univ. (Germany) . . . . [8686-10]

5:00 pm: **Biomolecular hydrogel-based lipid bilayer array system**, Joseph Najem, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8686-11]

Conference 8687 — Session 3

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

EAP-in-Action

Session Chair: **Yoseph Bar-Cohen,** Jet Propulsion Lab. (United States)

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. This session highlights some of the latest capabilities and applications of Electroactive Polymers (EAP) materials where the attendees are shown demonstrations of these materials in action. Also, the attendees interact directly with technology developers and given "hands-on" experience with this emerging technology. The first Human/EAP Robot Armwrestling Contest was held during this session of the 2005 EAPAD conference. See the program and descriptions of EAP Presentations listed under EAP Demonstrations in Special Events.

Conference 8688 — Session 3

Room: Sunrise
Mon 4:00 pm to 5:40 pm

Energy Harvesting and Scavenging: Broadband Techniques

Session Chairs: **Hyung-Jo Jung,** KAIST (Korea, Republic of); **Yaowen Yang,** Nanyang Technological Univ. (Singapore)

4:00 pm: **Broadband energy harvesting using nonlinear 2-DOF configuration**, Hao Wu, Lihua Tang, Panduranga Vittal Avvari, Yaowen Yang, Chee Kiong Soh, Nanyang Technological Univ. (Singapore) . . . . [8688-10]

4:20 pm: **Modeling of wide-band frequency-adjustable piezoelectric bimorph rnergy harvester**, Haifeng Zhang, Univ. of North Texas (United States) . . . . [8688-11]

4:40 pm: **Fundamental power limits of piezoelectric energy harvesters based on material strength**, Michael W. Shafer, Ephrahim Garcia, Cornell Univ. (United States) . . . . [8688-12]

5:00 pm: **A piezoelectric power harvester based on stainless steel substrate with dual oscillators**, Ya Shan Shih, Sun Chiu Lin, Wen Jong Wu, National Taiwan Univ. (Taiwan) . . . . [8688-13]

5:20 pm: **A multiaxial piezoelectric energy harvester**, Hadj daoud Mousselmal, Pierre-Jean Cottinet, Institut National des Sciences Appliquées de Lyon (France); Boudjemaa Remaki, Institut des Nanotechnologies de Lyon (France); Lionel Petit, Institut National des Sciences Appliquées de Lyon (France) . . . . [8688-14]

Conference 8689 — Session 3

Room: Royal Palm Four
Mon 4:00 pm to 5:20 pm

Smart Material Systems

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

4:00 pm: **Bayesian techniques to quantify parameter and model uncertainty in nonlinear distributed smart material systems**, Ralph C. Smith, Nathan Burch, North Carolina State Univ. (United States) . . . . [8689-8]

4:20 pm: **Lamb-wave dispersion under finite plastic deformation**, Kuang Liu, Anindya Ghoshal, U.S. Army Research Lab. (United States) . . . . [8689-9]

4:40 pm: **Micromechanics and finite element analysis of piezoelectric structural fiber composites**, Qingli Dai, Kenny Ng, Michigan Technological Univ. (United States) . . . . [8689-10]

5:00 pm: **Feasibility study of shape control with zero applied voltage utilizing hysteresis in strain-electric field relationship of piezoelectric ceramics**, Tadashige Ikeda, Tomoki Takahashi, Nagoya Univ. (Japan) . . . . [8689-11]

Conference 8690 — Session 3

Room: Royal Palm One
Mon 4:00 pm to 6:00 pm

Aerospace Applications

4:00 pm: **Adaptive magnetorheological seat suspensions for adaptive shock mitigation**, Wei Hu, Univ. of Maryland, College Park (United States); Gregory J. Hiemenz, Techno-Sciences Inc. (United States); Norman M. Wereley, Univ. of Maryland, College Park (United States) . . . . [8690-10]

4:20 pm: **Online acoustic emission monitoring of combustion turbines for compressor stator vane crack detection**, Jaya Prakash Koduru, Sependarmaz Momeni, Miguel Gonzalez, Obdulia Ley, Boris Zarate, Valery F. Godinez, MISTRAS Group, Inc. (United States) . . . . [8690-11]

4:40 pm: **Actuation needs for an adaptive trailing-edge device aimed at reducing fuel comsumption on regional aircraft**, Gianluca Diodati, Italian Aerospace Research Ctr. (Italy); Antonio Concilio, Ctr. Italiano Ricerche Aerospaziali (Italy) . . . . . . [8690-12]

5:00 pm: **An adaptive control system for wing TE shape control**, Ignazio Dimino, Antonio Concilio, Ctr. Italiano Ricerche Aerospaziali (Italy) . . . . . . [8690-13]

5:20 pm: **Estimated performance of an adaptive trailing-edge device aimed at reducing fuel consumption on a medium-size aircraft**, Gianluca Diodati, Antonio Concilio, Italian Aerospace Research Ctr. (Italy); Sergio Ricci, Alessandro De Gaspari, Polytechnic of Milan (Italy); Cedric Liauzun, Jean-Luc Godard, ONERA (France) . . . . [8690-14]

5:40 pm: **Design and development of an active Gurney flap for rotorcraft**, Jon Freire Gómez, Julian D. Booker, Phil H. Mellor, Univ. of Bristol (United Kingdom) . . . . [8690-15]

Conference 8691

Session 5

Room: Royal Palm Three
Mon 4:00 pm to 5:40 pm

Smart Electronics

Session Chair: **Prashanth S. Kumar,** Univ. of Arkansas (United States)

4:00 pm: **Flexible paper transistor made with ZnO-cellulose hybrid nano-composite for electronic applications,** Hyun-u Ko, Inha Univ. (Korea, Republic of); Gwang-Hoon Kim, Chosun Univ. (Korea, Republic of); Sang Yeol Yang, Jaehwan Kim, Inha Univ. (Korea, Republic of); Joo-Hyung Kim, Chosun Univ. (Korea, Republic of) . . . . [8691-9]

4:20 pm: **High-k dielectrics in II-V semiconductors for innovative electronics,** Aswini K. Pradhan, Norfolk State Univ. (United States) . . . . [8691-10]

4:40 pm: **CuIn0.81Al0.19Se2thin films preparation and Al/p-CuInAlSe2 Schottky diode formation,** Usha Parihar, Univ. of Jammu (India); Chetan J. Panchal, The Maharaja Sayajirao Univ. of Baroda (India); Naresh Padha, Univ. of Jammu (India) . . . . [8691-11]

5:00 pm: **Fault detection in word-level nano ICs using vector Boolean derivatives,** Samuel C. Lee, The Univ. of Oklahoma (United States)[8691-12]

5:20 pm: **Logic design of word-level 3D, 2-dot QCA nanoICs,** Samuel C. Lee, The Univ. of Oklahoma (United States) . . . . [8691-13]

Conference 8692

Concurrent Sessions

Session 4

Room: Pacific Salon Seven
Mon 4:00 pm to 6:00 pm

Monitoring and Control of Seismically Excited Structures

Session Chairs: **Masahiro Kurata,** Kyoto Univ. (Japan); **Jianchun Li,** Univ. of Technology, Sydney (Australia)

4:00 pm: **PVDF piezo-film as dynamic strain sensing for local damage detection of steel frame buildings,** Masahiro Kurata, Xiaohua Li, Kohei Fujita, Liusheng He, Mayako Yamaguchi, Masayoshi Nakashima, Kyoto Univ. (Japan) . . . . [8692-13]

4:20 pm: **A resetting semi-passive stiffness damper for response mitigation of civil infrastructure,** Kenneth K. Walsh, Ohio Univ. (United States) . . . . [8692-14]

4:40 pm: **Development of an adaptive seismic isolator for ultimate seismic protection of civil structures,** Jianchun Li, Yancheng Li, Univ. of Technology, Sydney (Australia); Weihua Li, Univ. of Wollongong (Australia); Bijan Samali, Univ. of Technology, Sydney (Australia) . . . . [8692-15]

5:00 pm: **Real-time seismic monitoring of hospital buildings in the United States,** Hasan S. Ulusoy, Erol Kalkan, U.S. Geological Survey (United States) . . . . [8692-16]

5:20 pm: **A framework for rapid post-earthquake assessment of bridges and restoration of transportation network functionality using structural health monitoring,** Shahab Ramhormozian, Piotr Omenzetter, The Univ. of Auckland (New Zealand) . . . . [8692-17]

5:40 pm: **Preliminary research on monitoring the durability of concrete structures subjected to sulfate attack with optical fibre Raman spectroscopy,** Yun Bai, Univ. College London (United Kingdom); Jing Jing Wang, Trinity College Dublin (Ireland); Yanfei Yue, Univ. College London (United Kingdom); P. A. Muhammed Basheer, Queen's Univ. Belfast (United Kingdom); John J. Boland, Trinity College Dublin (Ireland)[8692-180]

Session 5

Room: Pacific Salon Five
Mon 4:00 pm to 6:00 pm

Damage Localization using NDE Methods

Session Chairs: **Yunfeng Zhang,** Univ. of Maryland, College Park (United States); **Francesco Lanza di Scalea,** Univ. of California, San Diego (United States)

4:00 pm: **Fatigue crack localization with near-field acoustic emission signals,** Yunfeng Zhang, Changjiang Zhou, Univ. of Maryland, College Park (United States) . . . . [8692-18]

4:20 pm: **Noncontact structural damage detection using electromagnetic impedance sensing,** Jiong Tang, Qi Shuai, Univ. of Connecticut (United States) [8692-19]

4:40 pm: **Damage classification using support vector machines in guided-wave structural health monitoring,** Xiang Li, Daewon Kim, Yi Zhao, Embry-Riddle Aeronautical Univ. (United States) . . . . [8692-20]

5:00 pm: **Design of a curvature sensor using Ba0.64Sr0.36TiO$_3$ (BST) flexoelectric material,** Xiang Yan, Wenbin Huang, Xiaoning Jiang, Fuh-Gwo Yuan, North Carolina State Univ. (United States) . . . . [8692-21]

5:20 pm: **Nondestructive detection of steel rebar corrosion damage using ultrasonic guided waves,** Dongsheng Li, Dalian Univ. of Technology (China) . . . . [8692-22]

5:40 pm: **Acoustic mechanical feedthroughs,** Stewart Sherrit, Phil Walkemeyer, Xiaoqi Bao, Yoseph Bar-Cohen, Mircea Badescu, Jet Propulsion Lab. (United States) . . . . [8692-174]

Conference 8693

Session 3

Room: Sunset
Mon 4:00 pm to 4:40 pm

Distributed Sensor Information Processing

Session Chair: **Michael D. Todd,** Univ. of California, San Diego (United States)

4:00 pm: **Improved distributed fiber optic sensing system based on single-ended double-pulse input Brillouin scattering,** Tianying Chang, Ruijuan Yang, Jilin Univ. (China); Yongliang Wang, David Y. Li, L.C. Pegasus Corp. (United States); Hong-Liang Cui, Jilin Univ. (China) and Polytechnic Institute of New York Univ. (United States) . . . . [8693-9]

4:20 pm: **Intelligent fiber-optic statistical mode sensors using novel features and artificial neural networks,** Hasan S. Efendioglu, Fatih Univ. (Turkey); Tulay Yildirim, Yildiz Teknik Univ. (Turkey); Onur Toker, Kemal Fidanboylu, Fatih Univ. (Turkey) . . . . [8693-11]

Conference 8694

Session 2 continued

Room: Royal Palm Five
Mon 1:30 pm to 5:20 pm

4:00 pm: **Mechanical characterization of DCPD resins partially reinforced asphalt mix for pothole patching materials,** Wei Yuan, Jenn-Ming Yang, Univ. of California, Los Angeles (United States) . . . . [8694-11]

4:20 pm: **Road profile estimation of city roads using DTPS,** Qi Wang, Northeastern Univ. (United States); J. Gregory McDaniel, Boston Univ. (United States); Ming L. Wang, Northeastern Univ. (United States) . . . . [8694-12]

4:40 pm: **Measurement of elastic constants of rail steel at elevated temperatures using ultrasound, sonic resonance, and laser detection methods,** Haifeng Zhang, Mehdi Ahmadi, H. Felix Wu, Univ. of North Texas (United States) [8694-13]

5:00 pm: **Advanced inspection methods for the testing of solid and hollow railway axles,** Dimosthenis Liaptsis, Dawei Yan, Stavros Avramidis, TWI Ltd. (United Kingdom) . . . . [8694-14]

Conference 8695

Concurrent Sessions

Session 5

Room: Royal Palm Two
Mon 4:00 pm to 6:00 pm

Guided Waves for SHM: Nonlinear Ultrasonics

4:00 pm: **Nonlinear Guided Waves in Solids under Constrained Thermal Expansion.,** Claudio Nucera, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) . . . . [8695-25]

4:20 pm: **Monitoring ageing of Alkali Resistant Glass fiber reinforced cement (GRC) using Guided Ultrasonic Waves,** Jesús Eiras, Jordi Payá, Mercedes Bonilla, Univ. Politècnica de València (Spain); Tribikram Kundu, The Univ. of Arizona (United States) . . . . [8695-26]

4:40 pm: **Fatigue Crack Detection using Guided Waves Nonlinear Modulation,** Hoon Sohn, Hyung Jin Lim, KAIST (Korea, Republic of); Martin P. DeSimio, Univ. of Dayton Research Institute (United States); Kevin S. Brown, Mark Derriso, Air Force Research Lab. (United States)[8695-27]

5:00 pm: **Higher harmonic generation in a hollow cylinder for structural health monitoring,** Yang Liu, Cliff J. Lissenden, Joseph L. Rose, The Pennsylvania State Univ. (United States) . . . . [8695-28]

5:20 pm: **A Hybrid Characterization Method for Fatigue Damage Using Nonlinear Lamb Waves and Piezoelectric Sensor Networks,** Ming Hong, Zhongqing Su, Li Cheng, The Hong Kong Polytechnic Univ. (Hong Kong, China); Xinlin P. Qing, Commercial Aircraft Corp. of China, Ltd. (China) . . . . [8695-29]

5:40 pm: **Nonlinear Elastic Imaging of low-velocity impact damage in Composite Structures using an Inverse Filtering approach,** Francesco Ciampa, Michele Meo, Univ. of Bath (United Kingdom) . . .[8695-30]

Session 6

Room: Royal Palm Six
Mon 4:00 pm to 6:00 pm

Issues and Practical Consideration Related to SHM II

Session Chairs: **Daniel Guyomar,** Institut National des Sciences Appliquées de Lyon (France); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States)

4:00 pm: **Detection, localization and energy quantification of shocks on mechanical structures using elastic energy flow estimators from piezoelectric sensors bonded on the structure.,** Xingjun Wang, Daniel Guyomar, Mickaël Lallart, Kaori Yuse, Institut National des Sciences Appliquées de Lyon (France) [8695-31]

4:20 pm: **Numerical and experimental characterization of scattering in damaged composite plates,** Matteo Carrara, Massimo Ruzzene, Georgia Institute of Technology (United States) . . . . [8695-32]

4:40 pm: **Reliable predictions of micro-cracks from macro-scale responses,** Sonjoy Das, Sourish Chakravarty, Univ. at Buffalo (United States) . . . . [8695-33]

5:00 pm: **FPGA based hard- and software platform for ultrasound measurement systems and its application to time of flight measurement and phase sensitive ultrasound microscopy,** Gerhard Birkelbach, ASI Analog Speed Instruments GmbH (Germany); Wolfgang Grill, Univ. Leipzig (Germany) [8695-34]

5:20 pm: **Autonomous self-building blocks,** Wei-Chih Wang, Univ. of Washington (United States) and National Cheng Kung Univ. (Taiwan) . . [8695-35]

5:40 pm: **Analysis of wave propagation In rib-stiffened and isogrid panels for structural health monitoring techniques,** Benjamin S. Cooper, Andrei N. Zagrai, New Mexico Institute of Mining and Technology (United States)[8695-36]

Tuesday · 12 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8690	Conference 8691

Announcements, Awards, and Plenary Presentation · *Town & Country Ballroom*

8:00 to 8:25 am
- Smart Structures Product Implementation Award
- NDE and SSM Lifetime Achievement Award Presentations

Plenary Presentation · 8:25 to 9:10 am

Ultrasonic and electro-magnetic waves for NDE and SHM: experiment and modelling
Tribikram Kundu, Univ. of Arizona

Conference 8686

Session 5

Room: Towne
Tue 9:30 am to 10:30 am

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

9:30 am: **A µ-biomimetic uncooled infrared sensor**, Georg Siebke, Siegfried Steltenkamp, Ctr. of Advanced European Studies and Research (Germany) [8686-13]

Coffee Break. . . Tue 10:30 am to 11:00 am

Conference 8687

Session 4

Room: Town & Country Ballroom
Tue 9:30 am to 12:20 pm

Actuator for Soft Robotic or for Biomedical Applications
Session Chairs: **Barbar J. Akle,** Lebanese American Univ. (Lebanon); **Larry L. Howell,** Brigham Young Univ. (United States)

9:30 am: **Electroactive polymer and shape-memory alloy actuators in biomimetics and humanoids** *(Invited Paper)*, Yonas T. Tadesse, The Univ. of Texas at Dallas (United States) . . . .[8687-8]

10:10 am: **Directional underwater sensor based on ionic electroactive polymer device**, Reza Montazami, Maziar Ashuri, Ruisi Zhang, Wangyujue Hong, Abbey Machtemes, Iowa State Univ. (United States); Nichelle'Le Carrington, Savannah State Univ. (United States) . . . . . .[8687-9]

Coffee Break. . . Tue 10:30 am to 11:00 am

Conference 8688

Session 4

Room: Sunrise
Tue 9:30 am to 10:30 am

Biological-inspired Systems and Bio-MEMS
Session Chairs: **Vishnu Baba Sundaresan,** The Ohio State Univ. (United States); **Robert K. Lenzen,** Air Force Institute of Technology (United States)

9:30 am: **Synthesizing fluidic flexible matrix composite based cellular structures,** Suyi Li, Kon-Well Wang, Univ. of Michigan (United States) . . . . . . [8688-15]

9:50 am: **Piezoelectric bimorph optimization for a dual-actuated flapping-wing micro air vehicle**, Robert K. Lenzen, U.S. Air Force (United States) and Air Force Institute of Technology (United States); Ryan P. O'Hara, Garrison J. Lindholm, Air Force Institute of Technology (United States) and U.S. Air Force (United States); Richard G. Cobb, Mark F. Reeder, Air Force Institute of Technology (United States) . . . . . [8688-16]

10:10 am: **Nonlinear experimental study of the vibration energy harvester for cardiac pacemakers**, M. Amin Karami, David J. Bradley, Daniel J. Inman, Univ. of Michigan (United States) . . . . [8688-17]

Conference 8689

Session 4

Room: Royal Palm Four
Tue 9:30 am to 10:30 am

Active Polymers I
Session Chairs: **Constantin Ciocanel,** Northern Arizona Univ. (United States); **Hani E. Naguib,** Univ. of Toronto (Canada)

9:30 am: **Nonlinear dynamics and thermodynamics of azobenzene polymer networks** *(Invited Paper)*, William S. Oates, Garret Vo, The Florida State Univ. (United States) . . . .[8689-12]

10:10 am: **Morphing structures using ionic transistors through digital combinatorial logic**, Vishnu Baba Sundaresan, The Ohio State Univ. (United States) . . . . .[8689-13]

Coffee Break. . . Tue 10:30 am to 11:00 am

Conference 8690

Session 4

Room: Royal Palm One
Tue 9:30 am to 10:30 am

Automotive Applications
Session Chairs: **Diann E. Brei,** Univ. of Michigan (United States); **Marcelo J. Dapino,** The Ohio State Univ. (United States)

9:30 am: **Acoustic linear adaptable regression model (ALARM) methodology for psycho-behavioral sound quality quantification to improve automotive door experience**, Suhant Prajwal Reddy Ranga, Jonathan E. Luntz, Diann E. Brei, Univ. of Michigan (United States); Alan W. Moyer, Paul W. Alexander, Imad Bazzi, Nancy L. Johnson, General Motors Corp. (United States) . . . . [8690-16]

9:50 am: **SMA-actuated vertical deploy air dam, part 2: operation and test performance of prototype unit**, Alan L. Browne, Nancy L. Jonson, General Motors Corp. (United States); Jeffrey Brown, Dynalloy Inc. (United States) . . . . [8690-17]

10:10 am: **Nonlinear magnetostrictive modeling for smart material electro-hydraulic actuator development**, John P. Larson, Marcelo J. Dapino, The Ohio State Univ. (United States). . . . . [8690-18]

Conference end.

Conference 8691

Session 6

Room: Royal Palm Three
Tue 9:30 am to 10:10 am

Nano – Micro Systems I
Session Chair: **Ajit Khosla,** Simon Fraser Univ. (Canada)

9:30 am: **Molecular recognition using nanomechanical responses**, Anja Boisen, Technical Univ. of Denmark (Denmark) . . . .[8691-14]

9:50 am: **MEMS piezoelectric vector hydrophone**, Yongrae Roh, Jinwook Kim, Jaeyoung Lee, Kyungpook National Univ. (Korea, Republic of) . . . .[8691-15]

Tuesday · 12 March

Conference 8692	Conference 8693	Conference 8694	Conference 8695

Announcements, Awards, and Plenary Presentation · *Town & Country Ballroom*

8:00 to 8:25 am
- Smart Structures Product Implementation Award
- NDE and SSM Lifetime Achievement Award Presentations

Plenary Presentation · 8:25 to 9:10 am

Ultrasonic and electro-magnetic waves for NDE and SHM: experiment and modelling
Tribikram Kundu, Univ. of Arizona

Concurrent Sessions (Conference 8692)

Session 6	Session 7
Room: Pacific Salon Seven Tue 9:30 am to 12:20 pm	**Room: Pacific Salon Five** Tue 9:30 am to 10:30 am

Session 6 — Statistical Learning for Smart Structures

Session Chairs: **Hae Young Noh,** Stanford Univ. (United States); **Yang Wang,** Georgia Institute of Technology (United States)

9:30 am: **Structural modal identification using data sets with missing observations,** Thomas J. Matarazzo, Shamim N. Pakzad, Lehigh Univ. (United States) . . . . [8652-136]

9:50 am: **Extension of the rotation algorithm for earthquake damage estimation of complex structures,** Konstantinos Balafas, Anne S. Kiremidjian, Stanford Univ. (United States) . . . . [8692-24]

10:10 am: **Forecasting algorithm for building energy management system,** Hae Young Noh, Stanford Univ. (United States) and Carnegie Mellon Univ. (United States); Ram Rajagopal, Stanford Univ. (United States) . . . . [8692-25]

Coffee Break Tue 10:30 to 11:00 am

Session 7 — SHM of Laminated Composite Structures

Session Chairs: **Fabio Semperlotti,** Univ. of Notre Dame (United States); **Kon-Well Wang,** Univ. of Michigan (United States)

9:30 am: **On the detection of closing delaminations in laminated composite plates using the structural intensity method,** Alfredo Lamberti, Fabio Semperlotti, Univ. of Notre Dame (United States) [8692-30]

9:50 am: **Phased-array beamsteering in composite laminates for guide-wave structural health monitoring,** Peter Osterc, Daewon Kim, Embry-Riddle Aeronautical Univ. (United States); Byungseok Yoo, Techno-Sciences Inc. (United States)[8692-31]

10:10 am: **Analytically modeling the piezoresistivity of CNT composites with low-filler aggregation,** Tyler Tallman, Kon-Well Wang, Univ. of Michigan (United States) . . [8692-32]

Session 4 (Conference 8693)

Room: Sunset
Tue 9:30 am to 10:30 am

Sensors for Composites Testing I

Session Chair: Wolfgang Ecke, Institut für Photonische Technologien e.V. (Germany)

9:30 am: **The role of experimental validation in achieving reliable measurement data with applied FBG strain sensors** *(Invited Paper),* Wolfgang R. Habel, Vivien G. Schukar, Nadine Kusche, Constanze Schilder, Viktoriya Tkachenko, Bundesanstalt für Materialforschung und -prüfung (Germany). . . . . [8693-12]

10:10 am: **A comparative analysis of FBG and low-coherence fiber-optic sensors for SHM of composite structures,** Zoran V. Djinovic, Integrated Microsystems Austria GmbH (Austria); Milos C. Tomic, Univ. of Belgrade (Serbia); Marijana Stojkovic, Integrated Microsystems Austria GmbH (Austria). . . . [8693-13]

Coffee Break. .Tue 10:30 to 11:00 am

Session 3 (Conference 8694)

Room: Royal Palm Five
Tue 9:30 am to 12:00 pm

Radar/Microwave NDE

Session Chairs: **Nenad Gucunski,** Rutgers, The State Univ. of New Jersey (United States); **Tzu-Yang Yu,** Univ. of Massachusetts Lowell (United States)

9:30 am: **Finite element simulation of GPR surveys of concrete bridge decks,** Nenad Gucunski, Rutgers, The State Univ. of New Jersey (United States) . . . . [8694-15]

9:50 am: **Microwave tomographic imaging of concrete columns,** Tomasz M. Grzegorczyk, Delpsi, LLC (United States); Paul M. Meaney, Dartmouth College (United States) . . . . [8694-16]

10:10 am: **Wideband subsurface radar for bridge structural health monitoring and nondestructive evaluation,** Che-Fu Su, Tzu-Yang Yu, Univ. of Massachusetts Lowell (United States); Yu-Jiun Ren, Chieh-ping Lai, LR Tech (United States); H. Felix Wu, Univ. of North Texas (United States) . . . . [8694-17]

Coffee Break. .Tue 10:30 to 11:00 am

Concurrent Sessions (Conference 8695)

Session 7	Session 8
Room: Royal Palm Two Tue 9:30 am to 10:30 am	**Room: Royal Palm Six** Tue 9:30 am to 10:30 am

Session 7 — Optical Techniques for SHM

Session Chairs: **Ichiya Takahashi,** Mitsubishi Electric Corp. (Japan); **Wolfgang Grill,** Univ. Leipzig (Germany)

9:30 am: **Structural dynamic characterization of small-scale multipurpose payloads using conventional and fiber optic sensors,** Rebecca Clemens, Andrei N. Zagrai, Jon Schlavin, New Mexico Institute of Mining and Technology (United States); Vahid Sotoudeh, Richard J. Black, Joey Costa, Levy Oblea, Fereydoun Faridian, Behzad Moslehi, Intelligent Fiber Optic Systems Corp. (United States); Justin M. Oliveira, NASA Kennedy Space Ctr. (United States) . . . . [8695-37]

9:50 am: **Life cycle strain monitoring of composite airframe structures by FBG sensors,** Ichiya Takahashi, Kazushi Sekine, Masami Kume, Hajime Takeya, Mitsubishi Electric Corp. (Japan); Shu Minakuchi, Nobuo Takeda, The Univ. of Tokyo (Japan); Kiyoshi Enomoto, SOKEIZAI Ctr. (Japan) . . . . . [8695-38]

10:10 am: **Structural health monitoring of concrete elements with embedded arrays of optical fibers,** Sergei Khotiaintsev, Alfredo Beltrán-Hernández, Juan González-Tinoco, Gerardo Aguilar-Ramos, Univ. Nacional Autónoma de México (Mexico) . . . . [8695-39]

Coffee BreakTue 10:30 am to 11:00 am

Session 8 — SHM for Pipes

Session Chairs: **Paul Fromme,** Univ. College London (United Kingdom); **Tribikram Kundu,** The Univ. of Arizona (United States)

9:30 am: **High temperatures health monitoring of the condensed water height in steam pipe systems,** Shyh-Shiuh Lih, Yoseph Bar-Cohen, Hyeong Jae Lee, Mircea Badescu, Xiaoqi Bao, Stewart Sherrit, Nobuyuki Takano, Patrick N. Ostlund, Jet Propulsion Lab. (United States) . . . . [8695-40]

9:50 am: **Change in Time of Flight of Longitudinal (axial symmetric) modes due to Lamination in Steel pipes,** Umar Amjad, Chi H. Nguyen, Ehsan Mahmoudabadi, Tribikram Kundu, The Univ. of Arizona (United States) . . . . [8695-41]

10:10 am: **Characterization of traffic loads on buried pipeline for life-cycle monitoring and management of municipal distribution system,** Suzhen Li, Xinliang Li, Tongji Univ. (China) . . . . [8695-42]

Coffee Break. .Tue 10:30 to 11:00 am

Tuesday · 12 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8691

Session 6

Room: Towne
Tue 11:00 am to 12:20 pm

Sensors II

Session Chair: **Susan A. Frost,** NASA Ames Research Ctr. (United States)

11:00 am: **Integration and flight test of a biomimetic heading sensor** *(Invited Paper)*, Javaan S. Chahl, Univ. of South Australia (Australia); Akiko Mizutani, Odonatrix Pty Ltd. (Australia) . . . . [8686-14]

11:40 am: **Biomimetic image processing techniques for use on fly-inspired vision sensors**, Brian K. Dean, Oakland Univ. (United States); Cameron H. G. Wright, Steven F. Barrett, Univ. of Wyoming (United States) . . . . [8686-15]

12:00 pm: **Geodermis: Biomimicry of distributed sensing for earth-based building**, Hae-Bum A. Yun, Univ. of Central Florida (United States); Lakshmi Reddi, Florida International Univ. (United States); Toni-Gaye McCulloch, Bryan Paul, Univ. of Central Florida (United States) . . . . [8686-16]

Lunch Break . . . . Tue 12:20 pm to 2:00 pm

Session 4 continued

Room: Town & Country Ballroom
Tue 9:30 am to 12:20 pm

11:00 am: **Electroactive polymer (EAP) mobility device**, Mark C. Stasik, Jay R. Sayre, Megan S. Moore, Battelle Memorial Institute (United States); Chuck A. Plaxico, RoadSafe LLC. (United States) . . . . [8687-10]

11:20 am: **Electroactive polymer-based anthropomorphic robot finger system**, Baek-Chul Kim, Hanjoung Cho, Seunghoon Shin, HyungSeok Lee, Hyungpil Moon, Hyoukryeol Choi, Ja Choon Koo, Sungkyunkwan Univ. (Korea, Republic of) . . [8687-11]

11:40 am: **Power electronics concepts for driving EAP stack actuators**, Lars Eitzen, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) . . . . [8687-12]

12:00 pm: **Understanding efficiency limits for dielectric elastomer driver circuitry**, Ho Cheong Lo, The Univ. of Auckland (New Zealand); Emilio Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) . . . . [8687-13]

12:20 pm: **Progress toward EAP actuators for biomimetic social robots**, David F. Hanson Jr., Hanson Robotics, Inc. (United States) and Nanyang Technological Univ. (Singapore) and The Univ. of Texas at Arlington (United States) . . . . [8687-96]

Lunch Break . . . . Tue 12:40 pm to 2:00 pm

Session 5

Room: Sunrise
Tue 11:00 am to 12:20 pm

Energy Harvesting and Scavenging: General II

Session Chairs: **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Amr M. Baz,** Univ. of Maryland, College Park (United States)

11:00 am: **Vibration shape effects on the power output in piezoelectric vibro-impact engergy haverters**, Jens Twiefel, Leibniz Univ. Hannover (Germany) . . . . [8688-18]

11:20 am: **Analysis and optimization of standing wave thermoacoustic-piezoelectric energy harvester: An electrical circuit analogy approach**, Amr M. Baz, Mostafa A. Nouh, Univ. of Maryland, College Park (United States); Osama J. Aldraihem, King Saud Univ. (Saudi Arabia) . . . . [8688-19]

11:40 am: **A magnetic/piezoelectric-based thermal energy harvester**, Tien-Kan Chung, National Chiao Tung Univ. (Taiwan); Ujjwalu Shukla, Indian Institute of Technology (India) and National Chiao Tung Univ. (Taiwan); Chia-Yuan Tseng, National Chiao Tung Univ. (Taiwan); Ch-Min Wang, Department of Mechanical Engineering, National Chiao Tung University (Taiwan) . . . . [8688-20]

12:00 pm: **A vibration energy harvester using diamagnetic levitation**, Sri Vikram Palagummi, North Carolina State Univ. (United States). . . . . . . [8688-21]

Lunch Break . . . . Tue 12:20 pm to 2:00 pm

Session 5

Room: Royal Palm Four
Tue 11:00 am to 12:20 pm

Active Polymers II

Session Chairs: **Sergio Luis dos Santos e Lucato,** Teledyne Scientific Co. (United States); **Vishnu Baba Sundaresan,** The Ohio State Univ. (United States)

11:00 am: **Development of novel multifunctional biobased polymer composites with tailored conductive network of micro-and-nano-fillers**, Siu Ning Leung, Hani E. Naguib, Univ. of Toronto (Canada) . . . . [8689-14]

11:20 am: **Network modeling of membrane-based artificial cellular systems**, Eric C. Freeman, Michael K. Philen, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8689-15]

11:40 am: **Meso-decorated self-healing gels: network structure and properties**, Jin Gong, Kensuke Sawamura, Susumu Igarashi, Hidemitsu Furukawa, Yamagata Univ. (Japan) . . . . [8689-16]

12:00 pm: **Observation instrument of dynamic frictional interface of gel engineering materials with polarized optical microscopic**, Naoya Yamada, Masato Wada, M. Hasnat Kabir, Jin Gong, Hidemitsu Furukawa, Yamagata Univ. (Japan) . . . . [8689-17]

Lunch Break . . . . Tue 1:00 pm to 2:00 pm

Session 7

Room: Royal Palm Three
Tue 11:00 am to 12:20 pm

Nano – Micro Systems II

Session Chair: **Christina L. Brantley,** U.S. Army Research, Development and Engineering Command (United States)

11:00 am: **Overcoming obstacles to creating complex MEMS systems: parallels with the semiconductor and computer design industries**, Lesley Shannon, Simon Fraser Univ. (Canada) . . . . [8691-16]

11:20 am: **Standoff sensing bioanalytes using MEMS**, Thomas G. Thundat, X. Liu, S. Kim, Charles Van Neste, Univ. of Alberta (Canada) . . . . . [8691-17]

11:40 am: **Fabrication of nanotemplates using anodized aluminum oxidation for nanowire array applications**, Ilwoo Seok, Jonathan Cole, Shivan Haran, Arkansas State Univ. (United States) [8691-18]

12:00 pm: **Polymer-based MEMS devices with modified organic electronics and thin film transistor**, Vijay K. Varadan, Univ. of Arkansas (United States) . . . . [8691-19]

Session 8

Room: Royal Palm Three
Tue 12:20 pm to 1:00 pm

Keynote Session

Session Chair: **Sang H. Choi,** NASA Langley Research Ctr. (United States)

12:20 pm: **Establishing electrical characteristics of DNA molecular wires in carbon-based bionanoelectronics platform** *(Keynote Presentation)*, Sam Kassegne, San Diego State Univ. (United States) . . . . [8691-20]

Lunch Break . . . . Tue 1:00 pm to 2:00 pm

Tuesday · 12 March

Conference 8692

Concurrent Sessions

Session 6 continued

**Room: Pacific Salon Seven
Tue 9:30 am to 12:20 pm**

11:00 am: **Sequential detection of progressive damage**, Mark Mollineaux, Ram Rajagopal, Stanford Univ. (United States) . . . . [8692-26]

11:20 am: **Embedded linear classifiers for damage detection in civil infrastructure**, Jerome P. Lynch, Courtney Peckens, Univ. of Michigan (United States) . . . . [8692-27]

11:40 am: **Statistical learning for sensor networks: NPL footbridge case study**, Elena N. Barton, National Physical Lab. (United Kingdom) . . . . . . [8692-28]

Lunch Break . . Tue 12:20 pm to 2:00 pm

Session 8

**Room: Pacific Salon Five
Tue 11:00 am to 12:20 pm**

Advance Sensors based on Micro- and Nanotechnologies

Session Chairs: **Kenneth J. Loh,** Univ. of California, Davis (United States); **Michael K. Philen,** Virginia Polytechnic Institute and State Univ. (United States)

11:00 am: **Numerical and experimental characterizations of low-frequency MEMS AE sensors**, Hossain Saboonchi, Didem Ozevin, Univ. of Illinois at Chicago (United States) . . . . [8692-33]

11:20 am: **Active stiffness modulation of fins using macrofiber composite**, Ashok K. Kancharala, Michael K. Philen, Virginia Polytechnic Institute and State Univ. (United States). . . . . . . [8692-34]

11:40 am: **Tunable fiber ring laser absorption spectroscopic sensors for gas detection**, Shijie Zheng, Yinian Zhu, Sridhar Krishnaswamy, Northwestern Univ. Ctr. for Quality Engineering (United States) . . . . [8692-35]

12:00 pm: **On the sensing of magnetorheological elastomers**, Nima Ghafoorianfar, Faramarz Gordaninejad, Xiaojie Wang, Univ. of Nevada, Reno (United States) . . . . [8692-36]

Lunch Break . . Tue 12:20 pm to 2:00 pm

Conference 8693

Session 5

**Room: Sunset
Tue 11:00 am to 12:20 pm**

Sensors for Composites Testing II

Session Chair: **Wolfgang Ecke,** Institut für Photonische Technologien e.V. (Germany)

11:00 am: **A chirped long-period grating sensor for monitoring flow direction and cure of a resin**, Rebecca Y. N. Wong, Edmond Chehura, Stephen W. James, Ralph P. Tatam, Cranfield Univ. (United Kingdom) . . . . [8693-14]

11:20 am: **Multiplexed fibre-optic sensors for monitoring resin infusion, flow, and cure in composite material processing**, Edmon Chehura, Renata Jarzebinska, Elisabete F. Reia Da Costa, Alexandros A. Skordos, Stephen W. James, Ivana K. Partridge, Ralph P. Tatam, Cranfield Univ. (United Kingdom) . . . . [8693-15]

11:40 am: **Environmental barrier coating (EBC) durability modeling using a progressive failure analysis approach, part II**, Ali Abdul-Aziz, NASA Glenn Research Ctr. (United States); Galib Abumeri, AlphaSTAR Corp. (United States); Ramakrishna T. Bhatt, Joseph E. Grady, Dongming Zhu, NASA Glenn Research Ctr. (United States) . . . . [8693-16]

12:00 pm: **Characterization of fatigue damage in adhesively bonded lap joints through dynamic, full-spectral interrogation of fiber Bragg grating sensors**, Sean C. Webb, Kara J. Peters, North Carolina State Univ. (United States); Nikola Stan, Spencer Chadderdon, Richard Selfridge, Stephen Schultz, Brigham Young Univ. (United States). . . . .[8693-34]

Lunch Break . . . . . .Tue 1:00 pm to 2:00 pm

Conference 8694

Session 3 continued

**Room: Royal Palm Five
Tue 9:30 am to 12:00 pm**

11:00 am: **a two dimensional entropy and short time Fourier Transform application on ground penetrating radar data analysis**, Panglijen Candra, Dryver R. Huston, Tian Xia, The Univ. of Vermont (United States) . . . .[8694-18]

11:20 am: **Digital Control and Data Acquisition for High Performance Ground Penetrating Radars**, Dryver R. Huston, Tian Xia, Anbu Venkatachalam, The Univ. of Vermont (United States); Xianlei Xu, The Univ. of Vermont (United States) and China Univ. of Mining and Technology (China) . . . .[8694-19]

11:40 am: **A novel clutter reduction approach for GPR data from concrete structures**, Xiangmin Wei, Ying Zhang, Georgia Institute of Technology (United States) . . . .[8694-20]

Lunch Break . . . . . Tue 1:00 pm to 2:00 pm

Conference 8695

Concurrent Sessions

Session 9

**Room: Royal Palm Two
Tue 11:00 am to 1:00 pm**

Guided Waves for SHM: Localization Issues

Session Chairs: **Shivan Haran,** Arkansas State Univ. (United States); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

11:00 am: **Localization of defects in irregular waveguides by dispersion compensation and pulse compression**, Luca De Marchi, Alessandro Marzani, Marco Miniaci, Univ. degli Studi di Bologna (Italy) . . . .[8695-43]

11:20 am: **Adaptive unscented Kalman filter (UKF) for acoustic emission (AE) source localization in noisy environment**, Ehsan Dehghan-Niri, Alireza Farhidzadeh, Salvatore Salamone, Univ. at Buffalo (United States) . . . .[8695-44]

11:40 am: **Guided waves-based damage localization in riveted aircraft panel**, Tomasz Wandowski, Pawel Malinowski, The Szewalski Institute of Fluid-Flow Machinery (Poland); Wieslaw M. Ostachowicz, The Szewalski Institute of Fluid-Flow Machinery (Poland) and Gdynia Maritime Univ. (Poland) . . . .[8695-45]

12:00 pm: **Signal processing for the inspection of immersed structures**, Elisabetta Pistone, Abdollah Bagheri, Kaiyuan Li, Piervincenzo Rizzo, Univ. of Pittsburgh (United States) . . . .[8695-46]

12:20 pm: **Design of a low-power structural monitoring system to locate impacts based on dispersion compensation**, Alessandro Perelli, Carlo Caione, Luca De Marchi, Univ. degli Studi di Bologna (Italy); Davide Brunelli, Univ. degli Studi di Trento (Italy); Alessandro Marzani, Luca Benini, Univ. degli Studi di Bologna (Italy). . . . .[8695-47]

12:40 pm: **quantitative monitoring of 2-dimensional damages using envelop locating curves**, Chaoliang Du, Xinlin P. Qing, Yishou Wang, Commercial Aircraft Corp. of China, Ltd. (China) . . . .[8695-48]

Lunch Break . . . . Tue 1:00 to 2:00 pm

Session 10

**Room: Royal Palm Six
Tue 11:00 am to 1:00 pm**

SHM for Biomedical Applications I

Session Chairs: **Xiaoning Jiang,** North Carolina State Univ. (United States); **Shujun Zhang,** The Pennsylvania State Univ. (United States)

11:00 am: **Smart Materials for High Power Applications** *(Invited Paper)*, Shujun Zhang, Hyeong Jae Lee, The Pennsylvania State Univ. (United States) . . . .[8695-49]

11:30 am: **Piezoelectric Thick Films for High Frequency Biomedical Ultrasonic Transducer Applications** *(Invited Paper)*, Qifa Zhou, Xiang Li, Hsiusheng Hsu, Teng Ma, Changgeng Liu, K. Kirk Shung, The Univ. of Southern California (United States) . . . .[8695-50]

12:00 pm: **Quantitative acoustic evaluation of materials: devices and applications of single crystal PCMUT technology**, Kevin A. Snook, Thomas C. Walker, TRS Technologies, Inc. (United States); Fan Zheng, K. Kirk Shung, The Univ. of Southern California (United States); Vincent A. De Lucca, Richard A. Haber, Rutgers, The State Univ. of New Jersey (United States); Yi-Xian Qin, Stony Brook Univ. (United States); Wesley S. Hackenberger, TRS Technologies, Inc. (United States) . . . . [8695-51]

12:20 pm: **Analytical model of planar LiNbO3 plate with four-layer structure of inversion layer**, Jin Chen, Zhitian Zhang, Chao Zhang, Guanping Feng, Graduate School at Shenzhen,Tsinghua Univ. (China) . . . . [8695-52]

12:40 pm: **Design, fabrication and test of a small aperture, dual frequency ultrasound transducer**, Jianguo Ma, Xiaoning Jiang, North Carolina State Univ. (United States); Di Wu, Beijing Jiaotong Univ. (China) . . . . [8695-53]

Lunch Break. . . . . . . .Tue 1:00 pm to 2:00 pm

Tuesday · 12 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8691

Conference 8686 — Session 7

Room: Towne
Tue 2:00 pm to 3:00 pm

Sensors III

Session Chair: **Javaan S. Chahl,** RMIT Univ. (Australia)

2:00 pm: **Approaching limits of sensing using neuromorphic noise-exploitation principles** *(Invited Paper)*, Shantanu Chakrabartty, Michigan State Univ. (United States) . . . . [8686-17]

2:40 pm: **Bat biosonar as an inspiration for dynamic sensing**, Rolf Mueller, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8686-18]

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

Conference 8687 — Session 5

Room: Town & Country Ballroom
Tue 2:00 pm to 3:40 pm

Energy Harvesting I

Session Chairs: **Yonas T. Tadesse,** The Univ. of Texas at Dallas (United States); **William S. Oates,** The Florida State Univ. (United States)

2:00 pm: **Finite element modelling of the sensing and energy harvesting performance in ionic polymer metal composites**, Barbar J. Akle, Wassim Habchi, Lebanese American Univ. (Lebanon)[8687-15]

2:20 pm: **Autonomous dielectric elastomer generator using electret**, Cong Thanh Vu, G2Elab (France); Claire Jean-Mistral, Institut National des Sciences Appliquées de Lyon (France); Alain Sylvestre, G2Elab (France) . . . . [8687-16]

2:40 pm: **Oscillating-water-column wave-energy-converter based on dielectric elastomers**, Marco Fontana, Rocco Vertechy, Massimo Bergamasco, Scuola Superiore Sant'Anna (Italy). . . . . . . [8687-17]

3:00 pm: **Soft 3D printed energy harvesters**, Thomas G. McKay, The Univ. of Auckland (New Zealand); Peter Walters, Univ. of the West of England (United Kingdom); Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Benjamin M. O'Brien, Iain A. Anderson, The Univ. of Auckland (New Zealand) . . . . [8687-18]

3:20 pm: **Electroactive polymers for gaining sea power**, Benedikt Scherber, Matthias Grauer, Bosch Rexroth AG (Germany); Istvan Denes, Robert Bosch GmbH (Germany) . . . . [8687-19]

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

Conference 8688 — Session 6

Room: Sunrise
Tue 2:00 pm to 3:40 pm

Modeling, Simulation, Optimization, Signal Processing, Control, and Design of Integra

Session Chairs: **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawai'i (United States); **Manuel Collet,** Univ. de Franche-Comté (France)

2:00 pm: **Identification of flexible structures by frequency-domain observability range context**, Mark A. Hopkins, Rochester Institute of Technology (United States) . . . .[8688-22]

2:20 pm: **Modeling and control of a jellyfish-like bio-inspired AUV**, Cassio T. Faria, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States); Daniel J. Inman, Univ. of Michigan (United States) . . . . [8688-23]

2:40 pm: **Computation of 2D vibroacoustic wave's dispersion for optimizing acoustic power flow in interaction with adaptive metacomposites**, Manuel Collet, Morvan Ouisse, Univ. de Franche-Comte (France); Mohamed N. Ichchou, Ecole Centrale de Lyon (France); Roger Ohayon, Conservatoire National des Arts et Métiers (France) . . . .[8688-24]

3:00 pm: **Increasing overall wind-farm power efficiency by optimal cooperative control**, Jinkyoo Park, Stanford Univ. (United States) . . . .[8688-25]

3:20 pm: **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 (United States) . . . .[8688-26]

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

Conference 8689 — Session 6

Room: Royal Palm Four
Tue 2:00 pm to 3:20 pm

Shape Memory Polymers

Session Chairs: **Donald J. Leo,** Virginia Polytechnic Institute and State Univ. (United States); **Arun R. Srinivasa,** Texas A&M Univ. (United States)

2:00 pm: **Aging effects of epoxy shape-memory polymers**, Kannan Dasharathi, John A. Shaw, Univ. of Michigan (United States) . . . . [8689-18]

2:20 pm: **Shape-memory effect in crosslinked polymers: effects of polymer chemistry and network architecture**, Jacob D. Davidson, Yali Li, Nakhiah C. Goulbourne, Univ. of Michigan (United States) . . . . [8689-19]

2:40 pm: **A thermoviscoelastic constitutive model of epoxy shape-memory polymers**, Jianguo Chen, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China). . . . . [8689-20]

3:00 pm: **A constitutive theory for shape memory polymers: coupling of small and large deformation**, Qiao Tan, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China). . . . . [8689-21]

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

Conference 8691 — Session 9

Room: Royal Palm Three
Tue 2:00 pm to 3:00 pm

Nano-Micro Systems III

Session Chair: **Dileepan Joseph,** Univ. of Alberta (Canada)

2:00 pm: **Bio-inspired design: nonlinear digital pixels for multiple-tier processes**, Orit Skorka, Alireza Mahmoodi, Jing Li, Dileepan Joseph, Univ. of Alberta (Canada). . . . . [8691-21]

2:20 pm: **Polyimide neural probe for chronic sensing of neural activity and micropositioning**, Darryl W. Scott, Min H. Kim, Norfolk State Univ. (United States); Larry D. Sanford, Eastern Virginia Medical School (United States); Kyo D. Song, Hargsoon Yoon, Norfolk State Univ. (United States) . . . . [8691-22]

2:40 pm: **Development of magneto-impedance microsensors for the detection of buried defects using Eddy current**, Johan Moulin, Institut d'Électronique Fondamentale (France) . . [8691-23]

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

Tuesday · 12 March

Conference 8692

Session 9

Room: Pacific Salon Seven
Tue 2:00 pm to 3:40 pm

Application of Wireless Sensor for SHM

Session Chairs: **Shinae Jang,** Univ. of Connecticut (United States); **Jennifer A. Rice,** Univ. of Florida (United States)

2:00 pm: **Simulation analysis and experimental performance of a radar sensor network for distributed bridge monitoring**, Shanyue Guan, Jennifer A. Rice, Univ. of Florida (United States); Changzhi Li, Changzhan Gu, Texas Tech Univ. (United States). . . . . [8692-37]

2:20 pm: **Significance of sensor quality on structural health monitoring results**, Siavash Dorvash, Shamim N. Pakzad, Lehigh Univ. (United States). . . . [8692-38]

2:40 pm: **Smart sensor nodes for vibration measurement of large civil infrastructure**, Jong-Jae Lee, Yong-Soo Park, Sejong Univ. (Korea, Republic of); Ung-Jin Na, Ministry of Land, Transport and Maritime Affairs (Korea, Republic of); Won-Tae Lee, Chang-Geun Lee, Korea Expressway Corp. (Korea, Republic of) . . . . [8692-39]

3:00 pm: **Full-scale monitoring of in-service highway bridge using wireless hybrid sensor**, Shinae Jang, Sushil Daha, Jingcheng Li, Univ. of Connecticut (United States) . . . . [8692-40]

3:20 pm: **Design and initial validation of a wireless control system based on WSNs in civil engineering**, Yan Yu, Xu Wang, Luyu Li, Jinping Ou, Dalian Univ. of Technology (China). . . . . [8692-179]

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

Session 10

Room: Pacific Salon Five
Tue 2:00 pm to 3:40 pm

Next-Gen Sensors and Sensing Technologies

Session Chairs: **Jerome Peter Lynch,** Univ. of Michigan (United States); **Shantanu Chakrabartty,** Michigan State Univ. (United States)

2:00 pm: **Gen-2 RFID compatible, zero down-time, programmable mechanical strain-monitors and mechanical impact detectors**, Shantanu Chakrabartty, Kenji Aono, Tao Feng, Michigan State Univ. (United States) . . . . [8692-41]

2:20 pm: **Micro-aerial vehicle type wall-climbing robot mechanism for structural health monitoring**, Jae-Uk Shin, Donghoon Kim, Jong-Heon Kim, Hyun Myung, KAIST (Korea, Republic of) . . . . [8692-42]

2:40 pm: **Large-area graphene-based thin films and their application as strain sensors for structural health monitoring**, Gautam Naik, Northwestern Univ. (United States); Adarsh Kaniyoor, Sundara Ramaprabhu, Indian Institute of Technology Madras (India); Sridhar Krishnaswamy, Northwestern Univ. (United States)[8692-43]

3:00 pm: **Microparticle transport and concentration with surface acoustic waves**, Irving J. Oppenheim, Erin R. Dauson, David W. Greve, Kelvin B. Gregory, Carnegie Mellon Univ. (United States). . . . . [8692-44]

3:20 pm: **Cochlea-inspired sensing node for structural monitoring applications**, Courtney Peckens, Jerome P. Lynch, Univ. of Michigan (United States) . . [8692-45]

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

Conference 8693

Session 6

Room: Sunset
Tue 2:00 pm to 3:20 pm

Acoustic Emission and Ultrasound Sensors

Session Chair: **Richard Selfridge,** Brigham Young Univ. (United States)

2:00 pm: **Multi-element, high-temperature integrated ultrasonic transducers for structural health monitoring**, Alain Blouin, Jocelyn Veilleux, Silvio E. Kruger, Kuo-Ting Wu, National Research Council Canada (Canada) . . . . [8693-18]

2:20 pm: **Acoustic emission for fatigue damage monitoring in cross-welded aluminum plates**, Dimitrios G. Aggelis, Univ. of Ioannina (Greece) . . . . [8693-20]

2:40 pm: **Monitoring of glass-ceramic composites under static and dynamic loading by combined NDE methods**, Evangelos Z. Kordatos, Dimitrios G. Aggelis, Konstantinos G. Dassios, Theodoros E. Matikas, Univ. of Ioannina (Greece)[8693-21]

3:00 pm: **Large-area piezoceramic coating with IDT electrodes for ultrasonic sensing applications**, Vivek T. Rathod, D. Roy Mahapatra, Indian Institute of Science (India); A. Antony Jeyaseelan, Soma Dutta, National Aerospace Labs. (India) . . . . [8693-22]

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

Conference 8694

Session 4

Room: Royal Palm Five
Tue 2:00 pm to 3:40 pm

Fiber Optic Sensors in NDE/SHM

Session Chairs: **Farhad Ansari,** Univ. of Illinois at Chicago (United States); **Xingwei Wang,** Univ. of Massachusetts Lowell (United States)

2:00 pm: **Monitoring of out-of-autoclave BMI composites using fiber-optic sensors**, Sudharshan Anandan, Sriram Nagarajan, Amardeep Kaur, K. Chandrashekhara, Hai Xiao, Missouri Univ. of Science and Technology (United States); Nam Phan, Naval Air Systems Command (United States) . . . . [8694-21]

2:20 pm: **High-dynamic range, high-sensitivity FBG interrogation**, Nikola Stan, Douglas C. Bailey, Richard Selfridge, Stephen Schultz, Brigham Young Univ. (United States); Kara J. Peters, Mohammed Zikry, Sean C. Webb, North Carolina State Univ. (United States). . . . . [8694-22]

2:40 pm: **Fiber optics monitoring of a scarc specimen with crack location prediction**, Benjamin Smith, Shen-en Chen, The Univ. of North Carolina at Charlotte (United States); Guangqin Wei, NanZee Sensing Technology Co., Ltd. (China); Bin Shi, Nanjing Univ. (China). . . . . . [8694-23]

3:00 pm: **Nondestructive characterization for PDMS thin films using a miniature fiber optic photoacoustic probe**, Xiaotian Zou, Nan Wu, Ye Tian, Xingwei Wang, Univ. of Massachusetts Lowell (United States) . . . . [8694-24]

3:20 pm: **Fiber optic photoacoustic ultrasound generator based on gold nanocomposite**, Nan Wu, Ye Tian, Xiaotian Zou, Xingwei Wang, Univ. of Massachusetts Lowell (United States). . . . . [8694-25]

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

Conference 8695

Session 11

Room: Royal Palm Two
Tue 2:00 pm to 3:20 pm

Guided Waves for SHM: Distributed Sensors and Sensor Network

Session Chairs: **Jennifer E. Michaels,** Georgia Institute of Technology (United States); **Paul Fromme,** Univ. College London (United Kingdom)

2:00 pm: **Implementation of a novel imaging technique in an existing structural health monitoring system**, Patrice Masson, Nicolas Quaegebeur, Adrien Brunel, Univ. de Sherbrooke (Canada); Nezih Mrad, Defence Research and Development Canada, Ottawa (Canada) . . . . . . [8695-54]

2:20 pm: **Guided Ultrasonic Wave Propagation through Inaccessible Damage in a Folded Plate using Sensor-Actuator Network**, Ganesh Kolappan Geetha, D. Roy Mahapatra, Srinivasan Gopalakrishnan, Indian Institute of Science (India) . . . . [8695-55]

2:40 pm: **Damage Detection in Composite Structures with Multi-Path Guided Wave Imaging**, James S. Hall, Hidden Solutions, LLC (United States); Jennifer E. Michaels, Georgia Institute of Technology (United States) . . . . [8695-56]

3:00 pm: **Evaluation of the Lamb Waves Approach to Detect Simulated Damage in a Orthogonal Plane of the Sensor Network Surface for Corrosion Detection Application**, Fernando Dotta, Leandro B. Ceresetti, Embraer-Empresa Brasileira de Aeronautica SA (Brazil). . . . . [8695-57]

Coffee Break. . . . . Tue 3:20 pm to 4:00 pm

Session 12

Room: Royal Palm Six
Tue 2:00 pm to 3:40 pm

SHM for Railway Track, Energy Harvesting, and Other Issues

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

2:00 pm: **On the self-powering of SHM techniques using seismic energy harvesting**, Yi-Chieh Wu, Mickaël Lallart, Linjuan Yan, Daniel Guyomar, Claude Richard, Institut National des Sciences Appliquées de Lyon (France) . . . . [8695-58]

2:20 pm: **Axial stress determination using Impedance-based method and its application on the thermal stresses measurement in Continuous Welded Rail**, Xuan Zhu, Robert Phillips, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) . . . . [8695-59]

2:40 pm: **Experiment study on structure damage detection using a higher-order resonant circuit**, Wanlu Zhou, Lei Zuo, Stony Brook Univ. (United States) [8695-60]

3:00 pm: **Multiscale analysis of wave-damage interaction in two and three dimensional isotropic plates**, Filippo Casadei, Julian Rimoli, Massimo Ruzzene, Georgia Institute of Technology (United States) . . . . [8695-61]

3:20 pm: **Acoustic emission crack detection of railway turnouts using FBG sensing technology**, Y. Jiang, Xiaowei Ye, The Hong Kong Polytechnic Univ. Shenzhen Research Institute (China); Y. Q. Ni, The Hong Kong Polytechnic Univ. (Hong Kong, China); Xiaopeng Dong, Xiamen Univ. (China); Y. Chen, The Hong Kong Polytechnic Univ. (Hong Kong, China). . . . . [8695-62]

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

Tuesday · 12 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8691

Conference 8686

Session 8

Room: Towne
Tue 4:00 pm to 5:40 pm

Optics

Session Chair: **Shantanu Chakrabartty,** Michigan State Univ. (United States)

4:00 pm: **Simulation analysis on the optical role of the various structural disorder in the Morpho butterfly's color** *(Invited Paper)*, Akira Saito, Takuto Shibuya, kosei Ishibashi, Megumi Akai-kasaya, Yuji Kuwahara, Osaka Univ. (Japan) . . . . [8686-19]

4:40 pm: **Optical simulations of biomimetic nanostructures and applications** *(Invited Paper)*, Surojit Chattopadhyay, National Yang-Ming Univ (Taiwan); Yi-Fan Huang, National Yang-Ming Univ. (Taiwan) . . . . [8686-20]

5:20 pm: **Progress toward visual decoys to trap the male emerald ash borer**, Drew P. Pulsifer, Akhlesh Lakhtakia, The Pennsylvania State Univ. (United States); Mahesh S. Narkede, Univ. of Massachusetts Lowell (United States); Michael J. Domingue, The Pennsylvania State Univ. (United States); Beverly G. Post, Pennsylvania State Univ. (United States); Jayant Kumar, Univ. of Massachusetts Lowell (United States); Ra´ul J. Mart´ın-Palma, Thomas C. Baker, The Pennsylvania State Univ. (United States). . . [8686-21]

Session 9

Room: Towne
Tue 5:40 pm to 6:00 pm

Biomedical Applications

Session Chair: **Akira Saito,** Osaka Univ. (Japan)

5:40 pm: **Design and simulation of an intra-ventricular assistive device for end stage congestive heart failure patients**, Milad Hosseinipour, Mohammad H. Elahinia, The Univ. of Toledo (United States) . . . . [8686-22]

Conference 8687

Session 6

Room: Town & Country Ballroom Tue 4:00 pm to 6:20 pm

Energy Harvesting II

Session Chairs: **John D. Madden,** The Univ. of British Columbia (Canada); **Thomas G. McKay,** The Univ. of Auckland (New Zealand)

4:00 pm: **Platform-based design of EAP transducers in Danfoss PolyPower A/S**, Rahimullah Sarban, Danfoss PolyPower A/S (Denmark); Tómas V. Gudlaugsson, Technical Univ. of Denmark (Denmark). . . . .[8687-20]

4:20 pm: **Dielectric elastomer energy harvesting undergoing electromechanical phase transition**, Xiaojian Luo, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China). . . . . [8687-21]

4:40 pm: **Optimized energy harvesting materials and generator design**, Christian Graf, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany); Julia Hitzbleck, Torsten Feller, Karin Clauberg, Joachim Wagner, Jens Krause, Bayer MaterialScience AG (Germany); Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany). . . . .[8687-22]

5:00 pm: **Comparison of dielectric electroactive polymer generators' energy harvesting cycles**, Emmanouil Dimopoulos, Ionut Trintis, Stig Munk-Nielsen, Aalborg Univ. (Denmark). . . . . [8687-23]

5:20 pm: **Modular dc-dc converter system for energy harvesting with EAPs**, Lars Eitzen, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany). . . . .[8687-24]

5:40 pm: **Maximizing the energy density of dielectric elastomer generators using equi-biaxial loading**, Jiangshui Huang, Samuel Shian, Zhigang Suo, David R. Clarke, Harvard Univ. (United States) . . . . [8687-25]

6:00 pm: **Electrode effect on the cellulose piezo-paper energy harvester**, Lindong Zhai, Sangdong Jang, Jaehwan Kim, Zafar Abas, Inha Univ. (Korea, Republic of); Heung Soo Kim, Dongguk Univ. (Korea, Republic of); Joo-Hyung Kim, Chosun Univ. (Korea, Republic of) . . . .[8687-26]

Conference 8688

Session 7

Room: Sunrise
Tue 4:00 pm to 5:40 pm

Passive and Active Vibration Isolation Systems I

Session Chair: **Farhan Gandhi,** The Pennsylvania State Univ. (United States)

4:00 pm: **Vibration damping of a cantilever beam utilizing fluidic flexible matrix composites**, Bin Zhu, Chris D. Rahn, Charles E. Bakis, The Pennsylvania State Univ. (United States). . . . . [8688-27]

4:20 pm: **Analytical solutions to H_2and H_∞ optimization of resonant shunt electromagnetic tuned mass damper and vibration energy harvester**, Lei Zuo, Wen Cui, Xiudong Tang, Stony Brook Univ. (United States) . . . . [8688-28]

4:40 pm: **A new global approach using a network of piezoelectric elements and energy redistribution for enhanced vibration damping of smart structure**, Dan Wu, Daniel Guyomar, Claude Richard, Institut National des Sciences Appliquées de Lyon (France). . . . . [8688-29]

5:00 pm: **Experimental investigation of dynamic performance of a prototype hybrid-tuned mass damper under human excitation**, Nima Noormohammadi, Paul Reynolds, The Univ. of Sheffield (United Kingdom). . . . . [8688-30]

5:20 pm: **Simultaneous supply of infinite and infinitesimal stiffness of active isolation systems that are exposed to multiple vibration sources**, Björn T. Kletz, Technical Univ. Braunschweig (Germany) and Deutsches Zentrum für Luft- und Raumfahrt (Germany); Jörg Melcher, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany). . . . . [8688-31]

Conference 8689

Session 7

Room: Royal Palm Four
Tue 4:00 pm to 5:00 pm

Shape Memory Polymer Composites

Session Chairs: **Anindya Ghoshal,** U.S. Army Research Lab. (United States); **Tomoki Takahashi,** Nagoya Univ. (Japan)

4:00 pm: **Thermo-mechanical behavior and constitutive modeling of epoxy-based SMPs and their hybrid composites**, Mohammad Souri, Spandana Pulla, Anil Erol, Haluk E. Karaca, Charles Y. Lu, Univ. of Kentucky (United States) . . . . . [8689-23]

4:20 pm: **The preparation and characterization of nanocomposites based on polyhedral oligomeric silsesquioxane (POSS) reinforced shape-memory polymer**, Zhongyu Liu, Fang Xie, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) . . . . [8689-24]

4:40 pm: **In composition of few-layer grapheme and carbon nanofiber in nanopaper for rlectrical actuation of shape-memory polymer**, Haibao Lu, Harbin Institute of Technology (China). . . . . [8689-25]

5:00 pm: **Three dimensional experimental characterization and modeling of a NiMnGa alloy**, Isaac Nelson, Doug LaMaster, Heidi Feigenbaum, Constantin Ciocanel, Northern Arizona Univ. (United States) . . . . [8689-64]

Conference 8691

Session 10

Room: Royal Palm Three
Tue 4:00 pm to 5:40 pm

Flexible Nano-and Microsystems

Session Chair: **Eugene Edwards,** U.S. Army Research, Development and Engineering Command (United States)

4:00 pm: **Conformal printing of sensors on 3D and flexible surfaces using direct-write aerosol jet deposition**, Tyler J. Blumenthal, Vincent Fratello, Giovanni F. Nino, Keith E. Ritala, Quest Integrated, Inc. (United States). . . . .[8691-24]

4:20 pm: **Particle-based conductive silver ink customized for ink jet printing on cellulose electroactive paper**, Mohammad A. H. Khondoker, Seongcheol Mun, Jaehwan Kim, Inha Univ. (Korea, Republic of) . . . .[8691-25]

4:40 pm: **Synthesis and characterization of polymeric binders for printing inks**, Jungmin Lee, Linfeng Chen, Vijay K. Varadan, Univ. of Arkansas (United States) . . . .[8691-26]

5:00 pm: **Synthesis and properties of cellulose functionalized -4, 4'-(propane-2, 2'-diyl) diphenol-SiO_2/TiO_2 hybrid nanocomposites materials for high-performance applications**, Sivalingam Ramesh, Gwang-Hoon Kim, Chosun Univ. (Korea, Republic of); Heung Soo Kim, Dongguk Univ. (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of); Joo-Hyung Kim, Chosun Univ. (Korea, Republic of) . . . .[8691-27]

5:20 pm: **Printed tandem photovoltaic/thermoelectric device**, Hyun Jung Kim, National Institute of Aerospace (United States); Jungmin Lee, Vijay K. Varadan, Univ. of Arkansas (United States); Sang H. Choi, NASA Langley Research Ctr. (United States) . . . .[8691-28]

Tuesday · 12 March

Conference 8692

Session 11

Room: Pacific Salon Seven
Tue 4:00 pm to 4:40 pm

Advances in Energy Harvesting Technologies

Session Chair: **Tomonori Nagayama,** The Univ. of Tokyo (Japan)

4:00 pm: **An electromagnetic energy harvester using asynchronously vibrating cantilevers with phase shift**, Jinkyoo Park, Kincho H. Law, Stanford Univ. (United States). . . . . [8692-46]

4:20 pm: **Uncertainty quantification of a corrosion-enabled energy harvester for low-power sensing applications**, Scott A. Ouellette, Michael D. Todd, Univ. of California, San Diego (United States) . . . . [8692-47]

Session 12

Room: Pacific Salon Five
Tue 4:00 pm to 5:00 pm

Monitoring and Analysis of Wind Turbine Systems

Session Chairs: **R. Andrew Swartz,** Michigan Technological Univ. (United States); **Jerome Peter Lynch,** Univ. of Michigan (United States)

4:00 pm: **Vibration control simulations and experiments using piezoelectric transducers on wind turbine blades at UC San Diego**, Jeffery D. Tippmann, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) . . . . [8692-48]

4:20 pm: **Modified ERA analysis for modeling nonstationary rotational structural dynamics in wind turbines**, Antonio Velazquez, R. Andrew Swartz, Michigan Technological Univ. (United States) . . . . [8692-49]

4:40 pm: **Propagation error minimization method for multiple structural displacement monitoring system**, Haemin Jeon, Jae-Uk Shin, Hyun Myung, KAIST (Korea, Republic of) . . . . [8692-50]

Conference 8693

Session 7

Room: Sunset
Tue 4:00 pm to 5:00 pm

Sensors for Turbine Engines

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

4:00 pm: **Optical strain measurements on a rotating disk**, Mark R. Woike, Ali Abdul-Aziz, Michelle Clem, Gustave C. Fralick, NASA Glenn Research Ctr. (United States) . . . .[8693-23]

4:20 pm: **Turbine-engine rotor health monitoring and durability evaluation using spin tests data**, Ali Abdul-Aziz, Mark R. Woike, George Y. Baaklini, NASA Glenn Research Ctr. (United States). . . .[8693-24]

4:40 pm: **Optical method of measuring strain on a rotating disk using a cross-correlation imaging technique**, Michelle Clem, Mark R. Woike, Ali Abdul-Aziz, Gustave C. Fralick, NASA Glenn Research Ctr. (United States). . . . .[8693-25]

Conference 8694

Session 5

Room: Royal Palm Five
Tue 4:00 pm to 4:40 pm

Radioactive NDE

Session Chairs: **Tian Xia,** The Univ. of Vermont (United States); **Haifeng Zhang,** Univ. of North Texas (United States)

4:00 pm: **Performance evaluation of a combined neutron and X-ray digital imaging system**, Vaibhav Sinha, Anjali Srivastava, Hyoung Koo Lee, Xin Liu, Missouri Univ. of Science and Technology (United States) . . . .[8694-26]

4:20 pm: **Analysis of air voids distribution in concrete specimen using x-ray computed tomography**, Yu-Min Su, Nabil Hossiney, Mang Tia, Univ. of Florida (United States) . . . .[8694-27]

Conference 8695

Concurrent Sessions

Session 13

Room: Royal Palm Two
Tue 4:00 pm to 6:20 pm

Guided Waves for SHM: Modeling Aspects

Session Chairs: **Hoon Sohn,** KAIST (Korea, Republic of); **Peter Xinlin Qing,** Commercial Aircraft Corp. of China, Ltd. (China)

4:00 pm: **Numerical simulation for damage interaction of guided waves in composites**, Kalyan S. Nadella, Carlos E. Cesnik, Univ. of Michigan (United States) . . . .[8695-63]

4:20 pm: **Modeling of guided waves for detection of linear and nonlinear structural damage**, Yanfeng Shen, Victor Giurgiutiu, Bin Lin, Univ. of South Carolina (United States) . . . .[8695-64]

4:40 pm: **A coupled SAFE-BEM formulation for dispersion data extraction of leaky guided waves in waveguides of arbitrary cross-section**, Matteo Mazzotti, Univ. degli Studi di Bologna (Italy) and Drexel Univ. (United States); Alessandro Marzani, Univ. degli Studi di Bologna (Italy); Ivan Bartoli, Drexel Univ. (United States); Erasmo Viola, Univ. degli Studi di Bologna (Italy) . . . .[8695-65]

5:00 pm: **Modeling of ultrasonic guided waves using the finite cell method**, Sascha Duczek, Otto-von-Guericke-Univ. Magdeburg (Germany); Meysam Joulaian, Alexander Düster, Technische Univ. Hamburg-Harburg (Germany); Ulrich Gabbert, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . .[8695-66]

5:20 pm: **A guided wave approach for the detection of damage in a structure having elements with periodic damage**, Sushovan Mukherjee, Srinivasan Gopalakrishnan, Indian Institute of Science (India) [8695-67]

5:40 pm: **Fully coupled electromechanical elastodynamic model for guided wave propagation analysis**, Luke Borkowski, Kuang C. Liu, Aditi Chattopadhyay, Arizona State Univ. (United States) . . . . .[8695-68]

6:00 pm: **Damage analysis in composite structures using finite element method for SHM purposes**, Lin Zhao, Xinlin P. Qing, Yishou Wang, Commercial Aircraft Corp. of China, Ltd. (China) . . . .[8695-69]

Session 14

Room: Royal Palm Six
Tue 4:00 pm to 6:20 pm

Novel Instrumentation for Sensing and Actuation

Session Chairs: **Wei-Chih Wang,** Univ. of Washington (United States); **Wolfgang Grill,** Univ. Leipzig (Germany)

4:00 pm: **A flexible insert for wireless strain sensing**, Irving J. Oppenheim, David W. Greve, Carnegie Mellon Univ. (United States); Antonia F. Chen, Univ. of Pittsburgh Medical Ctr. (United States) . . . . .[8695-70]

4:20 pm: **Why may an atomic clock be needed for ultrasonic SHM with high temporal resolution?**, Wolfgang Grill, Univ. Leipzig (Germany) and ASI Analog Speed Instruments GmbH (Germany); Gerhard Birkelbach, ASI Analog Speed Instruments GmbH (Germany) . . . .[8695-71]

4:40 pm: **Liquid viscosity measurement using super harmonic resonance**, Wei-Chih Wang, Univ. of Washington (United States) and National Cheng Kung Univ. (Taiwan) . . . .[8695-72]

5:00 pm: **Carbon bed contamination detection and monitoring with piezoelectric wafer active sensors**, Jingjing Bao, Victor Giurgiutiu, Univ. of South Carolina (United States); Gregory W. Peterson, U.S. Army Edgewood Chemical Biological Ctr. (United States); Miranda Duncan, Univ. of South Carolina (United States) . . .[8695-73]

5:20 pm: **Characterization in various contrasts representing material properties by microscopic acoustic imaging**, Wolfgang Grill, Univ. Leipzig (Germany) and ASI Analog Speed Instruments GmbH (Germany). . . . .[8695-74]

5:40 pm: **Forward light scattering method for structural characterization of electrospun fibers**, Wei-Chih Wang, Univ. of Washington (United States) and National Cheng Kung Univ. (Taiwan); Jin-Jia Hu, National Cheng Kung Univ. (Taiwan)[8695-75]

6:00 pm: **Spectroscopic ellipsometry investigation of gold nanoparticles embedded in PDMS for bio-sensing applications**, Yia-Chung Chang, Mohammad T. Yaseen, Academia Sinica (Taiwan) . . . .[8695-76]

Posters · Tuesday · 6:00 to 7:30 pm

Conference attendees are invited to attend the joint poster session/exhibition reception to network, enjoy light refreshments, and view the poster papers. Attendees are required to wear their conference registration badge. Authors of poster papers will be present to answer questions concerning their papers. Poster authors must set up their poster between 10 am and 4 pm on Tuesday 12 March.

Conference 8686

Bionic design and analysis of morphing trailing-edge, Weilong Yin, Harbin Institute of Technology (China) . . . . [8686-33]

Experimental analysis on the effect of milk fat concentration on light scattering intensity, Jinying Yin, Harbin Institute of Technology (China) . [8686-34]

Inspiration from Morpho wing scales structrue to design advanced optical materials, Wang Zhang, Di Zhang, Shanghai Jiao Tong Univ. (China) . . [8686-35]

Research on biomimetic material templated from nature materials, Di Zhang, Wang Zhang, Shanghai Jiao Tong Univ. (China) . . . . [8686-36]

Redesigning of industrial product design systems on biological lines, Avinash Raipally, National Institute of Fashion Technology (India) . . . . [8686-37]

Adhesion performance of gecko-inspired flexible carbon nanotubes dry adhesive, Yang Li, Nanjing Univ. of Aeronautics and Astronautic (China); Geng Xu, Suzhou Institute of Nano-Tech and Nano-Bionics (China); Ling Gong, Nanjing Univ. of Aeronautics and Astronautic (China); Géza Tóth, Univ. of Oulu (Finland); Qingwen Li, Suzhou Institute of Nano-Tech and Nano-Bionics (China); Zhendong Dai, Nanjing Univ. of Aeronautics and Astronautic (China) . . . . [8686-38]

The driving pattern and safety margin of gekko gecko on slopes, Zhendong Dai, Institute of Bio-inspired Structure and Surface Engineering (China) . . . . [8686-39]

Conference 8687

Hot-embossing of microstructures on addition-curing polydimethylsiloxane films, Sindhu Vudayagiri, Liyun Yu, Suzan S. Hassouneh, Anne L. Skov, Technical Univ. of Denmark (Denmark)[8687-89]

Evolutionary algorithms for the multi-objective optimization of stacked dielectric elastomer actuators, Aaron D. Price, ABB AG Corporate Research Ctr. (Germany) . . . . [8687-90]

Anticipating electrical breakdown in dielectric elastomer actuators, Daniel Muffoletto, Kevin M. Burke, Jennifer Zirnheld, Univ. at Buffalo (United States) . . . . [8687-91]

Actuators based on intrinsic conductive polymers/carbon nanoparticles nanocomposites, Sergio Bocchini, Istituto Italiano di Tecnologia (Italy); Daisy Accardo, Istituto Italiano di Tecnologia (Italy) and Politecnico di Torino (Italy); Paolo Ariano, Istituto Italiano di Tecnologia (Italy); Mariangela Lombardi, Politecnico di Torino (Italy) and Istituto Italiano di Tecnologia (Italy); Maurizio Biso, Alberto Ansaldo, Davide Ricci, Istituto Italiano di Tecnologia (Italy) . . . . [8687-92]

Kinetics evaluation of using biomimetic IPMC actuators for stable bipedal locomotion, Milad Hosseinipour, Mohammad H. Elahinia, The Univ. of Toledo (United States) . . . . [8687-93]

The effects of electrode surface morphology on the actuation performance of IPMC, Kwang Jin J. Kim, Univ. of Nevada, Las Vegas (United States) [8687-94]

Scalable low nDOF hp-FEM model of IPMC actuation, David Pugal, Univ. of Nevada, Reno (United States); Alvo Aabloo, Univ. of Tartu (Estonia); Kwang Jin J. Kim, Univ. of Nevada, Las Vegas (United States) . . . . [8687-95]

Nanoporous graphene ionic-polymer actuator system with high-electromechanical strain, Mehdi Ghaffari, Yang Liu, William Kinsman, Yue Zhou, Minren Lin, Q. M. Zhang, The Pennsylvania State Univ. (United States); Shanthi Murali, Rodney S. Ruoff, The Univ. of Texas at Austin (United States) . . . . [8687-97]

Development of an active isolation mat based on dielectric elastomer stack actuators for mechanical vibration cancellation, Roman Karsten, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) . . . . [8687-98]

Strain-enhanced nanoparticle electrostrictive polymer blends for actuator applications, Boscij Pawlik, Christian Schirrmann, Kirstin Bornhorst, Florenta Costache, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . [8687-99]

Dielectric strength of elastomer membranes: from electromechanical instability to bulk breakdown, Alexander Kogler, Andreas Tröls, Richard Baumgartner, Rainer Kaltseis, Reinhard Schwödiauer, Ingrid Graz, Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria) . . . . [8687-100]

DEAP high-level product architecture, Tómas V. Gudlaugsson, Niels H. Mortensen, Technical Univ. of Denmark (Denmark); Rahimullah Sarban, Danfoss PolyPower A/S (Denmark) . . . . [8687-101]

Fabrication of stable reduced-graphene oxide dispersions in various media and their transparent conductive electrode for the dielectric elastomer actuators, Chong Min Koo, Kyungho Min, Min Ho Kim, Il Jin Kim, Soon Man Hong, Ji Young Jung, Won Jun Na, Korea Institute of Science and Technology (Korea, Republic of) . . . . [8687-102]

Validated numerical simulation model of a dielectric elastomer generator, Florentine Foerster, Holger Moessinger, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) . . . . [8687-103]

Silver nanowires embedded gel electrodes, Yuta Abe, Jin Gong, Hidemitsu Furukawa, Yamagata Univ. (Japan) . . . . [8687-104]

Polarizability investigation of 1-butyl-3-methylimidazolium cation in electroactive ionic liquid-cellulose gel actuator, Wissawin Kunchornsup, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) . . . . [8687-105]

A comparison study of ionic polymer-metal composites (IPMCs) fabricated with Nafion and other ion exchange membranes and their suggested applications, Jiyeon J. Park, Viljar Palmre, Univ. of Nevada, Reno (United States); Kwang Jin J. Kim, Univ. of Nevada, Las Vegas (United States); Dongsuk Shin, Department of Bioengineering, Rich University (United States); Daniel H Kim, Memorial Hermann Health System, Department of Neurosurgery, University of Texas (United States) . . . . . . [8687-106]

Sulfonated styrenic pentablock copolymer/silicate nanocomposite membranes and their IPMC transducers, Chong Min Koo, Jang-Woo Lee, Seunggun Yu, Soon Man Hong, Il Jin Kim, Jin Hong Lee, Santosh Yadav, Korea Institute of Science and Technology (Korea, Republic of) . . . . [8687-107]

Improvement of foamed ionic polymer metal composites actuator, Chuljin Kim, Kyung Soo Lee, Byung Chul Kweon, Sung Woon Cha, Young-Pil Park, Yonsei Univ. (Korea, Republic of) . . . . [8687-124]

Conference 8688

Damping properties of stay cable-passive damper system with effects of cable sag and damper stiffness, Min Liu, Harbin Institute of Technology (China) . . . . [8688-78]

Dynamic design of laminated piezocomposites structures (LAPS) using topology optimization method, Ruben A. Salas, Emilio C. N. Silva, Univ. de São Paulo (Brazil) . . . . [8688-79]

A bio-inspired test system for bionic above-knee prosthetic knees, Daihua Wang, Lei Xu, Qiang Fu, Gang Yuan, Chongqing Univ. (China) . . . . . [8688-80]

Theory and experiment research of two-dimension acoustic metamaterial, Hongwei Sun, Jiangsu Automation Research Institute (China); Ying Li, Nanjing Univ. of Science and Technology (China); Perngjin F. Pai, Univ. of Missouri-Columbia (United States); Zhiming Li, Jiangsu Automation Research Institute (China) . . . . [8688-81]

Analysis and modeling of a piezoelectric energy harvester for powering a wireless sensor, Damiano Milani, Francesco Braghin, Gisella Tomasini, Marco Bassetti, Politecnico di Milano (Italy) . . . . . [8688-82]

Modeling and Comparison of Cantilevered Piezoelectric Energy Harvester with Segmented and Continuous Electrode Configurations, Hongyan Wang, Harbin Institute of Technology (China) and Qiqihar Univ. (China); Lihua Tang, Nanyang Technological Univ. (Singapore); Xiaobiao Shan, Tao Xie, Harbin Institute of Technology (China); Yaowen Yang, Nanyang Technological Univ. (Singapore) . . . . [8688-83]

MR tactile device for minimally invasive surgery (MIS): experimental investigation, Jong-Seok Oh, Jin-Kyu W. Kim, Seung-Bok Choi, Inha Univ. (Korea, Republic of) . . . . [8688-84]

The assessment of chevron knee bracing frames seismic behavior, Massood Mofid, Sharif Univ. of Technology (Iran, Islamic Republic of) . . . . . [8688-85]

Multichannel active vibration control using MicroBlaze soft processor on Xilinx Virtex-4 FPGA, Shashikala Prakash, Renjith Kumar, National Aerospace Labs. (India); Ravikiran Guledgudd, SATTVA e-TECH India Pvt. Ltd. (India); Radhakrishna P., National Aerospace Labs. (India) . . . . . . [8688-86]

Electrically-controlled release of tannic acid from calcium-alginate hydrogel in transdermal drug delivery application, Nophawan Paradee, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) . . . . [8688-87]

Testing of CLEMR damper and its application to structures using fuzzy logic, Xiangcheng Zhang, Zhaodong Xu, Xinghuai Huang, Southeast Univ. (China) . . . . [8688-89]

Enhancement of piezoelectric energy harvesting with multi-stable nonlinear vibrations, Panduranga Vittal Avvari, Lihua Tang, Yaowen Yang, Chee Kiong Soh, Nanyang Technological Univ. (Singapore) . . . . [8688-90]

Zero-crossing velocity detector design for self-powered piezoelectric energy harvesting devices, Yu-Yin Chen, National Taiwan Univ. (Taiwan) and Ecole Normale Supérieure de Cachan (France); Dejan Vasic, Ecole Normale Supérieure de Cachan (France); François Costa, Ecole Normale Supérieure de Cachan (France) and Univ. Paris Est Créteil (France); Wen-Jong Wu, Chih-Kung Lee, National Taiwan Univ. (Taiwan) . . . . [8688-91]

An adaptive non-model-based control strategy for smart structures vibration suppression, Francesco Ripamonti, Matteo Morlacchi, Ferruccio Resta, Politecnico di Milano (Italy) . . . . [8688-92]

Experiment and analysis of morphing skin based on shape-memory composite tube, Shan bo Chen, Ning Feng, Jinsong Leng, Yanju Liu, Harbin Institute of Technology (China); Yijin Chen, Harbin Institute of Technology (China) . . . . [8688-93]

Implementation of a modal disturbance estimator for vibration suppression, Simone Cinquemani, Gabriele Cazzulani, Ferruccio Resta, Francesco Ripamonti, Politecnico di Milano (Italy) . . . . [8688-94]

Influence of thermal strain and pyroelectric effects on active vibration control of a smart piezo structure, Vivek Gupta, Himachal Pradesh Univ. (India) . . . . [8688-95]

Electroaeroelastic modeling and analysis of a hybrid piezoelectric-inductive flow energy harvester, José A. C. Dias, Carlos De Marqui Jr., Univ. de São Paulo (Brazil); Alper Erturk, Georgia Institute of Technology (United States) . . . . [8688-96]

Application of a passive/active autoparametric cantilever beam absorber with PZT actuator for duffing systems, Gerardo Silva, Hugo F. Abundis, Ctr. de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (Mexico); Benjamin Vazquez, Univ. Autónoma Metropolitana (Mexico) . . . . [8688-97]

A fuzzy-logic based dual-purpose adaptive circuit for vibration control and energy harvesting using piezoelectric transducer, Qing Li, Univ. of New Haven (United States) . . . . [8688-98]

Smart integrated energy monitoring and management system for standalone photovoltaic systems, Ali Abou-Elnour, Ajman Univ. of Science and Technology Network (United Arab Emirates) [8688-99]

A cantilevered piezoelectric bi-stable composite concept for broadband energy harvesting, Andres F. Arrieta, Tommaso Delpero, ETH Zurich (Switzerland); Andrea Bergamini, EMPA (Switzerland); Paolo Ermanni, ETH Zurich (Switzerland). . [8688-100]

Posters · Tuesday · 6:00 to 7:30 pm

Conference 8689

Fabrication and characterization of shape-memory polystyrene foams, Yong Tao Yao, Pei Xiang, Jinsong Leng, Harbin Institute of Technology (China) [8689-50]

Comparative study of nanomaterials for interlaminar reinforcement of fiber-composite panels, Karen R. Chiu, Terrisa Duenas, NextGen Aeronautics Inc. (United States); Yuris A. Dzenis, Jase Kaser, Precision Nanotechnologies LLC (United States); Charles E. Bakis, Pennsylvania State Univ. (United States); Keith Roberts, Daniel Carter, U.S. Army Research, Development and Engineering Command (United States) . . . . [8689-51]

Computational modeling of bio-mechanical behavior of microtubules, K. M. Liew, City Univ. of Hong Kong (Hong Kong, China) . . . . [8689-52]

Laser pinning of shape-memory alloy for controlling functional fatigue, Rajendra P. Prasath, Gopalkrishna M. Hegde, D. Roy Mahapatra, Indian Institute of Science (India) . . . . [8689-53]

Nonlocal elasticity theory for lateral torsional buckling of nanobeam, Md Z. Islam, City Univ. of Hong Kong (Hong Kong, China) . . . . [8689-54]

Fatigue damage evaluation of plain woven carbon fiber reinforced plastic (CFRP) modified with MFC (micro-fibrillated cellulose) by thermo-elastic damage analysis (TDA), Ryohei Aoyama, Doshisha Univ. (Japan) . . . . [8689-55]

Computational design of multifunctional composites made of shape-memory alloys and fibre-reinforced plastics, Björn Senf, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany); Iñaki Navarro y de Sosa, Technische Univ. Chemnitz (Germany); Christoph Eppler, Holger Kunze, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany) . . . . [8689-56]

Effects of transformation temperature in SMA wire-reinforced FRP composites, Shashishekarayya R. Hiremath, Rajendra P. Prasath, D. Roy Mahapatra, Indian Institute of Science (India) . . . . [8689-57]

An effective theoretical approach to chemo-responsive shape-memory effect in polymers, Haibao Lu, Harbin Institute of Technology (China) . . . . [8689-58]

Simulation and experiment research on smart metamaterial structures for wave isolation, Yun Li, Jiangsu Automation Research Institute (China) . . . . [8689-59]

A study of damping characteristics of alumina-filled epoxy nano-composites, Anand Kumar, Anand Kumar, Anand Kumar, Harcourt Butler Technological Institute (India); Priyanka Katiyar, Krishna Institute of Technology (India) . . . . [8689-60]

Fundamental physics of IPMC transduction: mechanoelectrical voltage relaxation explained, David Pugal, Viljar Palmre, Univ. of Nevada Reno (United States); Kwang Jin Kim, Univ. of Nevada Las Vegas (United States) . . . . [8689-61]

Thermoelectric properties of Al and Y-doped $CaMnO_3$, Kyeongsoon Park, C. M. Kim, J. W. Seo, Sejong Univ. (Korea, Republic of) . . . . [8689-62]

Study on self-healing effect of concrete cracks based on microbial technique, Chunxiang Qian, Hui Rong, Southeast Univ. (China) . . . . [8689-63]

Conference 8690

Semi-active magnetorheological seat suspension for vibration isolation of a helicopter crew seat, Gregory J. Hiemenz, Pablo Sztein, Techno-Sciences Inc. (United States); Wei Hu, Norman M. Wereley, Univ. of Maryland, College Park (United States); William C. Glass, Naval Air Warfare Ctr. Aircraft Div. (United States) . . . . [8690-19]

Structural design and analysis of a kind of improved pneumatic muscle fiber, Ning Feng, Shanbo Chen, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) . . . . [8690-20]

Proton exchange membrane based on sulfonated poly(ether ether ketone) and sulfonated poly(1,4-Phenylene ether ether sulfone) for vanadium redox flow battery, Suraluck Macksasitorn, Sairung Changkhamchom, Anuvat Sirivat, Kitipat Siemanond, Chulalongkorn Univ. (Thailand) . . . . [8690-21]

Conference 8692

Identification of Structural Parameters Based on Symbolic Time Series Analysis and Differential Evolution Strategy, Rongshuai Li, Akira Mita, Jin Zhou, Keio Univ. (Japan) . . . . [8692-119]

Multi-objective differential evolution algorithm for stochastic system identification, Jin Zhou, Akira Mita, Rongshuai Li, Keio Univ. (Japan). . . . [8692-120]

Low-frequency/high-sensitivity triaxial monolithic sensor, Fabrizio Barone, Fausto Acernese, Rosangela Canonico, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Univ. degli Studi di Salerno (Italy) . . . . [8692-121]

Large-band seismic characterization of the INFN Gran Sasso National Laboratory, Fabrizio Barone, Fausto Acernese, Rosangela Canonico, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Univ. degli Studi di Salerno (Italy) . . . . [8692-122]

Mechanical monolithic tiltmeter for low-frequency measurements, Fabrizio Barone, Fausto Acernese, Rosangela Canonico, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Univ. degli Studi di Salerno (Italy). . . . . [8692-123]

Conference 8689

Analysis of nano-indentation test for polycrystalline materials by modified strain gradient theory, Bong-Bu Jung M.D., Pohang Univ. of Science and Technology (Korea, Republic of) . . . . [8691-53]

Film-type haptic array actuator made with cellulose acetate, Ki-Baek Kim, Byung-Woo Kang, Inha Univ. (Korea, Republic of); Sang-Youn Kim, Korea Univ. of Technology and Education (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) [8691-54]

Hardware efficient seizure prediction algorithm, Sergi Consul, Bashir I. Morshed, Robert Kozma, Univ. of Memphis (United States) . . . . [8691-55]

The model of random signals generated by optical particle counter and the instrument improvement, Zhengang Yan, Baomin Bian, Nanjing Univ. of Science and Technology (China); Keding Yan, School of Electronic Information Engineering,Technological University, Xi'an (China); Chunyong Wang, zhenhua li, Nanjing Univ. of Science and Technology (China) . . . . [8691-56]

Conference 8692

Beat phenomenon analysis of concrete beam with piezoelectric sensors, Lin-Sheng Huo, Xu Li, Hongnan Li, Dalian Univ. of Technology (China) . . . . [8692-124]

Semi-active control of stay cables using nonlinear friction damper, Huiping WANG, Limin SUN, Tongji Univ. (China). . . . . [8692-125]

Assessment and evaluation of damage detection methods based on modal frequency change, Hien HoThu, Akira Mita, Keio Univ. (Japan) . . . . [8692-126]

Structural damage identification based on substructure sensitivity and l1 sparse regularization, Shumei Zhou, Yuequan Bao, Hui Li, Harbin Institute of Technology (China). . . . [8692-127]

Automated detection and classification of cracks on concrete bridge decks, Prateek Prasanna, Kristin J. Dana, Nenad Gucunski, Basily Basily, Rutgers, The State Univ. of New Jersey (United States) [8692-128]

Application of hall element as multimodal sensing device for artificial skin, Jun-ichiro Yuji, Kumamoto National College of Technology (Japan). . . [8692-129]

Data analysis for long-term structural health monitoring on a continuous rigid frame bridge, Lei Wang, Harbin Institute of Technology (China) . . . . [8692-130]

Multigas optical fiber sensing system, Weiqi Wang, Tianyu Zhang, Jilin Univ. (China); David Y. Li, L.C. Pegasus Corp. (United States). . . . . [8692-131]

Femtosecond laser irradiation enhanced room temperature tin oxide nanostructure gas sensor, Haizhou Ren, Haibin Huo, Mengyan Shen, Marina Ruths, Hongwei Sun, Univ. of Massachusetts Lowell (United States) . . . . [8692-132]

Simulation and experiment for large-scale space structure, Hongbo Sun, Zuoliang Zha, Jian Zhou, Wuxi Jincheng Curtian Wall Engineering Co. Ltd. (China) . . . . [8692-133]

Depth-sensor design and fabrication process using silver-paste printing method, Hyeunseok Choi, Korea Institute of Industrial Technology (Korea, Republic of). . . . . [8692-134]

Performance criteria for dynamic window systems utilizing nanostructured behaviors for energy harvesting and environmental comfort, Peter R. H. Stark, Anna H. Dyson, Brandon C. Andow, Bess Krietemeyer, Rensselaer Polytechnic Institute (United States) . . . . [8692-135]

Experimental investigation of annealed ionic polymer transducers in sensing, Bilge Kocer, Ursula Zangrilli, Lisa D. Mauck Weiland, Univ. of Pittsburgh (United States) . . . . [8692-137]

The Community Seismic Network and Quake-Catcher Network: enabling structural health monitoring through instrumentation by community participants, Monica D. Kohler, Thomas H. Heaton, Ming Hei Cheng, California Institute of Technology (United States) . . . . [8692-138]

Automated computer vision-based detection of exposed transverse reinforcement for post-earthquake safety assessments, Stephanie A. German, Georgia Institute of Technology (United States); Ioannis Brilakis, Univ. of Cambridge (United Kingdom); Reginald DesRoches, Georgia Institute of Technology (United States) . . . . [8692-139]

Active mass damper system employing time delay control algorithm for vibration mitigation of building structure, Dong Doo Jang, Hyung-Jo Jung, KAIST (Korea, Republic of). . . . . [8692-140]

Dynamic strain measurement for early damage detection of structures via long-gage optical fibers, Huang Huang, Ibaraki Univ. (Japan)[8692-141]

Operational modal identification of a long span cable-stayed bridge with wireless sensors, Quansheng Yan, Xijun Ye, Xiaolin E. Yu, Buyu Jia, South China Univ. of Technology (China) . [8692-143]

Optimal placement of smart sensors in CFS structures under blast loading using hybrid FEM-GA technique, Hamid R. Vosoughifar, Seyed Kazem Sadat Shokouhi, Azam Dolatshah, Islamic Azad Univ. (Iran, Islamic Republic of); Hassan Atapour, California State Univ., Fresno (United States) . . . . . . [8692-144]

Real-time health monitoring on impact identification of composite structures with distributed built?in sensor network, Liang Si, Technische Univ. München (Germany) and China Univ. of Mining and Technology (China); Zhonghui Chen, China Univ. of Mining and Technology, Beijing (China); Horst J. Baier, Technische Univ. München (Germany). . . . . [8692-145]

Semi-active vibration control with harmonically varying damping (application to serial TDOF system and filtering using the Stuart-Landau Equation), Satoshi Hirohata, Daisuke Iba, Kyoto Institute of Technology (Japan) . . . . [8692-146]

Design and development of piezo based on board alignment hexapod system, Chirag P. Dewan, Naimesh Patel, Dinavahi Subrahmanyam, Neeraj Mathur, Anup Vora, Space Applications Ctr. (India) . . . . [8692-147]

A piezoelectric-wafer-stack vibration energy harvester for wireless sensor networks, Xuezheng Jiang, Yancheng Li, Jianchun Li, Univ. of Technology, Sydney (Australia). . . . . [8692-148]

Posters · Tuesday · 6:00 to 7:30 pm

Conference attendees are invited to attend the joint poster session/exhibition reception to network, enjoy light refreshments, and view the poster papers. Attendees are required to wear their conference registration badge.
Authors of poster papers will be present to answer questions concerning their papers. Poster authors must set up their poster between 10 am and 4 pm on Tuesday 13 March.

Nonlinear behavior of coupling beams with novel shape-memory alloy dampers under lateral loads, Chenxi Mao, China Earthquake Administration (China) and Harbin Institute of Technology (China); Zhenying Wang, Northeast Forestry Univ. (China); Hui Li, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) . . . . [8692-150]

High-temperature measurement using Cu-plating fiber Bragg grating for metal smart structure applications, Tianying Chang, Jilin Univ. (China); Lei Jia, Qingmei Sui, Shandong Univ. (China); Hong-Liang Cui, Jilin Univ. (China) and Polytechnic Institute of New York Univ. (China). . . . . [8692-151]

Monitoring the deformation of the SMP-based active morphing structure using fiber Bragg gratings, Peng Li, Harbin Institute of Technology (China); Zhijun Yan, Lin Zhang, Aston Univ. (United Kingdom); Jinsong Leng, Harbin Institute of Technology (China). . . . . [8692-152]

Brush wear and dust accumulation fiber-optic sensor system for synchronous compensators online monitoring, Claudio Florídia, Livia R. Alves, Fábio R. Bassan, Antonio A. Juriollo, Flávio Borin, CpqD Foundation (Brazil); Afonso R. C. Souza, ELETRONORTE (Brazil) . . . . [8692-153]

Design of self-contained sensor for monitoring of deep-sea offshore platform, Yan Yu, Yang Song, Dalian Univ. of Technology (China); Chunwei Zhang, Univ. of Western Sydney (Australia); Jinping Ou, Dalian Univ. of Technology (China) . . . . [8692-154]

Battery-less wireless acoustic emission sensor based on piezoelectric wafer active sensor, Haiying Huang, Mazharul Islam, The Univ. of Texas at Arlington (United States) . . . . [8692-155]

Incorporating gyroscopic effects in low-order spinning finite element models for wind-turbine structural dynamics, Antonio Velazquez, R. Andrew Swartz, Michigan Technological Univ. (United States) . . . . [8692-156]

Development of cyber-based autonomous structural integrity assessment system for building structures, Masahiro Kurata, Kohei Fujita, Xiaohua Li, Tomoya Yamazaki, Kyoto Univ. (Japan). . . [8692-157]

Strength gain pattern analysis for real-time concrete curing process monitoring using an embedded PZT-steel plate probe, Ju-Won Kim, Changgil Lee, Eun-Seok Shin, Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of) [8692-158]

A novel rotational stiffness monitoring method of structure foundation, Shuang Hou, Yu Tianjing, Dalian Univ. of Technology (China) . . . . . . [8692-160]

A novel partial correlation noise model for damage identification, Dongsheng Li, Dalian Univ. of Technology (China). . . . . [8692-161]

Shear-mode piezoelectric acoustic emission sensor with a particular geometry design, Didem Ozevin, Hazim Yalcinkaya, Univ. of Illinois at Chicago (United States) . . . . [8692-162]

An acceleration transducer based on optical fiber Bragg grating with temperature self-compensating function, Chuan Wang, Lu Qiyu, Harbin Institute of Technology (China). . . . . [8692-163]

Experimental investigation on the interaction between magnetorheological fluid damper and stay cable, Min Liu, Harbin Institute of Technology (China) . . . . [8692-164]

A piezoelectric-electromagnetic-based energy harvester for railway health monitoring, Jingcheng Li, Shinae Jang, Jiong Tang, Univ. of Connecticut (United States) . . . . [8692-166]

Online structural health monitoring under operational conditions using wireless smart sensors, Shinae Jang, Univ. of Connecticut (United States); Priscilla O. Mensah-Bonsu, Univ. of Connecticut (United States) and Arup (United States); Sushil Dahal, Jingcheng Li, Univ. of Connecticut (United States) . . . . [8692-167]

Optimal sensor placement of base-isolated structure subjected to near-field earthquakes using novel TTFD approach, Seyed Kazem Sadat Shokouhi, Azam Dolatshah, Hamid R. Vosoughifar, Islamic Azad Univ. (Iran, Islamic Republic of); Bijan Dowlatshahi, Univ. of Minnesota (United States). . . . . . . [8692-168]

An operational power management method for the grid containing renewable power systems utilizing short-term weather and load forecastings, Fadhil Aula, Samuel C. Lee, The Univ. of Oklahoma (United States) . . . . [8692-169]

Housing and Development Board (Singapore) structural-health monitoring system for public housing in Singapore: An informed sense of health for building structures, Chor Cheong Fong, Housing & Development Board (Singapore); Joo Ming Lau, Housing & Development Board (Singapore)[8692-171]

Dynamic calibration of pressure transducers with an improved shock tube system, David Wisniewiski, Endevco Corp. (United States) . . . . [8692-172]

Capacitance sensors for nondestructive moisture determination in bio-fuel materials, Chari V. Kandala, Agricultural Research Service (United States); Naveen Puppala, New Mexico State Univ. (United States) . . . . [8692-173]

Behavior of prestressed sensor-metal plastic joints under static and dynamic load scenarios, Matthias Brenneis, Peter Groche, Institute for Production Engineering and Forming Machines (Germany). . . . . [8692-175]

Surface characteristics and mechanical properties of high-strength steel wires in corrosive conditions, Shunlong Li, Yang Xu, Hui LI, Harbin Institute of Technology (China). . . . . [8692-176]

Design, modeling, and testing of a piezoelectric impact compressive kinetic (PICK) tool for crack-stop hole treatment, Gary Simmons, Ronald M. Barrett, Caroline Bennett, Adolfo Matamoros, Stanley Rolfe, The Univ. of Kansas (United States) [8692-177]

FE simulation of SMA seal for Mars sample return, Xiaoqi Bao, Paulo J. Younse, Pradeep Bhandari, Jet Propulsion Lab. (United States) . . . . [8692-178]

Corrosion detection and evolution monitoring in Reinforced Concrete Structures by the use of Fiber Bragg Grating sensor, Shamyr S. Ali Alvarez, Pierre G. P. Ferdinand, Sylvain Magne, Commissariat à l'Énergie Atomique (France); Ricardo Nogueira, LEPMI UMR 5279 CNRS - Grenoble INP (France) [8692-181]

Axle weights identification with moving force identification theory, Hua Zhao, Hunan Univ. (China); Shiyong He, Guilin Economic Construction Investment Corp. (China) . . . . [8693-32]

Diagnostic on acceleration and information recovering using data fusion, Wei Lu, Harbin Institute of Technology (China). . . . . [8693-33]

Conference 8694

Nondestructive testing in an automated process chain for mass manufacturing of fiber-reinforced thermoplastic components, Michael Kalms, Sandra Hellmers, Christoph von Kopylow, Ralf B. Bergmann, Bremer Institut für Angewandte Strahltechnik GmbH (Germany). . . . . [8694-80]

Agent-based damaged detection in composite laminates, Md. Younus Ali, The Univ. of New South Wales (Australia). . . . . [8694-81]

Damage assessment of hydrokinetic composite turbine blades, Steve E. Watkins, Kevin E. Robison, James R. Nicholas, Greg A. Taylor, K. Chandrashekhara, Joshua L. Rovey, Missouri Univ. of Science and Technology (United States) . . . [8694-82]

Dielectric measurement of aged concrete as a function of moisture content in the frequency range of 0.5GHz to 4.5GHz, Hao Liu, Tzu Yang YU, Univ. of Massachusetts Lowell (United States) . . . . . [8694-83]

Study on style and mechanism of aerostatic instability for long span cable-stayed bridge, Xiaolun Hu, Huiping Wang, Southeast Univ. (China) . . . . [8694-84]

Effect of creep on magnetic domain structure of heat resistant steels, Suzhou Zhang, ShanTung Tu, Xiaoyin Hu, East China Univ. of Science and Technology (China). . . . . [8694-85]

Fiber optic photoacoustic ultrasound generator using optimized gold nanopattern with high absorption efficiency, Ye Tian, Nan Wu, Xiaotian Zou, Xingwei Wang, Univ. of Massachusetts Lowell (United States) . . . . [8694-86]

Using smart pressure map sensors to detect reflective cracks of pavements, Zhanping You, Keat Ghee Ong, Michigan Technological Univ. (United States) . . . . [8694-87]

Tissue characterization using acoustic wave tactile sensor array, Kyungrim Kim, Xiaoning Jiang, North Carolina State Univ. (United States). . . . . [8695-119]

Sensitivity-based optimal sensor placement for multi-type sensors, Xiaodan Sun, Gangling Hou, Zhenxu Wang, Harbin Engineering Univ. (China) . . . . [8695-120]

Bi-probability structural risk management method for bridge crane, Xiao Mei, Dashan Dong, Xinyuan Wang, Shanghai Maritime Univ. (China). . . [8695-121]

Damage detection of transmission tower using ARX models and statistical quantification of error propagation, Gang Liu, Zongming Huang, Chongqing Univ. (China). . . . . [8695-122]

Stress historical-log recording system based on ubiquitous mechanoluminescent sensing material, Nao Terasaki, Chaonan Xu, National Institute of Advanced Industrial Science and Technology (Japan) . . . . [8695-123]

Non-contact measurement assessment of aerospace structures, Daniel Meisner, Andrei N. Zagrai, New Mexico Institute of Mining and Technology (United States) . . . . [8695-124]

Damage detection of a prototype building structure under shaking table testing using outlier analysis, Ji-Hyun Hwang, Bong-Chul Joo, Young-Jun Yoo, Ki-Tae Park, Chin-Hyung Lee, Korea Institute of Construction Technology (Korea, Republic of) . . . . [8695-125]

Piezo-composites for energy harvesting from low-frequency noises, Xiaoming Zhou, Gengkai Hu, Beijing Institute of Technology (China). . . . [8695-126]

Study on self-healing effect of concrete cracks based on microbial technique, Chunxiang Qian, Hui Rong, Southeast Univ. (China) . . . . [8695-127]

Inverse problem solution in the identification of material elastic constants, Tadeusz Uhl, Wieslaw J. Staszewski, Lukasz Pieczonka, Pawel Packo, Lukasz Ambrozinski, AGH Univ. of Science and Technology (Poland) . . . . [8695-128]

Study of nonlinear interaction of Lamb waves with breathing crack in an aluminium plate, Nitesh P. Yelve, Mira Mitra, Indian Institute of Technology Bombay (India) . . . . [8695-129]

Advanced signal processing for high temperatures health monitoring of condensed water height in steam pipes, Shyh-Shiuh Lih, Yoseph Bar-Cohen, Hyeong Jae Lee, Nobuyuki Takano, Xiaoqi Bao, Jet Propulsion Lab. (United States) . . . . [8695-130]

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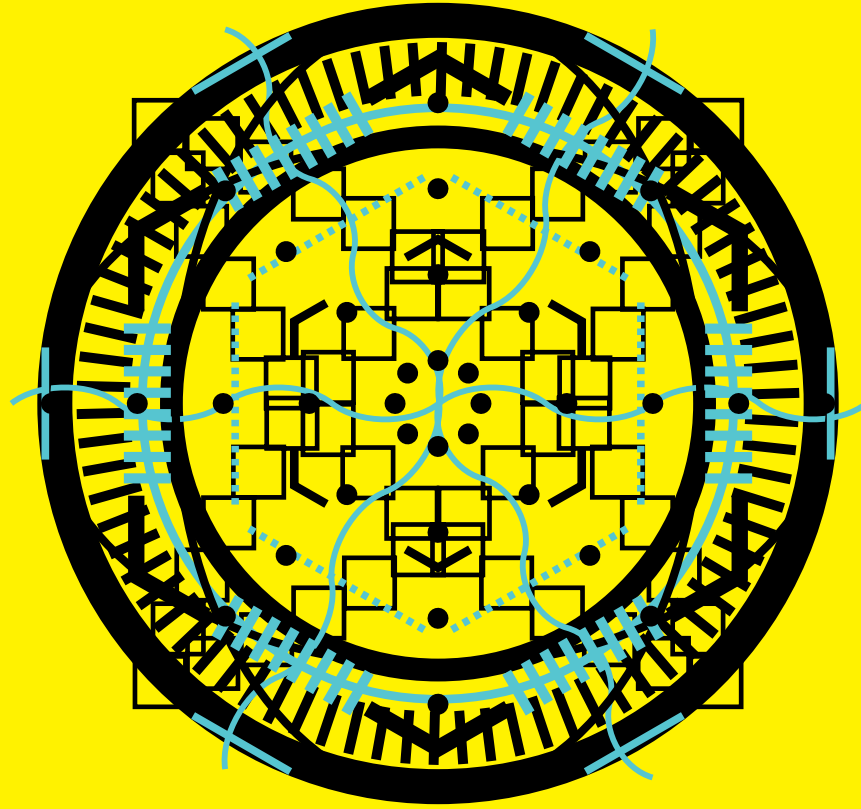
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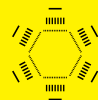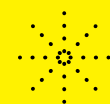
Wednesday · 13 March

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8691

Announcements, Awards, and Plenary Presentation · *Town & Country Ballroom*

8:00 to 8:25 am
- SPIE/ASME Best Student Paper Award
- ASME Best Paper Award
- ASME Gary Anderson Early Achievement Award

8:25 to 9:10 am
Bioinspired pneumatic artificial muscle actuator system design for aerospace and robotics applications
Norman Wereley, Univ. of Maryland, College Park

Session 10

Room: Towne
Wed 9:30 am to 10:30 am

Flight I
Session Chair: **Surojit Chattopadhyay,** National Yang-Ming Univ. (Taiwan)

9:30 am: **Microflyers: inspiration from nature** *(Invited Paper)*, Jayant Sirohi, The Univ. of Texas at Austin (United States) . . . . [8686-23]

10:10 am: **Relationship between wingbeat frequency and resonant frequency of the wing in insects**, Nam-Seo Goo, Ngoc-San Ha, Hoon Cheol Park, Konkuk Univ. (Korea, Republic of) . . . . [8686-24]

Coffee Break. . . Wed 10:30 am to 11:00 am

Session 7

Room: Town & Country Ballroom
Wed 9:30 am to 12:40 pm

Dielectric Elastomers EAP I
Session Chairs: **Miklos Zrinyi,** Budapest Univ. of Technology and Economics (Hungary); **Iain A. Anderson,** The Univ. of Auckland (New Zealand)

9:30 am: **Fast, miniaturized, and manufacturable Μm- to cm-scale dielectric elastomer actuators** *(Invited Paper)*, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland)[8687-27]

10:10 am: **Modeling of mechanical properties of stack actuators based on electroactive polymers**, Dominik Tepel, Christian Graf, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany). . . . . [8687-28]

Coffee Break. . . Wed 10:30 am to 11:00 am

Session 10

Room: Royal Palm One
Wed 9:30 am to 12:40 pm

Nanotubes and and the Use of Nanoparticles
Session Chairs: **Samuel Shian,** Harvard Univ. (United States); **Jinsong Leng,** Harbin Institute of Technology (China)

9:30 am: **Electrochemistry of electromechanical actuators based on carbon nanotubes and ionic liquids** *(Invited Paper)*, Kinji Asaka, Ken Mukai, Takushi Sugino, National Institute of Advanced Industrial Science and Technology (Japan); Hyacinthe Randriamahazaka, Univ. Paris 7-Denis Diderot (France); Toribio Fernández Otero, Univ. Politécnica de Cartagena (Spain). [8687-46]

10:10 am: **Development of piezoresistive PVDF-nanocomposites for strain sensing**, Reza Rizvi, Hani E. Naguib, Univ. of Toronto (Canada); Elaine Biddiss, Holland Bloorview (Canada) . . . . [8687-47]

Coffee Break. . Wed 10:30 am to 11:00 am

Session 8

Room: Sunrise
Wed 9:30 am to 10:30 am

Magneto Rheological Systems I
Session Chairs: **Norman M. Wereley,** Univ. of Maryland, College Park (United States); **Seung-Bok Choi,** Inha Univ. (Korea, Republic of)

9:30 am: **Principle, design, and testing of an inner bypass magnetorheological damper for shock and vibration mitigation**, Xian-Xu Bai, Univ. of Maryland, College Park (United States) and Univ. of Chongqing (China); Wei Hu, Norman M. Wereley, Univ. of Maryland, College Park (United States) . . . . [8688-32]

9:50 am: **A new magnetorheological elastomer-base isolator for structural control**, Majid Behrooz, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) . . . . [8688-33]

10:10 am: **Continuous variable transmission and regenerative braking devices in bicycles utilizing magnetorheological fluids**, Wai Ming E. Cheung, Wei-Hsin Liao, Chinese Univ. of Hong Kong (Hong Kong, China). . [8688-34]

Session 8

Room: Royal Palm Four
Wed 9:30 am to 10:30 am

Shape Memory Alloys: Experimental
Session Chairs: **Norman M. Wereley,** Univ. of Maryland, College Park (United States); **Veera Sundararaghavan,** Univ. of Michigan (United States)

9:30 am: **Shape-memory thermal lag and superelastic rate sensitivity of SMA cellular structures**, Ryan T. Watkins, John A. Shaw, Univ. of Michigan (United States); David S. Grummon, Michigan State Univ. (United States) . . . . [8689-26]

9:50 am: **Fatigue properties of NiTi shape-memory alloy thin plates**, Hiroshi Yamamoto, Minoru Taya, Yuanchang Liang, Onur C. Namli, Univ. of Washington (United States); Makoto Saito, Nabtesco Corp. (Japan) . . . . [8689-27]

10:10 am: **Experiments on functional fatigue of thermally activated shape-memory alloy springs and correlations with driving force intensity**, Ashwin Rao, Arun R. Srinivasa, Texas A&M Univ. (United States) . . . . [8689-28]

Coffee Break. . .Wed 10:30 am to 11:20 am

Session 11

Room: Royal Palm Three
Wed 9:30 am to 10:30 am

Microwave, RF Nanomaterials
Session Chair: **Lesley Shannon,** Simon Fraser Univ. (Canada)

9:30 am: **Microwave syntheses of graphene-based 3D hybrid nanostructures and their applications to energy storage systems**, Seok-Hu Bae, Il-Kwon Oh, KAIST (Korea, Republic of). . . . . [8691-29]

9:50 am: **3D rf integration at VTT**, Tauno Vaha-Heikkila, VTT Technical Research Ctr. of Finland (Finland) . . . . [8691-30]

10:10 am: **Magnetic resonance coupling of power transmission for biomedical applications**, Kyo D. Song, Hargsoon Yoon, Norfolk State Univ. (United States); Larry D. Sanford, Eastern Virginia Medical School (United States); Hyunjung Kim, National Insitute of Aerospace (United States); Sang H. Choi, NASA Langley Research Ctr. (United States); Eugene J. Song, National Insitute of Aerospace (United States) . . . . [8691-31]

Coffee Break. . Wed 10:30 am to 11:00 am

Wednesday · 13 March

Conference 8692	Conference 8693	Conference 8694	Conference 8695

Announcements, Awards, and Plenary Presentation · *Town & Country Ballroom*

8:00 to 8:25 am
- SPIE/ASME Best Student Paper Award
- ASME Best Paper Award
- ASME Gary Anderson Early Achievement Award

8:25 to 9:10 am
Bioinspired pneumatic artificial muscle actuator system design for aerospace and robotics applications
Norman Wereley, Univ. of Maryland, College Park

Conference 8692

Concurrent Sessions

Session 13

Room: Pacific Salon Five
Wed 9:30 am to 12:20 pm

Non-contact Sensing and Excitation I
Session Chair: **Hoon Sohn,** KAIST (Korea, Republic of)

9:30 am: **Laser lock-in thermography for fatigue crack detection in an uncoated metallic structure**, Yunkyu An, Ji Min Kim, Hoon Sohn, KAIST (Korea, Republic of) . . . . [8692-51]

9:50 am: **High-speed noncontact air-coupled to air-coupled ultrasonic system for internal defects and surface characterization of rails**, Stefano Mariani, Thompson V. Nguyen, Robert R. Phillips, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) [8692-53]

10:10 am: **Percussive augmenter of rotary drills (PARoD)**, Mircea Badescu, Jennifer Hasenoehrl, Yoseph Bar-Cohen, Stewart Sherrit, Xiaoqi Bao, Patrick N. Ostlund, Jack B. Aldrich, Jet Propulsion Lab. (United States) . . . . [8692-159]

Coffee Break. . . . . Wed 10:30 am to 11:00 am

Session 14

Room: Pacific Salon Seven
Wed 9:30 am to 10:30 am

Guided Wave Methods for Pipeline SHM
Session Chairs: **Irving J. Oppenheim,** Carnegie Mellon Univ. (United States); **Jung-Wuk Hong,** KAIST (Korea, Republic of)

9:30 am: **Singular value decomposition for novelty detection in ultrasonic pipe monitoring**, Chang Liu, Joel B. Harley, Yujie Ying, Mario Bergés, James H. Garrett Jr., David W. Greve, Irving J. Oppenheim, Carnegie Mellon Univ. (United States). . . . . [8692-58]

9:50 am: **Thermomechanical simulation of guided waves in pipes excited by laser pulses**, Jung-Wuk Hong, Hyeong Uk Lim, KAIST (Korea, Republic of). . . . . . . [8692-59]

10:10 am: **Monitoring of hot pipes at the power plant Neurath using guided waves**, Bianca Weihnacht, Thomas Klesse, Robert Neubeck, Lars Schubert, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany). [8692-60]

Coffee Break. . . . . .Wed 10:30 am to 11:00 am

Conference 8693

Session 8

Room: Sunset
Wed 9:30 am to 10:30 am

Optical Based Imaging
Session Chair: **Alkiviades S. Paipetis,** Univ. of Ioannina (Greece)

9:30 am: **Large field optical tomography system**, Björn Fischer, Christian Wolf, Thomas Härtling, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany). . . . . [8693-26]

9:50 am: **Polarization control in optical fibers and applications in optical microscopy and spectroscopy**, Christoph Zeh, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Rico Illing, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) and Technische Univ. Dresden (Germany); Bernd Köhler, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Jörg L. Opitz, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) and Technische Univ. Dresden (Germany); Lukas M. Eng, Technische Univ. Dresden (Germany); Thomas Härtling, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany). . . . . [8693-27]

10:10 am: **Time-resolved luminescence measurements on up-conversion phosphors for electron-beam sterilization monitoring**, Manuela Reitzig, Thomas Härtling, Martin Winkler, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Peter E. Powers, Univ. of Dayton (United States); Susan Derenko, Olaf Röder, Jörg L. Opitz, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany). . . . . [8693-28]

Coffee Break. . Wed 10:30 am to 11:00 am

Conference 8694

Concurrent Sessions

Session 6

Room: Royal Palm Two
Wed 9:30 am to 12:00 pm

Vibration-Based SHM/ NDE I
Session Chairs: **Paul H. Ziehl,** Univ. of South Carolina (United States); **Lingyu Yu,** Univ. of South Carolina (United States)

9:30 am: **Acoustic emission signatures of damage modes in structural materials**, Dimitrios G. Aggelis, Anastasios C. Mpalaskas, Theodeor E. Matikas, Univ. of Ioannina (Greece); Danny Van Hemelrijck, Univ. Libre de Bruxelles (Belgium). . . . . [8694-28]

9:50 am: **Acoustic emission monitoring of FRP-strengthened reinforced concrete columns subjected to reversed cyclic loading**, Gao Ma, Harbin Institute of Technology (China). . . . . . .[8694-29]

10:10 am: **Monitoring damage growth in carbon/epoxy composite panels**, Kassahun M. Asamene, Travis Whitlow, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) . . . . [8694-30]

Coffee Break Wed 10:30 to 11:00 am

Session 7

Room: Royal Palm Five
Wed 9:30 am to 10:30 am

NDE/SHM for Aerospace Materials
Session Chairs: **Andrew L. Gyekenyesi,** NASA Glenn Research Ctr. (United States); **Xingwei Wang,** Univ. of Massachusetts Lowell (United States)

9:30 am: **Detection of fretting damage in aerospace materials by thermoelectric means**, Hector G. Carreon, Univ. Michoacana de San Nicolás de Hidalgo (Mexico)[8694-56]

9:50 am: **Electromechanical impedance for SHM of aircraft bolted joints**, Vitalijs Pavelko, Riga Technical Univ. (Latvia). . . . [8694-57]

10:10 am: **Efficient characterization of variation propagation in cyclically periodic structures**, Jiong Tang, Kai Zhou, Univ. of Connecticut (United States) . . . . [8694-58]

Coffee Break Wed 10:30 am to 11:00 am

Conference 8695

Session 15

Room: Royal Palm Six
Wed 9:30 am to 10:30 am

SHM for Composite Materials
Session Chairs: **Victor Giurgiutiu,** Univ. of South Carolina (United States); **Sourav Banerjee,** Univ. of South Carolina (United States)

9:30 am: **Guided wave propagation in carbon composite laminate using piezoelectric wafer active sensors**, Matthieu Gresil, Victor Giurgiutiu, Univ. of South Carolina (United States) . . . .[8695-77]

9:50 am: **Examining the effect of delaminations and varying ply count on sensing ability for cfrp laminates embedded with terfenol-d**, Jonathan Rudd, Dustin L. Spayde, Oliver J. Myers, Mississippi State Univ. (United States) . . . .[8695-78]

10:10 am: **Experimental modal analysis for damage detection in composite plates using laser Doppler vibrometer**, Anand Kumar, Harcourt Butler Technological Institute (India); Bishakh Bhattacharya, Indian Institute of Technology Kanpur (India). . . . .[8695-79]

Coffee Break Wed 10:30 to 11:00 am

Conference 8686	Conference 8687	Conference 8688	Conference 8689	Conference 8691
Session 11	**Session 7 continued**	**Session 9**	**Session 9**	**Session 12**

Conference 8686 — Session 11

Room: Towne
Wed 11:00 am to 1:00 pm

Flight II

Session Chair: **Jayant Sirohi,** The Univ. of Texas at Austin (United States)

11:00 am: **Is clicking mechanism good for flapping wing micro aerial vehicle?**, Yao Wei Chin, Gih-Keong Lau, Nanyang Technological Univ. (Singapore). . [8686-25]

11:20 am: **Bioinspired corrugated wings for micro air vehicles**, Javaan S. Chahl, Manas Khurana, Univ. of South Australia (Australia) . . . . [8686-26]

11:40 am: **In-flight validated flexible-multibody structural dynamics model of a bioinspired ornithopter**, Cornelia Altenbuchner, James E. Hubbard Jr., National Institute of Aerospace (United States) . . . . [8686-27]

12:00 pm: **Unconstrained vertical takeoff of a flapping-wing system power by on-board batteries**, Vu Hoang Phan, Tri Q. Truong, Hoon Cheol Park, Konkuk Univ. (Korea, Republic of) . . . . [8686-28]

12:20 pm: **Unsteady aerodynamics in ornithopter flight**, Juan C. Gomez, Cornell Univ. (United States). . . . . [8686-29]

12:40 pm: **An investigation of 6-DOF insect flight dynamics with a flexible multibody dynamics approach**, Joong-Kwan Kim, Jae-Hung Han, KAIST (Korea, Republic of) . . . . [8686-30]

Lunch Break . . . . .Wed 1:00 pm to 2:00 pm

Conference 8687 — Session 7 continued

Room: Town & Country Ballroom
Wed 9:30 am to 12:40 pm

11:00 am: **Electrical modeling of dielectric elastomer stack transducers**, Henry Haus, Marc Matysek, Holger Moessinger, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) . . . .[8687-29]

11:20 am: **Modelling of dielectric elastomer loudspeakers including dissipative effects**, Benny Lassen, Univ. of Southern Denmark (Denmark) . . . .[8687-30]

11:40 am: **Modeling of roll-actuators based on electroactive polymers**, Thorben Hoffstadt, Christian Graf, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) . . . .[8687-31]

12:00 pm: **A comparison of the electromechanical characteristics of dielectric elastomer minimum energy structures (DEMES) and planar dielectric elastomer actuators (p-DEAs)**, Gerda Buchberger, Juergen Schoeftner, Bernhard Mayrhofer, Siegfried G. Bauer, Bernhard Jakoby, Wolfgang Hilber, Johannes Kepler Univ. Linz (Austria) . . . .[8687-32]

12:20 pm: **Novel silicone compatible cross-linkers for controlled functionalization of PDMS networks**, Anne L. Skov, Frederikke Bahrt Madsen, Anders Egede Daugaard, Søren Hvilsted, Technical Univ. of Denmark (Denmark) . . . . .[8687-33]

Lunch Break . . . . Wed 12:40 to 2:00 pm

Conference 8687 — Session 10 continued

Room: Royal Palm One
Wed 9:30 am to 12:40 pm

11:00 am: **Improving dry carbon nanotube actuators by chemical modifications, material hybridization, and proper engineering** *(Invited Paper)*, Maurizio Biso, Alberto Ansaldo, Davide Ricci, Istituto Italiano di Tecnologia (Italy) . . . . . [8687-48]

11:40 am: **Measuring the bending of asymmetric planar EAP structures**, Florian M. Weiss, Xue Zhao, Univ. of Basel (Switzerland); Konrad Vogelsang, Paul Scherrer Institut (Switzerland); Gabor M. Kovacs, EMPA (Switzerland); Bert Müller, Univ. of Basel (Switzerland) . . . . . .[8687-49]

12:00 pm: **Fabrication of shape-memory nanofibers by electrospinning method**, Fenghua Zhang, Zhichun Zhang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) . . . .[8687-50]

Lunch/Exhibition BreakWed 12:10 to 1:30 pm

12:20 pm: **Silica reinforced polypropyleneoxide network: a novel silicone-resembling elastomer with enhanced dielectric properties**, Kaustav Goswami, Piotr Mazurek, Frederikke Bahrt, Anders Egede Daugaard, Anne L. Skov, Technical Univ. of Denmark (Denmark) . . . . [8687-51]

Lunch Break . . . . Wed 12:40 pm to 2:00 pm

Conference 8688 — Session 9

Room: Sunrise
Wed 11:00 am to 12:20 pm

SMA- and Piezo-Based Materials and Systems

Session Chairs: **Yirong Lin,** The Univ. of Texas at El Paso (United States); **Diann E. Brei,** Univ. of Michigan (United States)

11:00 am: **Position control of SMA having Seebeck voltage as feedback**, VijayaVenkata Narasimha Sriram V. Malladi, Pablo A. Tarazaga, Virginia Polytechnic Institute and State e Univ. (United States) . . [8688-35]

11:20 am: **Simultaneous measurement of longitudinal and lateral piezoelectric strain coefficients using digital-image correlation**, Mohammad H. Malakooti, Henry A. Sodano, Univ. of Florida (United States) . . . .[8688-36]

11:40 am: **Design of direct-drive servo-valve operated by the piezostack actuator**, Juncheol Jeon, Quoc Hung Nguyen, Seung-Bok Choi, Inha Univ. Korea, Republic of) . . . . [8688-37]

12:00 pm: **Effect of misalignment between ultrasound piezoelectric transducers on transcutaneous energy transfer**, Changki Mo, Scott Hudson, Washington State Univ. (United States); Leon J. Radziemski, PiezoEnergy Technologies, LLC (United States) . . . . [8688-38]

Lunch Break . . . . Wed 12:20 pm to 2:00 pm

Conference 8689 — Session 9

Room: Royal Palm Four
Wed 11:20 am to 12:20 pm

Magneto-Active Materials

Session Chairs: **David S. Grummon,** Michigan State Univ. (United States); **Arun R. Srinivasa,** Texas A&M Univ. (United States)

11:20 am: **Semi-empirical modeling of hysteresis compensation in magnetostrictive actuator**, Ki-Hyun Ji, STX (Korea, Republic of); Hae-Jung Park, Chungnam National Univ. (Korea, Republic of); Young Woo Park, Univ. of Maryland, College Park (United States) and Chungnam National Univ. (Korea, Republic of); Norman M. Wereley, Univ. of Maryland, College Park (United States) . . . . [8689-30]

11:40 am: **Characterization and finite element modeling of Galfenol minor magnetization loops**, Zhangxian Deng, Marcelo J. Dapino, The Ohio State Univ. (United States) . . . . [8689-31]

12:00 pm: **Effects of low-magnetic field on the electrical resistivity and piezoresistivity of Ni-CNT filled epoxy-based composites**, Huigang Xiao, Jinbao Jiang, Hui Li, Harbin Institute of Technology (China) . . . . [8689-32]

Lunch Break . . . . . Wed 1:00 pm to 2:00 pm

Conference 8691 — Session 12

Room: Royal Palm Three
Wed 11:00 am to 12:40 pm

Fabrication and Characterization I

Session Chair: **Ajit Khosla,** Simon Fraser Univ. (Canada)

11:00 am: **Nano-materials for chemical and mechanical testing applications**, Behraad Bahreyni, Simon Fraser Univ. (Canada) . . . .[8691-32]

11:20 am: **Tailoring material properties with shaped femtosecond-laser pulses**, Stefan Kontermann, Anna Lena Baumann, Thomas Gimpel, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Kay M. Guenther, Clausthal Univ. of Technology (Germany); Augustinas Ruibys, Andreas Gabler, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Wolfgang Schade, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) and Clausthal Univ. of Technology (Germany). . . . .[8691-33]

11:40 am: **Electromagnetic characteristics of Polyaniline/SWCNT composites**, Brahmanandam Javvaji, D. Roy Mahapatra, S. Raha, Indian Institute of Science (India) . . . .[8691-34]

12:00 pm: **Strain measurements on scattered, highly oriented CNTs**, Sebastian M. Geier, Thorsten Mahrholz, Johannes Riemenschneider, Peter Wierach, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Michael Sinapius, Technical Univ. of Braunschweig (Germany) . . . . .[8691-35]

12:20 pm: **Atomic layer deposited Al-doped ZnO films for optoelectronic applicatins**, Aswini K. Pradhan, Rajeh Mundle, Norfolk State Univ. (United States) . . . .[8691-36]

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

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Conference 8692

Concurrent Sessions

Session 13 continued

**Room: Pacific Salon Five
Wed 9:30 am to 12:20 pm**

11:00 am: **Thermoelastic stress analysis of fatigue prone details on highway bridges**, Steven B. Chase, Univ. of Virginia (United States) . . . . [8692-54]

11:20 am: **Noncontact measurement of guided ultrasonic-wave scattering for fatigue crack characterization**, Paul Fromme, Univ. College London (United Kingdom) . . . . [8692-55]

11:40 am: **Visualization of thermally-induced delamination by means of guided-waves processing**, Maciej Radzienski, Polish Academy of Sciences (Poland) and Gdansk Univ. of Technology (Poland); Wieslaw Ostachowicz, Gdansk Univ. of Technology (Poland); Pawel Kudela, Polish Academy of Sciences (Poland) . . . . [8692-56]

12:00 pm: **Identification of impurities and strains in granular chains using acoustic solitons**, Jinkyu Yang, Feng Li, Zhenhua Tian, Liuxian Zhao, Lingyu Yu, Univ. of South Carolina (United States) . . . . [8692-57]

Lunch Break . . . . Wed 12:20 pm to 2:00 pm

Session 15

**Room: Pacific Salon Seven
Wed 11:00 am to 12:20 pm**

Advances in Optical Sensors

Session Chairs: **Yingzi Lin**, Northeastern Univ. (United States); **Hai Xiao**, Missouri Univ. of Science and Technology (United States)

11:00 am: **Theoretical and experimental study of a time-domain-reflectometry (TDR) probe used for water content measurement of clayrock through their electromagnetic properties**, Thierry Bore, Dominique Placko, Ecole Normale Supérieure de Cachan (France); Sylvie Delepine-Lesoille, ANDRA (France); Frederick Taillade, IFSTTAR (France) . . . . [8692-61]

11:20 am: **Micromachined fiber tip pressure sensor with corrugated diaphragm**, Yinan Zhang, Amardeep Kaur, Lei Yuan, Hai Xiao, Missouri Univ. of Science and Technology (United States) . . [8692-62]

11:40 am: **Assembly-rree embeddable fiber-optic strain and temperature sensor for structural health monitoring**, Amardeep Kaur, Sriram Nagarajan, Sudharshan Anandan, K. Chandrashekhara, Steve E. Watkins, Hai Xiao, Missouri Univ. of Science and Technology (United States); Nam Phan, Naval Air Systems Command (United States) . . . . [8692-63]

12:00 pm: **Vibration control of shell-like structures with optical strain gauges**, Simone Cinquemani, Francesco Braghin, Lorenzo Comolli, Gabriele Cazzulani, Ferruccio Resta, Politecnico di Milano (Italy) . . . . [8692-64]

Lunch Break . . . . Wed 12:20 pm to 2:00 pm

Conference 8693

Session 9

**Room: Sunset
Wed 11:00 am to 12:20 pm**

New Sensor Technologies

Session Chair: **Rosalind M. Wynne**, Villanova Univ. (United States)

11:00 am: **Microstructured optical fiber monitor for cryogenic applications**, Rosalind M. Wynne, Svetlana Filiche, Villanova Univ. (United States) . . . . [8693-29]

11:20 am: **Improvements in electric-field sensor sensitivity by exploiting a tangential field configuration**, Spencer Chadderdon, Leeland Woodard, Daniel T. Perry, Stephen Schultz, Richard Selfridge, Brigham Young Univ. (United States) . . . . [8693-30]

11:40 am: **Multimode polymer optical fiber-based SMS structure for large-strain measurement**, Jie Huang, Xinwei Lan, Hanzheng Wang, Lei Yuan, Hai Xiao, Missouri Univ. of Science and Technology (United States) . . . . [8693-31]

12:00 pm: **Enzyme-linked monoclonal antibody microstructured optical fiber monitor**, Rosalind M. Wynne, Julie DellAntonio, Francis Anuszewski, Elias Panagiotakis, William Kelly, Villanova Univ. (United States) . . . . [8693-17]

Conference End.

Conference 8694

Concurrent Sessions

Session 6 continued

**Room: Royal Palm Two
Wed 9:30 am to 12:00 pm**

10:30 am: **Monitoring friction related surface degradation using acoustic emission technique**, Kassahun M. Asamene, Bonaventure Mills-Dadson, Abm Iftekharul Islam, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) . . . [8694-31]

11:00 am: **One Dimensional Predictive Model of Adhesion Strength in FRP-bonded Concrete System using Acoustic Technique**, Denvid Lau, City Univ. of Hong Kong (Hong Kong, China) . . . . [8694-32]

11:20 am: **Acoustic emission monitoring and fatigue prediction of steel bridge components**, Jianguo Yu, Paul H. Ziehl, Juan M. Caicedo, Fabio Matta, Univ. of South Carolina (United States) . . . . [8694-33]

11:40 am: **Detection and assessment of damages in hybrid composite structures by acoustic emission**, Dong-Jin Yoon, Byeong-Hee Han, Korea Research Institute of Standards and Science (Korea, Republic of) . . . . [8694-34]

Lunch Break . . . . Wed 12:00 pm to 2:00 pm

Session 8
**Room: Royal Palm Five
Wed 11:00 am to 11:40 am**

Damage Detection Algorithms

Session Chairs: **Akira Sasamoto**, National Institute of Advanced Industrial Science and Technology (Japan); **Didem Ozevin**, Univ. of Illinois at Chicago (United States)

11:00 am: **Output-only Structural System Identification Method with a New Two-stage Kalman Filter and Incomplete Measurement**, Yong Ding, Bin Wu, B. Y. Zhao, Harbin Institute of Technology (China); S. S. Law, The Hong Kong Polytechnic Univ. (Hong Kong, China) . . . . [8694-59]

11:20 am: **Active sensing waveform design for estimating progressive fatigue damage in structures**, Daniel Huff, The Boeing Co. (United States); Narayan Kovvali, Antonia Papandreou-Suppappola, Aditi Chattopadhyay, Arizona State Univ. (United States); Subhasish Mohanty, Argonne National Lab. (United States) . . . . . [8694-60]

Lunch Break . . . . . . Wed 1:00 pm to 2:00 pm

Conference 8695

Session 16

**Room: Royal Palm Six
Wed 11:00 am to 1:00 pm**

Guided Waves for SHM: Temperature and Texture Issues

Session Chairs: **Sourav Banerjee**, Univ. of South Carolina (United States); **Lingyu Yu,** Univ. of South Carolina (United States)

11:00 am: **Nonlinear guided waves for neutral temperature measurement in continuous welded rails: results from laboratory and field tests**, Claudio Nucera, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) . . . . [8695-80]

11:20 am: **Elasto-acoustic coefficients relating to the time-of-flight of guided acoustic waves travelling on aluminum structures and respective temperature coefficients**, Hermann Klinghammer, Khurram S. Tarar, Univ. Leipzig (Germany); Mieczyslaw Pluta, Wroc?aw Univ. of Technology (Poland); Gerhard Birkelbach, Wolfgang Grill, Univ. Leipzig (Germany) . . . . [8695-81]

11:40 am: **Temperature-independent localization algorithm using guided wave interrogation methods**, Kevin Hensberry, Narayan Kovvali, Aditi Chattopadhyay, Arizona State Univ. (United States)[8695-82]

12:00 pm: **Studies of texture in nuclear graphites using laser ultrasonic line source measurements**, James B. Spicer, Lindsey R. Lindamood, Johns Hopkins Univ. (United States) . . . . [8695-83]

12:20 pm: **Temperature effect modelling of PZT transducers used for lamb wave propagation in damage detection applications**, Piotr Kijanka, Pawel Packo, Wieslaw J. Staszewski, Tadeusz Uhl, AGH Univ. of Science and Technology (Poland) . . . . [8695-84]

12:40 pm: **Cointegration and wavelet analysis based approach for Lamb wave based structural damage detection**, Phong B. Dao, Wieslaw J. Staszewski, AGH Univ. of Science and Technology (Poland) [8695-85]

Lunch Break . . . . Wed 1:00 to 2:00 pm

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Conference 8686

Session 12

Room: Towne
Wed 2:00 pm to 2:40 pm

Miscellaneous Studies

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

2:00 pm: **Effects of motor protein binding/ unbinding on their collective transport**, Woochul Nam, Bogdan I. Epureanu, Univ. of Michigan (United States) . . . . [8686-31]

2:20 pm: **Using cellular energy conversion and storage mechanics for bio-inspired energy harvesting**, Eric C. Freeman, Michael K. Philen, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8686-32]

Conference end.

Conference 8687

Session 8

Room: Town & Country Ballroom
Wed 2:00 pm to 3:40 pm

Dielectric Elastomers EAP II

Session Chairs: **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Kinji Asaka,** National Institute of Advanced Industrial Science and Technology (Japan)

2:00 pm: **Novel silicone elastomer formulations for DEAPs**, Mohamed Y. Benslimane, Danfoss PolyPower A/S (Denmark); Anca G Bejenariu, Anne L. Skov, Technical Univ. of Denmark (Denmark) . . . . [8687-34]

2:20 pm: **Snap through instability of dielectric elastomers coupling polarization saturation and strain stiffening**, Liwu Liu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) . . . . [8687-35]

2:40 pm: **Multilayer stack actuator made from new prestrain-free dielectric elastomers**, Xiaofan Niu, Wei Hu, David McCoul, Hristiyan Stoyanov, Paul Brochu, Qibing Pei, Univ. of California, Los Angeles (United States) . . . . [8687-109]

3:00 pm: **Effects of filler modification and structuring on dielectric enhancement of silicone rubber composites**, Mehdi Razzaghi-Kashani, Sara Javadi, Tarbiat Modares Univ. (Iran, Islamic Republic of) . . . . [8687-37]

3:20 pm: **Fast triggering of instabilities in balloon membranes by dielectric elastomer actuators**, Richard Baumgartner, Alexander Kogler, Johannes Kepler Univ. Linz (Austria); Choon Chiang Foo, Harvard Univ. (United States); Rainer Kaltseis, Johannes Kepler Univ. Linz (Austria); Christoph Keplinger, Zhigang Suo, Harvard Univ. (United States); Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria) . . . . [8687-38]

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

Session 11

Room: Royal Palm One
Wed 2:00 pm to 3:40 pm

IPMC

Session Chairs: **Roy D. Kornbluh,** SRI International (United States); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

2:00 pm: **Characterization and modeling of humidity-dependence of IPMC sensing dynamics**, Chai Yong Lim, Arizona State Univ. (United States); Hong Lei, Xiaobo Tan, Michigan State Univ. (United States) . . . . [8687-52]

2:20 pm: **Charge dynamics of ionic polymer metal composites in response to electrical bias**, Youngsu Cha, Maurizio Porfiri, Polytechnic Institute of New York Univ. (United States) . . . . [8687-53]

2:40 pm: **Design optimization of rod-shaped IPMC actuator**, Siul A. Ruiz, Benjamin Mead, Hyeok Yun, Kwang Jin J. Kim, Woosoon Yim, Univ. of Nevada, Las Vegas (United States) . . . . [8687-54]

3:00 pm: **Viscoelastic model of IPMC actuators**, Veiko Vunder, Andres Punning, Alvo Aabloo, Univ. of Tartu (Estonia) . . . . [8687-55]

3:20 pm: **Deformation behavior of ionic polymer metal composite actuator in several pH solutions**, Masaki Omiya, Wataru Aoyagi, Keio Univ. (Japan) . . . .[8687-56]

Coffee Break. . Wed 3:40 pm to 4:10 pm

Conference 8688

Session 10

Room: Sunrise
Wed 2:00 pm to 3:20 pm

Aircraft, MAV/UAV and Morphing Systems

Session Chairs: **Daniel J. Inman,** Univ. of Michigan (United States); **Nakhiah C. Goulbourne,** Univ. of Michigan (United States)

2:00 pm: **Experimental testing of spanwise morphing trailing edge concept**, Alexander Pankonien, Univ. of Michigan (United States); Daniel J. Inman, Univ. of Michigan (United States) . . . . [8688-39]

2:20 pm: **Power requirements for bi-harmonic amplitude and bias modulation control of a flapping-wing micro air vehicle**, Justin Carl, Garrison J. Lindholm, Richard G. Cobb, Mark F. Reeder, Air Force Institute of Technology (United States) . . . . [8688-40]

2:40 pm: **Active damping for General Electric 41% subscale GEnx composite fan blade with embedded piezoelectric patches**, Benjamin B. Choi, NASA Glenn Research Ctr. (United States); Kirsten P. Duffy, The Univ. of Toledo (United States) . . . . [8688-41]

3:00 pm: **Characterization of multifunctional skin-material for morphing leading-edge applications**, Sebastian M. Geier, Markus Kintscher, Peter Wierach, Martin Wiedemann, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)[8688-42]

Coffee Break. . . . . Wed 3:20 pm to 4:00 pm

Conference 8689

Session 10

Room: Royal Palm Four
Wed 2:00 pm to 3:40 pm

SMA: Modeling and Characterization I

Session Chairs: **Marcelo J. Dapino,** The Ohio State Univ. (United States); **Christopher B. Churchill,** HRL Labs., LLC (United States)

2:00 pm: **A two species thermodynamic preisach approach for superleastic shape-memory alloys under tension, torsion, and bending loading conditions**, Ashwin Rao, Arun R. Srinivasa, Texas A&M Univ. (United States) . . . . [8689-33]

2:20 pm: **A three species thermodynamic preisach approach for simulating complete torsional response of shape-memory alloys**, Ashwin Rao, Arun R. Srinivasa, Texas A&M Univ. (United States) . . . . [8689-34]

2:40 pm: **Magnetization in MSMAs: 2D modeling and experimental chracterization**, Douglas H. LaMaster, Heidi Feigenbaum, Constantin Ciocanel, Isaac Nelson, Northern Arizona Univ. (United States) . . . . . [8689-35]

3:00 pm: **Magnetic field and stress-induced phased transformation in single crystalline of NiMnColn metamagnetic shape-memory alloys**, Peizhen Li, Haluk E. Karaca, Ali S. Turabi, Hirobomi Tobe, Univ. of Kentucky (United States) . . . . [8689-36]

3:20 pm: **Thermal response of infinitely extended layered Nickel-Titanium shape-memory alloy thin films with variable material properties**, Abhijit Bhattacharyya, Mehmet M. Ozturk, Univ. of Arkansas Little Rock (United States) . . . . [8689-37]

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

Conference 8691

Session 13

Room: Royal Palm Three
Wed 1:40 pm to 2:20 pm

Keynote Session

Session Chair: **Sang H. Choi,** NASA Langley Research Ctr. (United States)

1:40 pm: **Moving technology from test tube to commercial product: a case study of three inventions** (*Keynote Presentation*), Robert G. Bryant, NASA Langley Research Ctr. (United States) . . . .[8691-37]

Session 14

Room: Royal Palm Three
Wed 2:20 pm to 3:40 pm

Fabrication and Characterization II

Session Chair: **Hyun-U Ko,** Inha Univ. (Korea, Republic of)

2:20 pm: **New highly-magnetic binary phase system**, Leisha M. Armijo, The Univ. of New Mexico (United States) . . . . . [8691-38]

2:40 pm: **Preparation and electrochemical properties of spinel lithium manganese oxide**, Gaojun Wang, Shaoxing Univ. (China); Linfeng Chen, Gyanesh N. Mathur, Vijay K. Varadan, Univ. of Arkansas (United States) . . . . [8691-39]

3:00 pm: **Electrical and electromechanical behaviors of ZnO-cellulose hybrid nanocomposites**, Seongcheol Mun, Hyun-U Ko, Inha Univ. (Korea, Republic of); Byung-Woo Kang, Samsung Electro-Mechanics (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) . . . .[8691-40]

3:20 pm: **Study of the electrochemical properties of hematite, magnetite, and maghemite nanoparticles for their applications in lithium ion batteries**, Linfeng Chen, Univ. of Arkansas (United States); Gaojun Wang, Shaoxing Univ. (China); Jungmin Lee, Pratyush Rai, Gyanesh N. Mathur, Vijay K. Varadan, Univ. of Arkansas (United States) . . . .[8691-41]

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

Wednesday · 13 March

Conference 8692

Session 16

Room: Pacific Salon Five
Wed 2:00 pm to 3:40 pm

Advances in Fiber Optic Sensors for Damage Detection

Session Chairs: **Branko Glisic,** Princeton Univ. (United States); **Li Zhou,** Nanjing Univ. of Aeronautics and Astronautics (China)

2:00 pm: **Damage detection and characterization using fiber optic sensors**, Branko Glisic, Yao Yao, Dorotea Sigurdardottir, Princeton Univ. (United States); David L. K. Hubbell, Univ. of Toronto (Canada) . . . . [8692-65]

2:20 pm: **Multiple impacts identification techniques in composite structures using FBG sensors**, Mijia Yang, Tao Ruan, North Dakota State Univ. (United States). . . . . [8692-66]

2:40 pm: **Dynamic signal recovery from fibre Bragg grating sensors using two-wave mixing**, Ryan N. John, Heriot-Watt Univ. (United Kingdom) and BAE Systems (United Kingdom); Ian J. Read, BAE Systems (United Kingdom); William N. MacPherson, Heriot-Watt Univ. (United Kingdom) . . . . [8692-67]

3:00 pm: **Fiber Bragg grating sensor system network for an adaptive trailing-edge shape monitoring: preliminary finite element evaluation**, Monica Ciminello, Antonio Concilio, Ctr. Italiano Ricerche Aerospaziali (Italy) . . . . [8692-68]

3:20 pm: **Strain and damage monitoring in solar-powered aircraft composite wing using fiber Bragg grating sensors**, Dae Hyun Kim, Kun-Ho Lee, Byung-Jun Ahn, Jin-Hyuk Lee, Seong-Kyun Cheong, Seoul National Univ. of Technology (Korea, Republic of); Ik-Hyeon Choi, Korea Aerospace Research Institute (Korea, Republic of) . . [8692-69]

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

Session 17

Room: Pacific Salon Seven
Wed 2:00 pm to 3:40 pm

Advances in Transducers for Acoustics and Ultrasonics

Session Chairs: **Fuh-Gwo Yuan,** North Carolina State Univ. (United States); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

2:00 pm: **Unpowered wireless generation and sensing of ultrasound**, Haiying Huang, The Univ. of Texas at Arlington (United States) . . . . [8692-70]

2:20 pm: **Assembly of smart adaptronic piezometal composites by use of prefabricated batches of piezoceramic microparts**, Michael Mueller, Reimund Neugebauer, Volker Wittstock, Technische Univ. Chemnitz (Germany). . . . . [8692-71]

2:40 pm: **Guided wave generation, sensing and damage detection using in-plane shear piezoelectric wafer**, Wensong Zhou, Hui Li, Harbin Institute of Technology (China); Fuh-Gwo Yuan, North Carolina State Univ. (United States). . . . . . . [8692-72]

3:00 pm: **Design of alternative sensors for NDE/SHM applications based on highly nonlinear solitary waves**, Luyao Cai, Xianglei Ni, Piervincenzo Rizzo, Univ. of Pittsburgh (United States). . . . . . . [8692-73]

3:20 pm: **Analytical assessment of in-plane and out-of-plane electromechanical impedance spectroscopy (EMIS) of piezoelectric wafer active sensor**, Tuncay Kamas, Bin Lin, Victor Giurgiutiu, Univ. of South Carolina (United States). . . . . [8692-74]

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

Conference 8694

Session 9

Room: Royal Palm Two
Wed 2:00 pm to 5:20 pm

SHM/NDE for Bridges

Session Chairs: **Ming L. Wang,** Northeastern Univ. (United States); **Genda Chen,** Missouri Univ. of Science and Technology (United States)

2:00 pm: **Vehicle live-load effects evaluation of stay cable based on SHM**, Chengming Lan, Univ. of Science and Technology Beijing (China) . . . [8694-35]

2:20 pm: **Real-time bridge scour monitoring with magnetic-field strength**, Genda Chen, Brandon P. Schafer, Zhibin Lin, Missouri Univ. of Science and Technology (United States) . . . . [8694-36]

2:40 pm: **Placement/delivery evaluation of nanocomposite for robot supported nondestructive rehabilitation of concrete bridge decks**, Giri Venkiteela, Matthew Klein, Husam Najm, Perumalsam N. Balaguru, Rutgers, The State Univ. of New Jersey (United States) . . . . [8694-37]

3:00 pm: **In-situ health monitoring on steel bridges with dual-mode piezoelectric sensors**, Lingyu Yu, Univ. of South Carolina (United States); H. Felix Wu, Univ. of North Texas (United States); Victor Giurgiutiu, Paul H. Ziehl, Univ. of South Carolina (United States) . . . . [8694-38]

3:20 pm: **Cyber-infrastructure design and implementation for structural health monitoring**, Gwendolyn W. van der Linden, Abbas Emami-Naeini, SC Solutions, Inc. (United States); Yilan Zhang, Jerome P. Lynch, Univ. of Michigan (United States) [8694-39]

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

Session 10

Room: Royal Palm Five
Wed 2:00 pm to 4:20 pm

Modeling and Simulation in NDE/SHM

Session Chairs: **Piotr Omenzetter,** The Univ. of Auckland (New Zealand); **Haifeng Zhang,** Univ. of North Texas (United States)

2:00 pm: **Finite element model calibration of a RC building based on seismic response trends from long-term monitoring**, Faheem Butt, Piotr Omenzetter, The Univ. of Auckland (New Zealand) . . . . [8694-61]

2:20 pm: **The selection of spectral element polynomial orders for high-rrequency numerical wave propagation**, Zahra Heidary, Didem Ozevin, Univ. of Illinois at Chicago (United States). . [8694-62]

2:40 pm: **Numerical predictions of visco-elastic properties and dynamic moduli of innovative pothole patching materials**, Kuo-Yao Yuan, Wei Yuan, Jiann-Wen Ju, Jenn-Ming Yang, Wei H. Kao, Larry Carlson, Univ. of California, Los Angeles (United States) . . . . [8694-63]

3:00 pm: **Numerical study of structural change estimation in a rotor system based on change in resonance and antiresonance frequencies**, Adam C. Wroblewski, NASA Glenn Research Ctr. (United States) . . . . [8694-64]

3:20 pm: **Numerical and experimental investigation of delamination clapping with meshfree methods and nonlinear acoustic techniques**, Ettore Barbieri, Univ. of Oxford (United Kingdom); Michele Meo, Francesco Ciampa, Univ. of Bath (United Kingdom) . . . . [8694-65]

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

Conference 8695

Session 17

Room: Royal Palm Six
Wed 2:00 pm to 3:40 pm

SHM for Biomedical Applications II

Session Chairs: **George Zentai,** Varian Medical Systems, Inc. (United States); **Wei-Chih Wang,** Univ. of Washington (United States)

2:00 pm: **In vivo muscle length-force-joint angle relationship in quasi-static muscle action of biceps muscle**, Muhammad Zakir Hossain, Wolfgang Grill, Univ. Leipzig (Germany) . . . . [8695-86]

2:20 pm: **Fully integrated MEMS based scanning endoscope with potential OCT application**, Wei-Chih Wang, Univ. of Washington (United States) and National Cheng Kung Univ. (Taiwan) . . . . . [8695-87]

2:40 pm: **Quantitative simulation of wave propagation in a human leg to support the ultrasonic non-invasive assessment of human bones**, Giovanni Castellazzi, Luca De Marchi, Univ. degli Studi di Bologna (Italy); Petr Krysl, Univ. of California, San Diego (United States); Alessandro Marzani, Univ. degli Studi di Bologna (Italy) [8695-88]

3:00 pm: **Bio-penetrating near-infrared mechanoluminescent sensing material for on-site biomechanical measurement**, Nao Terasaki, Chaonan Xu, Liaoying Zheng, Yiroshi Yamada, National Institute of Advanced Industrial Science and Technology (Japan) . . . . [8695-89]

3:20 pm: **An electromagnetic-coil based nondestructive method demonstrating a screw-hole targeting of an intramedullary interlocking nail in long-bone surgery**, Tien-Kan Chung, Hou-Jen Chu, National Chiao Tung Univ. (Taiwan); Tze-Hong Wong, National Taiwan Univ. Hospital, Hsin-Chu Branch (Taiwan); Ya-Wen Cheng, Wensyang Hsu, Meng-Shiue Lee, National Chiao Tung Univ. (Taiwan) . . . [8695-90]

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

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Session 9

Room: Town & Country Ballroom
Wed 4:00 pm to 6:20 pm

Field-activated EAP

Session Chairs: **Deepa Sritharan,** Univ. of Maryland, College Park (United States); **Jonathan M. Rossiter,** Univ. of Bristol (United Kingdom)

4:00 pm: **Field-distribution in EAP-transducers with diagonal-edge contacts**, Christian Graf, Thorben Hoffstadt, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) . . . . [8687-39]

4:20 pm: **Uncertainty quantification and stochastic-based viscoelastic modeling of finite deformation elastomers**, William S. Oates, The Florida State Univ. (United States); Paul Miles, Grove City College (United States); Michael Hays, The Florida State Univ. (United States); Ralph C. Smith, North Carolina State Univ. (United States) . . . . [8687-40]

4:40 pm: **More than 10-fold increase in the actuation strain of dielectric elastomer actuators**, Samin Akbari, Samuel Rosset, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . [8687-41]

5:00 pm: **Enhancement of the dielectric properties of dielectric elastomers by Janus particle fillers**, Hsinyu Chen, City College of New York (United States) . . . . [8687-42]

5:20 pm: **Very-high breakdown field strength for dielectric elastomer actuators quenched in dielectric liquid bath**, Thanh Giang La, Gih-Keong Lau, Nanyang Technological Univ. (Singapore) . . . . [8687-43]

5:40 pm: **Optimized flexible electrode for EAP (electroactive polymer)**, Junman Lee, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of); Sangryeoul Ryu, Dongjoo Lee, Yeungnam Univ. (Korea, Republic of); Hongsoo Choi, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of) . . . . [8687-44]

6:00 pm: **New operating limits for applications with electroactive elastomer: effects of the drift of the permittivity and the electrical breakdown**, Cong Thanh Vu, G2Elab (France); Claire Jean-Mistral, Institut National des Sciences Appliquées de Lyon (France); Alain Sylvestre, G2Elab (France) . . . . [8687-45]

Conference 8687

Session 12

Room: Royal Palm One
Wed 4:00 pm to 6:20 pm

Novel

Session Chairs: **Ray Henry Baughman,** The Univ. of Texas at Dallas (United States); **Tissaphern Mirfakhrai,** Stanford Univ. (United States)

4:00 pm: **Electrorotation of novel electroactive polymers in uniform DC and AC electric field**, Miklos Zrinyi, Semmelweis Univ. (Hungary); Masami Nakano, Tohoku Univ. (Japan) . . . . [8687-57]

4:20 pm: **Artificial muscles emerging from lamina materials**, Sina Sareh, Jonathan M. Rossiter, Univ. of Bristol (United Kingdom) . . . . [8687-58]

4:40 pm: **Modeling and experimental study of bistable dielectric elastomer structures**, Tiefeng Li, Zhannan Zou, Ke Li, Shaoxing Qu, Zhejiang Univ. (China) . . . . [8687-59]x

5:00 pm: **On the development of planar actuators for variable stiffness devices**, Markus Henke, Gerald Gerlach, Technische Univ. Dresden (Germany) . . . . [8687-60]

5:20 pm: **Electromechanical and electrooptical functions of plasticized PVC with colossal dielectric constant professor president of fiber science and technology, Japan**, Toshihiro Hirai, Shinshu Univ. (Japan) . . . . [8687-61]

5:40 pm: **High-dielectric permittivity elastomers from well-dispersed expanded graphite in low concentrations**, Malgorzata Kostrzewska, Anca G. Bejenariu, Anders Egede Daugaard, Anne L. Skov, Technical Univ. of Denmark (Denmark) . . . . [8687-62]

6:00 pm: **Drop and dry film fabrication of Beta-phase Poly(vinylidene fluoride)**, Go Murasawa, Ken Miyata, Akihiro Nishioka, Hidemitsu Furukawa, Yamagata Univ. (Japan) . . . . [8687-63]

Conference 8688

Session 11

Room: Sunrise
Wed 4:00 pm to 6:00 pm

Magneto Rheological Systems II

Session Chairs: **Mehdi Ahmadian,** Virginia Polytechnic Institute and State Univ. (United States); **Faramarz Gordaninejad,** Univ. of Nevada, Reno (United States)

4:00 pm: **A magneto-rheological fluid-based torque sensor for smart torque wrench application**, Farzad Ahmadkhanlou, Gregory N. Washington, Univ. of California, Irvine (United States) . . . . [8688-44]

4:20 pm: **Simulation of adaptive semi-active magnetorheological seat damper for vehicle occupant blast protection**, JinHyeong Yoo, Muthuvel Murugan, U.S. Army Research Lab. (United States) . . . . [8688-45]

4:40 pm: **Control of 4-DOF MR haptic master: slave robot for minimally invasive surgery**, Chang-Ho Uhm, Phoung-Bac Nguyen, Seung-Bok Choi, Inha Univ. (Korea, Republic of). . . . . [8688-46]

5:00 pm: **An improved polynomial dynamic model of a magnetorheological fluid damper under impact loadings**, Zhaochun Li, Nanjing Univ. of Science and Technology (China) and Nanjing Forestry Univ. (China); Zhe Yang, Jiajia Zheng, Jiong Wang, Nanjing Univ. of Science and Technology (China) . . . . [8688-47]

5:20 pm: **Energy-efficient MRF brakes and clutches avoiding no-load losses**, Dirk G. Güth, Markus Schamoni, Jürgen Maas, Ostwestfalen-Lippe Univ. of Applied Sciences (Germany) . . . . [8688-48]

5:40 pm: **Design of the magnetorheological mount with high-damping force for the marine diesel-generator set**, Ok-Hyun Kang, Won-Hyun Kim, Won H. Joo, Hyundai Heavy Industries Co., Ltd. (Korea, Republic of); Joon-Hee Park, Inha Univ. (Korea, Republic of) . . . . [8688-49]

Conference 8689

Session 11

Room: Royal Palm Four
Wed 4:00 pm to 5:40 pm

SMA: Modeling and Characterization II

Session Chairs: **Abhijit Bhattacharyya,** Univ. of Arkansas at Little Rock (United States); **Haluk E. Karaca,** Univ. of Kentucky (United States)

4:00 pm: **Sensing of retained martensite during thermal cycling of shape-memory alloy wires via electrical resistance**, Christopher B. Churchill, HRL Labs., LLC (United States) . . . . [8689-38]

4:20 pm: **Thermo-mechanical self-adaptive ball screw drive using thermal shape-memory effect**, Iñaki Navarro y de Sosa, Technische Univ. Chemnitz (Germany); André Bucht, Tom Junker, Kenny Pagel, Welf-Guntram Drossel, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany). . . . . [8689-39]

4:40 pm: **Assessing local strain in NiTi-scaffolds prepared by selective laser melting**, Therese Bormann, Univ. Basel (Switzerland) and Univ. of Applied Sciences Northwestern Switzerland (Switzerland); Michael de Wild, Univ. of Applied Sciences Northwestern Switzerland (Switzerland); Felix Beckmann, Helmholtz-Zentrum Geesthacht (Germany); Bert Müller, Univ. Basel (Switzerland) . . . . . [8689-40]

5:00 pm: **Lagoudas model for optomechanical mountings: parametric study and characterization campaign**, Marco Riva, INAF - Osservatorio Astronomico di Brera (Italy); Elena Villa, Francesca Passaretti, Daniela Rigamonti, CNR-IENI (Italy); Francesco Zanetti, Politecnico di Milano (Italy); Filippo Maria Zerbi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . [8689-41]

5:20 pm: **Thermo-mechanically coupled analysis of shape-memory alloy plates**, Ashish Khandelwal, Indian Institute of Science (India); Vidyashankar R. Buravalla, GE Global Research (India); D. Roy Mahapatra, Indian Institute of Science (India) . . . . [8689-42]

Conference 8691

Session 15

Room: Royal Palm Three
Wed 4:00 pm to 6:00 pm

Fabrication and Characterization III

Session Chair: **Shivan Haran,** Arkansas State Univ. (United States)

4:00 pm: **Review of Sn and Se based binary/ternary semiconductors and schottky diodes: material aspects and current transport**, Naresh Padha, Univ. of Jammu (India). . . . . [8691-42]

4:20 pm: **Visualization of interior substructures with nanoscale resolution using ultrasonic-atomic force microscopy**, Dongryul Kwak, Taesung Park, Ikkeun Park, Chiaki Miyasaka, Seoul National Univ. (Korea, Republic of) . . . . [8691-43]

4:40 pm: **Hybrid nanocomposites made with cellulose and ZnO nanoparticles and its biosensing application**, Mohammad Maniruzzaman, Ulo Kersen, Mohammad A. H. Khondoker, Jaehwan Kim, Inha Univ. (Korea, Republic of) . . . . [8691-44]

5:00 pm: **1D ZnO nanoarray using electron-beam lithography**, Aswini K. Pradhan, Norfolk State Univ. (United States) . . . . [8691-45]

5:20 pm: **Fabrication of CZTS-based thin film solar cells using all-solution processing and pulsed light crystallization**, Ilwoo Seok, Carson Munn, Shivan Haran, Arkansas State Univ. (United States) [8691-46]

5:40 pm: **Detection and control of sigma-3 twin defects in semiconductor ingot and epitaxy growth**, Yeonjoon Park, Hyunjung Kim, National Institute of Aerospace (United States); Jonathan R. Skuza, NASA Langley Research Ctr. (United States); Kunik Lee, Turner-Fairbank Highway Research Ctr. (United States); Sang H. Choi, NASA Langley Research Ctr. (United States) . . . . [8691-47]

Wednesday · 13 March

Conference 8692		Conference 8694		Conference 8695

Conference 8692
Concurrent Sessions

Session 18

Room: Pacific Salon Five
Wed 4:00 pm to 5:40 pm

SHM of Civil Infrastructure Systems I

Session Chairs: **Daniele Zonta,** Univ. degli Studi di Trento (Italy); **Genda Chen,** Missouri Univ. of Science and Technology (United States)

4:00 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) . . . . [8692-75]

4:20 pm: **Analysis of monitoring data from cable-stayed bridge using sensor fusion techniques**, Daniele Zonta, Univ. degli Studi di Trento (Italy); Matteo Pozzi, Carnegie Mellon Univ. (United States); Branko Glisic, Princeton Univ. (United States); Ming L. Wang, Northeastern Univ. (United States); Riccardo Zandonini, Univ. degli Studi di Trento (Italy); Daniele Inaudi, Daniele Posenato, Smartec S.A. (Switzerland); Yang Zhao, Intelligent Instrument System, Inc. (United States) . . . . [8692-76]

4:40 pm: **Real-time bridge scour monitoring with magneto-inductive field coupling**, Andriy Radchenko, David Pommerenke, Genda Chen, Pratik Maheshwari, Satyajeet Shinde, Viswa Pilla, Yahong R. Zheng, Missouri Univ. of Science and Technology (United States) . . . . [8692-77]

5:00 pm: **Automated wireless monitoring system for cable tension using smart sensors**, Sung-Han Sim, Ulsan National Institute of Science and Technology (Korea, Republic of); Jian V. Li, Hongki Jo, Univ. of Illinois at Urbana-Champaign (United States); JongWoong Park, KAIST (Korea, Republic of); Soojin Cho, Billie F. Spencer, Jr, Univ. of Illinois at Urbana-Champaign (United States); Chung-Bang Yun, Ulsan National Institute of Science and Technology (Korea, Republic of) . . . . [8692-78]

5:20 pm: **Structural health monitoring of a steel stringer bridge with long-gauge FBG sensors**, Jian Zhang, W. Hong, Y. S. Tang, Caiqian Yang, Gang Wu, Zhishen Wu, Southeast Univ. (China) . . . . . . [8692-79]

Session 19

Room: Pacific Salon Seven
Wed 4:00 pm to 5:40 pm

Image Sensing Technologies for SHM

Session Chairs: **Seunghee Park,** Sungkyunkwan Univ. (Korea, Republic of); **Haiying Huang,** The Univ. of Texas at Arlington (United States)

4:00 pm: **Visualization technique for fatigue cracks at steel structures integrating a scanning laser source with piezoelectric sensors**, Changgil Lee, Ju-Won Kim, Hyun Uk Kim, Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of) . . [8692-80]

4:20 pm: **Implementation of a wireless image motion estimation method for two-dimensional crack monitoring**, Sin Hang Man, Hong Kong Univ. of Science and Technology (Hong Kong, China)[8692-81]

4:40 pm: **Accurate and fast in-plane displacement measurement method for large-scale structures by utilizing repeated pattern**, Shien Ri, National Institute of Advanced Industrial Science and Technology (Japan); Satoshi Hayashi, Shinji Ogihara, Tokyo Univ. of Science (Japan); Hiroshi Tsuda, National Institute of Advanced Industrial Science and Technology (Japan) . . . . [8692-82]

5:00 pm: **Use of advanced noncontact instrumentation for exploring structural behavior**, Chia-Ming Chang, Thomas M. Frankie, Daniel A. Kuchma, Billie F Spencer Jr., Univ. of Illinois at Urbana-Champaign (United States) . . . . . . [8692-83]

5:20 pm: **The use of digital image correlation for nondestructive and multiscale damage quantification**, Eric Schwartz, Raghavendra Saralaya, Trilion Quality Systems (United States); Jefferson Cuadra, Drexel Univ. (United States); Kavan Hazeli, Drexel Univ. (United States) and Drexel Univ. (United States); Prashanth A. Vanniamparambil, Ivan Bartoli, Antonios Kontsos, Drexel Univ. (United States) . . . . [8692-84]

Conference 8694
Concurrent Sessions

Session 9 continued

Room: Royal Palm Two
Wed 2:00 pm to 5:20 pm

4:00 pm: **Integrated monitor and warning system for the Jeremiah Morrow Bridge**, Mehdi Norouzi, Jason Kumpf, Victor J. Hunt, Arthur J. Helmicki, Univ. of Cincinnati (United States) . . . . [8694-40]

4:20 pm: **Arch bridge suspenders damage detection based on GA optimized BP neural network**, Junliang Hu, Quansheng Yan, Shiping Huang, Hengbin Zheng, Zhou Chen, South China Univ. of Technology (China) . . . . [8694-41]

4:40 pm: **Monitoring lower limit states in bridge structures**, Mohammed M. Ettouney, Weidlinger Associates, Inc. (United States); Sharada Alampali, Prospect Solutions, LLC (United States) . . . . [8694-42]

5:00 pm: **Uses of WIM data in bridge risk management**, Mohammed M. Ettouney, Margaret Tang, Ryan Anderson, Weidlinger Associates, Inc. (United States) . . . . [8694-43]

Session 11

Room: Royal Palm Five
Wed 4:00 pm to 5:40 pm

Wireless SHM

Session Chairs: **Jerome Peter Lynch,** Univ. of Michigan (United States); **Yan Wan,** Univ. of North Texas (United States)

4:00 pm: **Slotted patch antenna sensor for wireless strain sensing**, Xiaohua Yi, Chunhee Cho, Yang Wang, Manos M. Tentzeris, Georgia Institute of Technology (United States); Roberto T. Leon, Virginia Polytechnic Institute and State Univ. (United States) . . . . [8694-66]

4:20 pm: **Optimal sensor placement for structural health monitoring: A comparative study between the control engineering and civil engineering approaches**, Gopichand Movva, Yan Wan, Shengli Fu, H. Felix Wu, Univ. of North Texas (United States) . . . . [8694-67]

4:40 pm: **Implementation of a Compressive Sampling Scheme for Energy Efficiency in a Wireless Structural Health Monitoring System**, Sean O'Connor, Jerome P. Lynch, Univ. of Michigan (United States) . . . . [8694-68]

5:00 pm: **Full-scale testing of civil structures using wireless sensing technologies**, Zhenhua Huang, H. Felix Wu, Univ. of North Texas (United States)[8694-69]

5:20 pm: **Experimental case studies on wireless and wired sensors**, Kaoshan Dai, Tongji Univ. (China); Zhenhua Huang, Univ. of North Texas (United States); Gang Zong, Yichao Huang, Weixing Shi, Tongji Univ. (China) . . . . [8694-70]

Conference 8695

Session 18

Room: Royal Palm Six
Wed 4:00 pm to 6:40 pm

Metamaterial

Session Chair: **Guoliang Huang,** Univ. of Arkansas at Little Rock (United States)

4:00 pm: **Study of an elastic metamaterial beam for broadband bending wave suppression**, Rui Zhu, Guoliang Huang, Univ. of Arkansas at Little Rock (United States) . . . . [8695-91]

4:20 pm: **High stiffness-high damping chiral metamaterial assemblies for low-frequency applications**, Emanuele Baravelli, Georgia Institute of Technology (United States) and Univ. degli Studi di Bologna (Italy); Massimo Ruzzene, Georgia Institute of Technology (United States) . . . . [8695-92]

4:40 pm: **Novel split ring metamaterial for vibration control and structural health monitoring**, Riaz Ahmed, Sourav Banerjee, Univ. of South Carolina (United States) . . . . [8695-93]

5:00 pm: **Actual working mechanisms of smart metamaterial structures**, Perngjin F. Pai, Univ. of Missouri-Columbia (United States); Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) . . . . [8695-94]

5:20 pm: **Effective medium properties of acoustic crystals in two dimensions**, Ying Wu, King Abdullah Univ. of Science and Technology (Saudi Arabia); Jun Mei, South China Univ. of Technology (China)[8695-95]

5:40 pm: **Acoustic metamaterials: super absorbers for low-frequency sound**, Jun Mei, South China Univ. of Technology (China); Guancong Ma, Min Yang, Zhiyu Yang, Weijia Wen, Ping Sheng, Hong Kong Univ. of Science and Technology (Hong Kong, China)[8695-96]

6:00 pm: **Focusing Lamb flexural waves by designing an elastic metamaterial plate with variable microstructures**, Xiang Yan, North Carolina State Univ. (United States); Guoliang Huang, Univ. of Arkansas at Little Rock (United States); Fuh-Gwo Yuan, North Carolina State Univ. (United States) . . . . [8695-97]

6:20 pm: **Nonlocal effect of acoustic wave interaction with thin-plate metamaterial**, Pei Li, Xiaoming Zhou, Beijing Institute of Technology (China); Guoliang Huang, Univ. of Arkansas at Little Rock (United States); Gengkai Hu, Beijing Institute of Technology (China) . . . . [8695-98]

Thursday · 14 March

Conference 8687	Conference 8688	Conference 8689	Conference 8691

Plenary Presentation · *Town & Country Ballroom*

8:25 to 9:10 am
Heterointegration of smart systems by co-integration of materials and processes
Karlheinz Bock, Fraunhofer Research Institution for Modular Solid State Technologies EMFT

Conference 8687

Concurrent Sessions

Session 13

Room: Town & Country Ballroom
Thu 9:30 am to 12:40 pm

Application of EAP
Session Chairs: **Hyouk Ryeol Choi,** Sungkyunkwan Univ. (Korea, Republic of); **John D. Madden,** The Univ. of British Columbia (Canada)

9:30 am: **Stable electrosmotically driven Nastic actuators** *(Invited Paper)*, Elisabeth Smela, Deepa Sritharan, Univ. of Maryland, College Park (United States) . . . . . [8687-64]

10:10 am: **Adaptive lenses using transparent dielectric elastomer actuators**, Samuel Shian, Harvard Univ. (United States); Roger M. Diebold, Harvard Univ. (United States) and Univ. of California, Santa Barbara (United States); David R. Clarke, Harvard Univ. (United States) . . . . [8687-65]

Coffee Break. . . . Thu 10:30 am to 11:00 am

Session 15

Room: Royal Palm One
Thu 9:30 am to 10:30 am

Electrodes and Control
Session Chairs: **Thomas Wallmersperger,** Technische Univ. Dresden (Germany); **Ji Su,** NASA Langley Research Ctr. (United States)

9:30 am: **Dielectric elastomers with novel highly-conducting electrodes**, Holger Böse, Detlev Uhl, Fraunhofer-Institut für Silicatforschung (Germany) . . . . . . [8687-76]

9:50 am: **The effect of folds on highly compliant crumpled thin metal film electrodes used in dielectric elastomer actuators**, Sze Hsien Low, Gih-Keong Lau, Nanyang Technological Univ. (Singapore) . . . . [8687-77]

10:10 am: **Closed-loop control of a tube-type cylindrical IPMC**, Benjamin Mead, Woosoon Yim, Siul A. Ruiz, Univ. of Nevada, Las Vegas (United States) . . . . [8687-78]

Conference 8688

Concurrent Sessions

Session 12

Room: Sunrise
Thu 9:30 am to 12:20 pm

Energy Harvesting and Scavenging: General III
Session Chairs: **William W. Clark,** Univ. of Pittsburgh (United States); **Steve Southward,** Virginia Polytechnic Institute and State Univ. (United States); **Yi-Chung Shu,** National Taiwan Univ. (Taiwan); **Norbert Schwesinger,** Technische Univ. München (Germany)

9:30 am: **Vibration energy harvesting using Galfenol-based transducer**, Viktor Berbyuk, Chalmers Univ. of Technology (Sweden). . . . . [8688-50]

9:50 am: **Durability of a d33-mode piezo-composite electricity-generating element**, Nam-Seo Goo, Van-Lai Pham, Jun Zhao, Jisoo Park, Konkuk Univ. (Korea, Republic of) . . . . [8688-51]

10:10 am: **Enhanced piezoelectric energy harvesting utilizing magnetic effect**, Jiong Tang, Jiawen Xu, Univ. of Connecticut (United States) . . . . [8688-52]

Coffee Break. . . . Thu 10:30 am to 11:00 am

Session 13

Room: Towne
Thu 9:30 am to 10:30 am

Modeling of Energy Harvesting Systems I
Session Chair: **M. Amin Karami,** Univ. of Michigan (United States)

9:30 am: **Study of a piezoelectric energy harvester with a dynamic magnifier**, Dejan Vasic, François Costa, Ecole Normale Supérieure de Cachan (France) . . . [8688-57]

9:50 am: **Investigation of bistable piezo-composite plates for broadband energy harvesting**, David N. Betts, Christopher R. Bowen, Hyunsun A. Kim, Nicholas Gathercole, Christopher T. Clarke, Univ. of Bath (United Kingdom); Daniel J. Inman, Univ. of Michigan (United States) . . . . [8688-58]

10:10 am: **Mechanical and thermal energy harvesting utilizing phase transformations in 32-mode relaxor-ferroelectric single crystals**, Wen Dong, Univ. of California, Los Angeles (United States); Peter Finkel, Ahmed Amin, Naval Undersea Warfare Ctr. (United States); Christopher S. Lynch, Univ. of California, Los Angeles (United States) . . . . [8688-59]

Conference 8689

Session 12

Room: Royal Palm Four
Thu 9:30 am to 10:30 am

Active Composites I
Session Chairs: **Ralph C. Smith,** North Carolina State Univ. (United States); **Nakhiah C. Goulbourne,** Univ. of Michigan (United States)

9:30 am: **The challenges of achieving good electrical and mechanical properties when making structural supercapacitors**, Constantin Ciocanel, Cindy Browder, Chris Simpson, Ross Colburn, Northern Arizona Univ. (United States). . . . . [8689-43]

9:50 am: **Aligned nanowire-graphene aerogel for lithium-ion battery**, Yirong Lin, MD Arif Ishiaque Shuvo, MD Ashiqur Rahaman Khan, Miguel Mendoza, The Univ. of Texas at El Paso (United States). . . . . [8689-44]

10:10 am: **Environmental degradation of nano-enhanced composite materials through durability and electrical resistance measurements**, Alkiviadis S. Paipetis, Giorgos Gkikas, Danai-Dimitra Douka, Sotirios A. Grammatikos, Nektaria-Marianthi Barkoula, Univ. of Ioannina (Greece) . . . . [8689-45]

Coffee Break. . . . Thu 10:30 am to 11:00 am

Conference 8691

Session 16

Room: Royal Palm Three
Thu 9:30 am to 10:30 am

Metamaterials and Optical Nanostructures
Session Chair: **Vijay K. Varadan,** Univ. of Arkansas (United States)

9:30 am: **Nanoscale imaging of mesh size distribution in gel engineering materials with visual scanning microscopic light scattering**, Yosuke Watanabe, M. Hasnat Kabir, Jin Gong, Hidemitsu Furukawa, Yamagata Univ. (Japan) . . . . [8691-48]

9:50 am: **Characterization of shape-memory gels using scanning microscopic light scattering**, M. Hasnat Kabir, Yosuke Watanabe, Jin Gong, Hidemitsu Furukawa, Yamagata Univ. (Japan) . . . . [8691-49]

10:10 am: **Modelling of the structure-property relationships in the A-quartz structures**, Yong Tao Yao, Harbin Institute of Technology (China). . . . . [8691-50]

Thursday · 14 March

Conference 8692	Conference 8694	Conference 8695

Plenary Presentation · *Town & Country Ballroom*

8:25 to 9:10 am
Heterointegration of smart systems by co-integration of materials and processes
Karlheinz Bock, Fraunhofer Research Institution for Modular Solid State Technologies EMFT

Concurrent Sessions

Concurrent Sessions

Session 19

Session 20

Room: Pacific Salon Seven
Thu 9:30 am to 12:20 pm

Non-contact Sensing and Excitation II
Session Chairs: **Hoon Sohn,** KAIST (Korea, Republic of); **Ryan L. Harne,** Univ. of Michigan (United States)

9:30 am: **Estimation of defect parameters in transversally anisotropic materials using infrared thermography**, Arun Manohar, Jeffery D. Tippmann, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) . . . . [8692-85]

9:50 am: **Entangled CNTs active layer for noncontact nondestructive evaluation in composite laminates and enhanced impact properties**, Fulvio Pinto, J. O'Byrne, Davide Mattia, Michele Meo, Univ. of Bath (United Kingdom) . . . . [8692-86]

10:10 am: **A vision-based approach for obtaining the time-varying displacement field of vibrating systems**, Mohammad Reza Jahanshahi, Yulu Chen, Sami F. Masri, The Univ. of Southern California (United States) . . . . [8692-87]

Coffee Break. . . . . Thu 10:30 am to 11:00 am

Session 21

Room: Pacific Salon Five
Thu 9:30 am to 10:30 am

SHM of Aerospace Structures
Session Chairs: **Benjamin Kyle Henderson,** Air Force Research Lab. (United States); **Mulugeta A. Haile,** U.S. Army Research Lab. (United States); **Haiying Huang,** The Univ. of Texas at Arlington (United States)

9:30 am: **Integration of structural health monitoring in the design-cycle and reduction of weight**, Mulugeta A. Haile, Anindya Ghoshal, U.S. Army Research Lab. (United States) . . . . [8692-92]

9:50 am: **Temperature-compensated strain measurement of full-scale small aircraft wing structure using low-cost FBG interrogator**, Jin-Hyuk Kim, Yeongwan Lee, Yoon-Young Kim, Chun-Gon Kim, KAIST (Korea, Republic of). . . . . [8692-93]

10:10 am: **Fiber-optic system for deflection and damage detection in morphing wing structures**, Michael Scheerer, Aerospace & Advanced Composites GmbH (Austria); Zoran V. Djinovic, Integrated Microsystems Austria GmbH (Austria); Martin Schüller, Fraunhofer ENAS (Germany) . . . . [8692-94]

Session 12

Room: Royal Palm Two
Thu 9:30 am to 12:20 pm

Vibration-Based SHM/NDE II
Session Chairs: **Theodoros E. Matikas,** Univ. of Ioannina (Greece); **Yan Wan,** Univ. of North Texas (United States)

9:30 am: **Multilayer transfer matrix characterization of complex materials with scanning acoustic microscopy**, Jeong Nyeon Kim, Richard L. Tutwiler, The Pennsylvania State Univ. (United States); Ikkeun Park, Seoul National Univ. of Science and Technology (Korea, Republic of); Chiaki Miyasaka, The Pennsylvania State Univ. (United States) . . . . [8694-44]

9:50 am: **Damage investigation of single-edge notched beam tests with concrete specimens using acoustic emission techniques**, Qingli Dai, Kenny Ng, Michigan Technological Univ. (United States)[8694-45]

10:10 am: **Hexagonal air-coupled sensor array for advanced impact echo testing**, Nenad Gucunski, Seong-Hoon Kee, Rutgers, The State Univ. of New Jersey (United States) . . . . [8694-46]

Coffee Break. . . . . Thu 10:30 am to 11:00 am

Session 13

Room: Royal Palm Five
Thu 9:30 am to 10:30 am

Thermal NDE
Session Chairs: **Simon Laflamme,** Iowa State Univ. (United States); **Zhenhua Huang,** Univ. of North Texas (United States)

9:30 am: **Structural noise reduction in lock-in thermography imaging of composites by time-domain reconstruction and spatial slope correction**, Krishnendu Chatterjee, Suneet Tuli, Indian Institute of Technology Delhi (India) . . . . [8694-71]

9:50 am: **A comparison of thermal responses of CFRP composites due to low energy impact and defect growth due to post-impact vibration using infrared thermography**, Sri Naga Pavan Addepalli, Kelvin E. Donne, Swansea Metropolitan Univ. (United Kingdom); Ian R. Cooper, TWI Ltd. (United Kingdom); Owen Williams, Swansea Metropolitan Univ. (United Kingdom); Benjamin Dutton, TWI Ltd. (United Kingdom) . . . . [8694-72]

10:10 am: **Non-destructive evaluation of photovoltaic cells using Photothermal beam deflection technique**, Anita R. Warrier, Indian Institute of Technology Madras (India) . . . . [8694-73]

Room: Royal Palm Six
Thu 9:30 am to 10:30 am

SHM based on Nonlinear Techniques
Session Chairs: **Sridhar Krishnaswamy,** Northwestern Univ. (United States); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States)

9:30 am: **Frequency-wavenumber filtering of nonlinear Lamb waves for detection and imaging of fatigue damage in aluminum plates**, Christopher T. Owens, Eric D. Swenson, Air Force Institute of Technology (United States) . . . . [8695-99]

9:50 am: **Linear and nonlinear acoustic moment for structural health monitoring for compression loaded structures**, Michele Meo, Gian Piero Malfense Fierro, Univ. of Bath (United Kingdom) . . . . [8695-100]

10:10 am: **Nonlinear ultrasonic evaluation of fatigue damage of adhesive joints**, Yue-Sheng Wang, Guo-Shuang Shui, Beijing Jiaotong Univ. (China) . . . . [8695-101]

Coffee Break. . . . . Thu 10:30 am to 11:00 am

Thursday · 14 March

Conference 8687

Session 13 continued

Room: Town & Country Ballroom
Thu 9:30 am to 12:40 pm

11:00 am: **Few layer graphene drive transparent dielectric elastomer actuator for variable focus lens application**, Taeseon Hwang, Hyeok Yong Kwon, Joon-Suk Oh, Jung-Pyo Hong, Seung-Chul Hong, YoungKwan Lee, Hyouk Ryeol Choi, Sungkyunkwan Univ. (Korea, Republic of); Kwang Jin Kim, Univ. of Nevada, Las Vegas (United States); Jae-Do Nam, Sungkyunkwan Univ. (Korea, Republic of). . . . . . . [8687-66]

11:20 am: **Design optimization of a linear actuator**, Björn Rechenbach, Morten Willatzen, Univ. of Southern Denmark (Denmark); Kim P. Lorenzen, Danfoss PolyPower A/S (Denmark); Benny Lassen, Univ. of Southern Denmark (Denmark) . . . . [8687-67]

11:40 am: **Tunable grating with active feedback**, Samuel Rosset, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Benjamin M. O'Brien, Todd A. Gisby, Daniel Xu, The Univ. of Auckland (New Zealand); Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Iain A. Anderson, The Univ. of Auckland (New Zealand). . . . . [8687-68]

12:00 pm: **Dielectric elastomer actuators for active microfluidic control**, David McCoul, Coleman Murray, Dino Di Carlo, Qibing Pei, Univ. of California, Los Angeles (United States) . . . . [8687-69]

12:20 pm: **All inkjet-printed electroactive polymer actuators for microfluidic lab-on-chip systems**, Oliver Pabst, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Jolke Perelaer, Friedrich-Schiller-Univ. Jena (Germany); Erik Beckert, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Ulrich S. Schubert, Friedrich-Schiller-Univ. Jena (Germany); Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . [8687-70]

Lunch Break . . . . . Thu 12:40 pm to 2:00 pm

Session 16

Room: Royal Palm One
Thu 11:00 am to 12:40 pm

Field-actuated EAP

Session Chairs: **Eugene D. Daneshvar,** Univ. of Michigan (United States); **Vinh Ho,** Univ. of California, Irvine (United States)

11:00 am: **P(VDF-TrFE) stacked actuators: design, fabrication, and performance**, Alan Poole, Danfoss PolyPower A/S (Denmark); Julian D. Booker, Univ. of Bristol (United Kingdom) . . . . [8687-79]

11:20 am: **New DEA by organic modification of silicone and polyurethane networks**, Bjoern Kussmaul, Michael Wegener, Martin Bluemke, Fraunhofer-Institut für Angewandte Polymerforschung (Germany); Jens Krause, Joachim Wagner, Torsten Feller, Karin Clauberg, Julia Hitzbleck, Bayer MaterialScience AG (Germany); Hartmut Krueger, Fraunhofer-Institut für Angewandte Polymerforschung (Germany). . . . . [8687-80]

11:40 am: **Effect of viscoelastic relaxation on the electromechanical coupling of dielectric elastomer**, Bo Li, Hualing Chen, Junjie Sheng, Xi'an Jiaotong Univ. (China) . . . . [8687-81]

12:00 pm: **Synthesis and electromechanical characterization of a new acrylic dielectric elastomer**, Wei Hu, Xiaofan Niu, Univ. of California, Los Angeles (United States); Xinguo Yang, Hunan Univ. (China); Qibing Pei, Univ. of California, Los Angeles (United States) . . . . [8687-82]

12:20 pm: **Effect of mechanical parameters on dielectric elastomer minimum energy structures**, Jun Shintake, Samuel Rosset, Dario Floreano, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . [8687-83]

Lunch Break . . . . . . Thu 12:40 pm to 2:00 pm

Conference 8688

Session 12 continued

11:00 am: **A hybrid electromagnetic energy harvesting device for low-frequency vibration**, Hyung-Jo Jung, Jeongsu Park, In-Ho Kim, KAIST (Korea, Republic of) . . . . [8688-53]

11:20 am: **Design of laminated piezocomposite energy harvesting devices using topology optimization methods**, Cesar Y. Kiyono, Emilio C. N. Silva, Univ. de São Paulo (Brazil) . . . . [8688-54]

11:40 am: **Development of a piezoelectric polymer wind energy harvesting flag**, Tsutomu Nishigaki, Kinki Univ. (Japan) . . . . [8688-55]

12:00 pm: **Highly-integrated energy harvesting device for rotational applications utilizing quasi-static piezoelectric and electromagnetic generators**, Jens Twiefel, Marc C. Wurz, Leibniz Univ. Hannover (Germany) [8688-56]

Session 14

Room: Towne
Thu 11:00 am to 12:20 pm

Modeling of Energy Harvesting Systems II

Session Chairs: **Alper Erturk,** Georgia Institute of Technology (United States); **Ya D. Wang,** Univ. of Michigan (United States)

11:20 am: **Energy harvesting from harmonic and noise excitation of multilayer piezoelectric stacks: modeling and experiment**, Sihong Zhao, Alper Erturk, Georgia Institute of Technology (United States) . . . . [8688-61]

11:40 am: **Shear-mode energy harvesting of piezoelectric sandwich beam**, Mohammad H. Malakooti, Henry A. Sodano, Univ. of Florida (United States) . . . . [8688-62]

12:00 pm: **Power-generation prediction for piezoelectric composite plates by modal analysis**, Yuan-Fang Chou, Chen-Hsiang Cheng, National Taiwan Univ. (Taiwan) . . . . [8688-63]

6:00 pm: **Electromechanical and statistical modeling of turbulence-induced vibration for energy harvesting**, Jared D. Hobeck, Daniel J. Inman, Univ. of Michigan (United States) . . . . [8688-101]

Conference 8689

Session 13

Room: Royal Palm Four
Thu 11:00 am to 12:20 pm

Multifunctional Structural Composites

Session Chairs: **Cindy Browder,** Northern Arizona Univ. (United States); **Yirong Lin,** The Univ. of Texas at El Paso (United States)

11:00 am: **A finite element modeling of a multifunctional hybrid composite beam with viscoelastic materials**, Ya D. Wang, Daniel J. Inman, Univ. of Michigan (United States). . . . . [8689-46]

11:20 am: **Acoustic impedance matching using dynamic homogenization**, Hossein Sadeghi, Ankit Srivastava, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) . . . . [8689-47]

11:40 am: **Modifying the acoustic impedance of polyurea-based composites**, Wiroj Nantasetphong, Alireza V. Amirkhizi, Zhanzhan Jia, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) . . . . . . [8689-48]

12:00 pm: **Ultrasonic studies of fly ash/polyurea composites**, Jing Qiao, Harbin Institute of Technology (China); Alireza V. Amirkhizi, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States); Gaohui Wu, Harbin Institute of Technology (China) . . . [8689-49]

Conference end.

Conference 8691

Session 17

Room: Royal Palm Three
Thu 11:00 am to 11:40 am

Nano-Micro Systems

11:00 am: **Design and development of nanostructured artificial materials for radar and ladar applications**, Vijay K. Varadan, Univ. of Arkansas (United States); Paul B. Ruffin, Eugene Edwards, Christina L. Brantley, U.S. Army Research, Development and Engineering Command (United States) . . . . [8691-51]

11:20 am: **A novel nanoscaled force sensor based on silicon photonic crystal**, Tianlong Li, Longqiu Li, Wenping Song, Guangyu Zhang, Yao Li, Harbin Institute of Technology (China). . . . . [8691-52]

PANEL DISCUSSION

Room: Royal Palm Three
Thu 11:40 am to 1:00 pm

Panelists:

Anja Boisen, Denmark Technical Univ., **Sam Kassegne**, San Diego State Univ., **Lesley Shannon**, Simon Fraser Univ., **V. K. Varadan**, Univ. of Arkansas and Pennsylvania State Univ.

Conference end.

Thursday · 14 March

Conference 8692	Conference 8694	Conference 8695

Conference 8692

Concurrent Sessions

Session 20 continued

Room: Pacific Salon Seven
Thu 9:30 am to 12:20 pm

11:00 am: **Development of a stereo camera system for road surface assessment**, Di Su, Tomonori Nagayama, Yozo Fujino, The Univ. of Tokyo (Japan) . . . . [8692-88]

11:20 am: **Excitation of stress waves in concrete using a focused electric spark source**, Jinying Zhu, Xiaowei Dai, Michael R. Haberman, The Univ. of Texas at Austin (United States) . . . . [8692-89]

11:40 am: **Evaluation of vision-based corrosion detection algorithms for noncontact condition assessment of structures**, Mohammad Reza Jahanshahi, Sami F. Masri, The Univ. of Southern California (United States) . . . . [8692-90]

12:00 pm: **Identification of source location by using compressive approach**, Wentao Wang, Yuequan Bao, Hui Li, Harbin Institute of Technology (China) . . . . [8692-91]

Session 22

Room: Pacific Salon Five
Thu 11:00 am to 12:20 pm

Sensing and Control Solutions for Machinery

Session Chairs: **Masayoshi Tomizuka,** Univ. of California, Berkeley (United States); **Mircea Badescu,** Jet Propulsion Lab. (United States)

11:00 am: **A regenerative damper with MR fluids working between gear transmissions**, Yan Chan, The Univ. of Hong Kong (Hong Kong, China); Chao Chen, Wei-Hsin Liao, The Chinese Univ. of Hong Kong (Hong Kong, China) . . . . [8692-95]

11:20 am: **Auto-Gopher: a wireline deep sampler driven by piezoelectric percussive actuator and EM rotary motor**, Mircea Badescu, Aaron Ressa, Yoseph Bar-Cohen, Stewart Sherrit, Jet Propulsion Lab. (United States); Kris Zacny, Gale L. Paulsen, Honeybee Robotics (United States); Luther W. Beegle, Xiaoqi Bao, Jet Propulsion Lab. (United States) . . . [8692-96]

11:40 am: **Laser displacement sensor to monitor the layup process of composite laminate production**, Nick Miesen, Roger M. Groves, Jos Sinke, Rinze Benedictus, Technische Univ. Delft (Netherlands) . . . . [8692-97]

12:00 pm: **Self-powered wireless vibration-sensing module for machining monitoring**, Tien-Kan Chung, Hao-Tien D. Lee, Chia-Yung Tseng, Wen-Tuan Lo, National Chiao Tung Univ. (Taiwan); Wen-Chin Wang, Chi-Jen Tu, Pei-Yuan Tasi, Jui-Wen Chang, Precision Machinery Research Development Ctr. (Taiwan) . . . . [8692-98]

Conference 8694

Concurrent Sessions

Session 12 continued

Room: Royal Palm Two
Thu 9:30 am to 12:20 pm

11:00 am: **Designing 2D arrays for SHM of planar structures: a review**, Tadeusz Stepinski, Uppsala Univ. (Sweden); Lukasz Ambrozinski, Tadeusz Uhl, AGH Univ. of Science and Technology (Poland) . . . . [8694-47]

11:20 am: **An ultrasonic wave-front with propagation direction dependent frequency**, Stuart B. Palmer, Samuel Hill, George Rowlands, Steven M. Dixon, The Univ. of Warwick (United Kingdom) . . . . [8694-48]

11:40 am: **The method to process ambient test data for unscaled flexibility identification**, Jian Zhang, Southeast Univ. (China) . . . . [8694-49]

12:00 pm: **Overall evaluation light-weight composite pressure vessel with alloy liner by acoustic emission and Bragg grating**, Junqing Zhao, Xiaodong He, Rongguo Wang, Wenbo Liu, Harbin Institute of Technology (China). . . . . [8694-50]

Session 14

Room: Royal Palm Five
Thu 11:00 am to 12:00 pm

Electrical and Magnetic NDE

Session Chairs: **Akira Sasamoto,** National Institute of Advanced Industrial Science and Technology (Japan); **Didem Ozevin,** Univ. of Illinois at Chicago (United States)

11:00 am: **Imaging and detection of cracks in metallic structures with Eddy current sensors**, Thierry Bore, Pierre-Yves Joubert, Dominique Placko, Ecole Normale Supérieure de Cachan (France). . . . . [8694-74]

11:20 am: **Multiple defect interpretation based on Gaussian processes for MFL technology**, Buddhi S. Wijerathna, Univ. of Technology, Sydney (Australia); Teresa A. Vidal-Calleja, Sarath Kodagoda, Qiang Zhang, Jaime Valls Miro, Univ. of Technology Sydney (Australia) . . . . [8694-75]

11:40 am: **A novel methodology to determine needle position for DC potential difference method to evaluate quenching depth from surface**, Akira Sasamoto, Takayuki Suzuki, National Institute of Advanced Industrial Science and Technology (Japan); Masahiro Iwata, Natsuko Ike, Tatsuya Kaneda, EMIC (Japan) . . . . [8694-76]

Conference 8695

Session 20

Room: Royal Palm Six
Thu 11:00 am to 1:00 pm

Guided Wave for SHM: Sensing, Excitation and Related Issues

Session Chairs: **Lingyu Yu,** Univ. of South Carolina (United States); **Jennifer E. Michaels,** Georgia Institute of Technology (United States)

11:00 am: **Strategies for guided wave imaging using two-element annular transducers**, Jennifer E. Michaels, Alexander J. Dawson, Thomas E. Michaels, Georgia Institute of Technology (United States) . . . . [8695-102]

11:20 am: **Aging effects on guided wave structural health monitoring sensor performance**, Keith A. Vehorn, Univ. of Dayton Research Institute (United States); Kevin S. Brown, Air Force Research Lab. (United States); Martin P. DeSimio, Steven E. Olson, Univ. of Dayton Research Institute (United States) . . . . [8695-103]

11:40 am: **Uncertainty quantification of a guided wave structural health monitoring system for composite bolted joints**, Colin Haynes, Michael D. Todd, Univ. of California, San Diego (United States) . . . . [8695-104]

12:00 pm: **Pressure mapping system based on guided waves reflection**, Nicolas Quaegebeur, Patrice Masson, Univ. de Sherbrooke (Canada); Louis Brault, Telops (Canada); Nicolas Beaudet, Philippe Sarret, Univ. de Sherbrooke (Canada) . . . . [8695-105]

12:20 pm: **Wavelet best basis compressed sensing of ultrasonic guided waves**, Alessandro Perelli, Luca De Marchi, Luca Flamigni, Alessandro Marzani, Nicolò Speciale, Univ. degli Studi di Bologna (Italy). [8695-106]

12:40 pm: **Crack detection with Lamb wave frequency-wavenumber analysis**, Lingyu Yu, Univ. of South Carolina (United States); Cara Leckey, NASA Langley Research Ctr. (United States); Zhenhua Tian, Univ. of South Carolina (United States); Matthew Rogge, NASA Langley Research Ctr. (United States) . . . .

Lunch Break . . . . .Thu 1:00 pm to 2:00 pm

Thursday · 14 March

Conference 8687		Conference 8688		Conference 8692
Concurrent Sessions		Concurrent Sessions		Concurrent Sessions

Conference 8687 — Concurrent Sessions

Session 14

Room: Town & Country Ballroom
Thu 2:00 pm to 3:40 pm

Application of EAP: Focus on Sensors

Session Chair: **Siegfried G. Bauer,** Johannes Kepler Univ. Linz (Austria)

2:00 pm: **Six-axis capacitive force/torque sensor based on dielectric elastomer**, Hyouk Ryeol Choi, Ja Choon Koo, Hyungpil Moon, Dae Gyoeng Kim, Baek Chul Kim, Sungkyunkwan Univ. (Korea, Republic of) . . . . [8687-71]

2:20 pm: **Study on the anti-slip using dielectric elastomer slip sensor**, Cho Hanjoung, Baekchul Kim, Daegyeong Kim, Lee Youngkwan, Jae-Do Nam, Hyouk Ryeol Choi, Hyungpil Moon, Ja Choon Koo, Sungkyunkwan Univ. (Korea, Republic of) . . [8687-72]

2:40 pm: **Self sensing of multiple dielectric elastomer actuators**, Daniel Xu, Todd A. Gisby, Sheng Quan Xie, Iain A. Anderson, The Univ. of Auckland (New Zealand) . . . . [8687-73]

3:00 pm: **Large displacement zipping DEAs for microfluidic large-scale integrated chips**, Luc Maffli, Samuel Rosset, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . . [8687-74]

Coffee Break. . . . . Thu 3:20 pm to 4:00 pm

3:20 pm: **Development of the dual-axis hybrid tactile sensor**, Seonggi Kim, Hyungpil Moon, Ja Choon Koo, Hyouk Ryeol Choi, Sungkyunkwan Univ. (Korea, Republic of) . . . . [8687-75]

Conference end.

Session 17

Room: Royal Palm One
Thu 2:00 pm to 3:20 pm

Conductive and Ionic

Session Chairs: **Marc J. Madou,** Univ. of California, Irvine (United States); **Reza Montazami,** Iowa State Univ. (United States)

2:00 pm: **GEM Printer: 3D gel printer for free shaping of functional gel engineering materials**, Hidemitsu Furukawa, Muroi Hisato, Kouki Yamamoto, Ryo Serizawa, Jin Gong, Yamagata Univ. (Japan) . . . . [8687-84]

2:20 pm: **Polyelectrolyte gels as bending actuators: modeling and numerical simulation,** Thomas Wallmersperger, Technische Univ. Dresden (Germany); Karsten Keller, Univ. Stuttgart (Germany); Abdolhamid Attaran, Technische Univ. Dresden (Germany) . . . . [8687-85]

2:40 pm: **The effects of bilayer geometry on the detachment process and operation efficiency of polypyrrole/gold bilayer actuators**, Vinh Ho, Lawrence Kulinsky, Marc J. Madou, Univ. of California, Irvine (United States) . . . . [8687-86]

3:00 pm: **Study of hybrid actuators based on conducting polymer sandwich complex**, Rudolf Kiefer, Univ. of Tartu (Estonia); Jadranka Trava-Sejdic, Paul A. Kilmartin, The Univ. of Auckland (New Zealand); Rauno Temmer, Tarmo Tamm, Alvo Aabloo, Univ. of Tartu (Estonia) . . . . [8687-87]

Conference end.

Conference 8688 — Concurrent Sessions

Session 15

Room: Sunrise
Thu 2:00 pm to 3:20 pm

Adaptive Systems and Strategies

Session Chairs: **Alison B. Flatau,** Univ. of Maryland, College Park (United States); **Victor Giurgiutiu,** Univ. of South Carolina (United States)

2:00 pm: **Effect of loading rate on the superelastic behavior of SMAs under multi-axial loading condition: analytical modeling and experiment**, Masood Taheri Andani, Mohammad H. Elahinia, The Univ. of Toledo (United States) . . . . [8688-64]

2:20 pm: **An active control logic to improve the fatigue strength of smart flexible structures**, Francesco Ripamonti, Pasquale Ambrosio, Ferruccio Resta, Francesco Braghin, Politecnico di Milano (Italy) . . . . [8688-66]

2:40 pm: **On ultrasonic squeeze film levitation: Modeling and feedback control of ultrasonic bearing systems**, Sebastian Mojrzisch, Joerg Wallaschek, Leibniz Univ. Hannover (Germany) . . . . [8688-67]

3:00 pm: **Power fluctuation reduction methodology for the grid-connected renewable power systems**, Fadhil T. Aula, Samuel C. Lee, The Univ. of Oklahoma (United States) . . . . [8688-68]

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

Session 16

Room: Towne
Thu 2:00 pm to 3:40 pm

Passive and Active Vibration Isolation Systems II

Session Chair: **Paul Reynolds,** The Univ. of Sheffield (United Kingdom)

2:00 pm: **Experimental characterization of a bi-dimensional array of negative capacitance piezo-patches for vibroacoustic control**, Flaviano Tateo, Manuel Collet, Morvan Ouisse, FEMTO-ST (France) . . . . [8688-69]

2:20 pm: **Performance-based design of buildings with superelastic-friction base isolators**, Osman E. Ozbulut, Univ. of Virginia (United States) . . . [8688-70]

2:40 pm: **Tunable bandgaps in one-dimensional granular crystals composed of cylindrical particles**, Jinkyu Yang, Mehrashk Meidani, Taegyu Kang, Feng Li, Univ. of South Carolina (United States); Duc Ngo, Eastern International Univ. (Viet Nam) . . . . . [8688-71]

3:00 pm: **Approximate pole-placement controller using inverse plant dynamics for floor vibration control**, Donald S. Nyawako, Paul Reynolds, Malcolm J. Hudson, The Univ. of Sheffield (United Kingdom) . . . . [8688-72]

3:20 pm: **Passive and hybrid piezoelectric circuits to reduce induced-atmospheric turbulence vibration of a plate-like wing**, Tarcisio M. P. Silva, Carlos De Marqui, Univ. de São Paulo (Brazil) . . . . [8688-73]

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

Conference 8692 — Concurrent Sessions

Session 23

Room: Pacific Salon Five
Thu 2:00 pm to 3:40 pm

Advances in System Identification Methods

Session Chair: **Hae-Bum A. Yun,** Univ. of Central Florida (United States)

2:00 pm: **Decoupling of multiple-input systems and time-domain system identification of civil engineering structures**, Jian V. Li, Univ. of Illinois at Urbana-Champaign (United States); Manuel Ruiz-Sandoval, Univ. Autónoma Metropolitana (Mexico); Billie F. Spencer Jr., Amr S. Elnashai, Univ. of Illinois at Urbana-Champaign (United States) . . . . . [8692-99]

2:20 pm: **A novel model-free data processing technique for ad hoc analysis in monitoring for heterogeneous infrastructure networks**, Hae-Bum A. Yun, Ganesh Sundaresan, Univ. of Central Florida (United States); Jong-Woo Kim, Hanwha Chemical Corp. (Korea, Republic of); Ki-Tae Park, Korea Institute of Construction Technology (Korea, Republic of) . . . . [8692-100]

2:40 pm: **Prediction of scour depth around bridge piers using Gaussian process**, Rajesh Kumar Neerukatti, Inho Kim, Masoud Yekani Fard, Aditi Chattopadhyay, Arizona State Univ. (United States) . . . . [8692-165]

3:00 pm: **Health assessment of structures in presence of nonlinearity: novel approaches**, Achintya Haldar, Abdullah Al-Hussein, Ajoy Kumar Das, The Univ. of Arizona (United States) . [8692-102]

3:20 pm: **Adaptive structural damage identification using residual error analysis**, Qiang Yin, Nanjing Univ. of Science and Technology (China) . [8692-103]

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

Thursday · 14 March

Conference 8694

Conference 8695

Session 24

Room: Pacific Salon Seven
Thu 2:00 pm to 3:40 pm

Actuators and Novel Control Solutions

Session Chairs: **Simone Cinquemani,** Politecnico di Milano (Italy); **Paul Reynolds,** The Univ. of Sheffield (United Kingdom)

2:00 pm: **Evaluation method for a controller of active mass damper using central pattern generator**, Junichi Hongu, Daisuke Iba, Morimasa Nakamura, Ichiro Moriwaki, Kyoto Institute of Technology (Japan) . . . . [8692-104]

2:20 pm: **Averaging sensors technique for active vibration control applications**, Simone Cinquemani, Francesco Braghin, Gabriele Cazzulani, Ferruccio Resta, Politecnico di Milano (Italy) . . . . [8692-105]

2:40 pm: **Low-frequency control strategy for seismic attenuation of inertial platforms and mechanical suspensions**, Fabrizio Barone, Fausto Acernese, Rosangela Canonico, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Fabio Garufi, Univ. degli Studi di Napoli Federico II (Italy); Gerardo Giordano, Rocco Romano, Univ. degli Studi di Salerno (Italy). . . . . [8692-106]

3:00 pm: **Effect of in-structure damping uncertainty on semi-active control performance: a modeling perspective**, Arun Puthanpurayil, Paul Reynold, Donald S. Nyawako, The Univ. of Sheffield (United Kingdom). . . . . [8692-107]

3:20 pm: **Vibration control of piezoelectric FGM plate using finite element method**, Priyanka A. Jadhav, Kamal Bajoria, Indian Institute of Technology Bombay, India (India) . . . . [8692-108]

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

Session 15

Room: Royal Palm Two
Thu 2:00 pm to 4:20 pm

Remote Sensing Technologies

Session Chairs: **Dryver R. Huston,** The Univ. of Vermont (United States); **Shen-En Chen,** The Univ. of North Carolina at Charlotte (United States)

2:00 pm: **Acoustic emission remote sensing of thermal protection system performance with elastic waveguides**, Dryver R. Huston, Stephen Pearson, Douglas G. Fletcher, The Univ. of Vermont (United States) . . . . [8694-51]

2:20 pm: **Digital image correlation and distortion correction for creep deformation measurement of high temperature components**, Jianxin Gao, Yang Yang, TWI Ltd. (United Kingdom); Hans R. Siebert, Thorsten Siebert, Dantec Dynamics GmbH (Germany); Enrique Piñeiro Ben, Asociación de Investigación Metalúrgica del Noroeste (Spain). . . . . [8694-52]

2:40 pm: **LiDAR scan and smart Piezo layer combined damage quantification**, Shen-En Chen, The Univ. of North Carolina at Charlotte (United States); Howard H. Chung, Acellent Technologies, Inc. (United States); Youngjin Park, The Univ. of North Carolina at Charlotte (United States) . . . . [8694-53]

3:00 pm: **Bolted-connection modeling and validation through laser-aided testing**, Changqing Gong, Kaoshan Dai, Tongji Univ. (China); Benjiamin Smith, The Univ. of North Carolina at Charlotte (United States) . . . . [8694-54]

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

4:00 pm: **Full field displacement measurement by double symmetrical illumination with diode lasers through a pair of double exposure reflection holograms**, Ventseslav C. Sainov, Angel G. Baldjiev, Institute of Optical Materials and Technologies (Bulgaria). . . . . [8694-55]

Conference end.

Session 16

Room: Royal Palm Five
Thu 2:00 pm to 3:00 pm

NDE for Nuclear Facilities

Session Chairs: **Ryan M. Meyer,** Pacific Northwest National Lab. (United States); **Lingyu Yu,** Univ. of South Carolina (United States)

2:00 pm: **Nondestructive Examination for Light Water Reactor Sustainability: Needs and Research Priorities**, Ryan M. Meyer, Jamie B. Coble, David L. Brenchley, Kevin L. Simmons, Pacific Northwest National Lab. (United States); Dwight A. Clayton, Cyrus M. Smith, Oak Ridge National Lab. (United States); Sasan Bakhatiari, Argonne National Lab. (United States); Pradeep Ramuhalli, Pacific Northwest National Lab. (United States) . . . . [8694-77]

2:20 pm: **Development of an automated scanner and phased array ultrasonic testing technique for the inspection of nozzle welds in the nuclear industry**, Dimosthenis Liaptsis, TWI Ltd. (United Kingdom); Vasilios A. Papadimitriou, Ioannis Roditis, Panagiotis Chatzakos, Innora Ltd. (Greece). . . . . [8694-78]

2:40 pm: **Design, fabrication, and testing of YCOB high-temperature acoustic emission sensor**, Joseph A. Johnson, Kyungrim Kim, North Carolina State Univ. (United States); Shujun Zhang, Pennsylvania State Univ. (United States); Xiaoning Jiang, North Carolina State Univ. (United States). . . . . [8694-79]

> ### PANEL DISCUSSION
>
> **Room: Royal Palm Five**
> **Thu 4:20 pm to 5:40 pm**
>
> Session Chair: **Caesar Singh,** U.S. Dept. of Transportation (United States)

Session 21

Room: Royal Palm Six
Thu 2:00 pm to 3:40 pm

Vibration Based SHM Systems

Session Chairs: **Perngjin F. Pai,** Univ. of Missouri-Columbia (United States); **Peter Xinlin Qing,** Commercial Aircraft Corp. of China, Ltd. (China)

2:00 pm: **Crack detection on wind turbine blade in an operating environment using vibro-acoustic modulation technique**, Sungmin Kim, Douglas E. Adams, Purdue Univ. (United States); Hoon Sohn, KAIST (Korea, Republic of). . . . . [8695-108]

2:20 pm: **Bolted joint loosening detection by using laser excitation**, Feblil Huda, Hokkaido Univ. (Japan) and Univ. of Riau (Indonesia); Itsuro Kajiwara, Hokkaido Univ. (Japan); Naoki Hosoya, Shibaura Institute of Technology (Japan); Shozo Kawamura, Toyohashi Univ. of Technology (Japan) . . . . [8695-109]

2:40 pm: **Damage-patterns based method to locate discontinuities in beams**, Gilbert-Rainer Gillich, Zeno-Iosif Praisach, Univ. Eftimie Murgu Resita (Romania). . . . . [8695-110]

3:00 pm: **Dynamic characteristics and vibration-based damage inspection of structures with actual fatigue cracks**, Perngjin F. Pai, Univ. of Missouri-Columbia (United States); Jun Liu, Northwestern Polytechnical Univ. (China); Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) . . . . [8695-111]

3:20 pm: **Monitoring the fracture healing of an internally fixated pelvis using vibration analysis**, Lydia CY Wong, Wing K Chiu, Monash Univ. (Australia); Matthias Russ, The Alfred Hospital (Australia); Susan Liew, Alfred Health (Australia) . . . . [8695-112]

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

Conference 8688

Session 17

Room: Sunrise
Thu 4:00 pm to 5:20 pm

Passive and Active Vibration Isolation Systems III

Session Chairs: **Roger Ohayon,** Conservatoire National des Arts et Métiers (France); **Jiong Tang,** Univ. of Connecticut (United States)

4:00 pm: **Simulation study of semi-active control of stay cable using MR damper under wind excitations,** Jiangyun Liu, Hongwei Huang, Limin Sun, Tongji Univ. (China). . . . . . [8688-74]

4:20 pm: **A comparison between the IMSC and the DMSC for vibration suppression of smart flexible structures,** Francesco Ripamonti, Mattia Serra, Ferruccio Resta, Politecnico di Milano (Italy). . . . . [8688-75]

4:40 pm: **Numerical assessment of seismic performance of steel building with recentering damper under near-fault ground motions,** Hui Qian, Zhengzhou Univ. (China); Hongnan Li, Dalian Univ. of Techonolgy (China); Gangbing Song, Univ. of Houston (United States). . . . . [8688-76]

5:00 pm: **Novel vibration-assisted cell injector based on shearing piezoactuator,** Zenan Wang, Su Zhao, Wei Tech Ang, Nanyang Technological Univ. (Singapore) . . . . [8688-77]

Conference end.

Conference 8692

Concurrent Sessions

Session 25

Room: Pacific Salon Five
Thu 4:00 pm to 5:40 pm

Self-Sensing Cementitious Composites

Session Chairs: **Yiqing Ni,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Haeng-Ki Lee,** KAIST (Korea, Republic of)

4:00 pm: **A study of re-usable electromechanical impedance methods for structural health monitoring of concrete structures,** Sam Na, Haeng-Ki Lee, KAIST (Korea, Republic of). . . . . [8692-109]

4:20 pm: **Characterization of in-situ triboluminescent optical Fiber (ITOF) sensor for real-time damage monitoring in cementitious composites,** David O. Olawale, Tarik J. Dickens, The Florida State Univ. (United States); Annuli Okoye, Univ. of Massachusetts Amherst (United States); Mohammed J. Uddin, Florida State Univ. (United States); Okenwa O. Okoli, The Florida State Univ. (United States) . . . . [8692-110]

4:40 pm: **Identification of impact force using embedded PZT sensors: experimental verification of identification accuracy,** Y. Q. Ni, Z.G. Guo, Y. Chen, The Hong Kong Polytechnic Univ. (Hong Kong, China); Xiaowei Ye, The Hong Kong Polytechnic Univ. Shenzhen Research Institute (Hong Kong, China) . . . . [8692-111]

5:00 pm: **Smart multifunctional cement mortar containing graphite nanoplatelet,** Hongjian Du, Sze Dai Pang, Ser-Tong Quek, National Univ. of Singapore (Singapore) . . . . [8692-112]

5:20 pm: **A scouring sensor by using the electrical properties of carbon nanotube-filled cement-based composite,** Huigang Xiao, Guanjin Wang, Harbin Institute of Technology (China) . . . [8692-113]

Conference end.

Session 26

Room: Pacific Salon Seven
Thu 4:00 pm to 5:40 pm

SHM of Civil Infrastructure Systems II

Session Chairs: **Sung-Han Sim,** Ulsan National Institute of Science and Technology (Korea, Republic of); **Satish Nagarajaiah,** Rice Univ. (United States)

4:00 pm: **Road condition evaluation using the vibration response of ordinary vehicles and synchronously recorded movies,** Tomonori Nagayama, The Univ. of Tokyo (Japan); Yuuki Shimada, Univ. of Tokyo (Japan); Yozo Fujino, The Univ. of Tokyo (Japan) . . . . [8692-114]

4:20 pm: **Compressive sampling based approach for identification of moving loads distribution on cable-stayed bridges,** Yuequan Bao, Hui Li, Fujian Zhang, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) and Harbin Institute of Technology (China). . . . . [8692-115]

4:40 pm: **Road profile estimation of city roads using DTPS,** Qi Wang, Northeastern Univ. (United States); Gregory J. McDaniel, Boston Univ. (United States); Ming L. Wang, Northeastern Univ. (United States) . . . . [8692-116]

5:00 pm: **Structural health monitoring of bridges in Kentucky,** Issam E. Harik, Abheetha Peiris, Univ. of Kentucky (United States) . . . . [8692-117]

5:20 pm: **Time-frequency methods for structural health monitoring of deepwater risers subjected to vortex-induced vibrations,** Satish Nagarajaiah, Rice Univ. (United States); Srinivasan Gopalakrishnan, Indian Institute of Science (India); Chaojun Huang, Peng Sung, Rice Univ. (United States). . . . . [8692-118]

Conference 8695

Session 22

Room: Royal Palm Six
Thu 4:00 pm to 6:00 pm

Signal Processing for SHM

Session Chairs: **Michael D. Todd,** Univ. of California, San Diego (United States); **George Zentai,** Varian Medical Systems, Inc. (United States)

4:00 pm: **Frequency response feature selection in a Bayesian framework,** Zhu Mao, Michael D. Todd, Univ. of California, San Diego (United States) . . . . [8695-113]

4:20 pm: **Abnormal behavior detection in the Jeremiah Morrow Bridge based on the long term measurement-data patterns,** Mehdi Norouzi, Jason Kumpf, Victor J. Hunt, Arthur J. Helmicki, Univ. of Cincinnati (United States). . . . . [8695-114]

4:40 pm: **Advanced signal processing for imaging defects using scanning-laser-generated high order guided wave modes,** Eric B. Flynn, Los Alamos National Lab. (United States); See Yenn Chong, Chonbuk National Univ. (Korea, Republic of); Gregory J. Jarmer, Los Alamos National Lab. (United States); Jung-Ryul Lee, Chonbuk National Univ. (Korea, Republic of) . . . . [8695-115]

5:00 pm: **Multiscale pseudo-force model in 2D wavelet domain for damage detection of plate elements,** Maosen Cao, Wies?aw M. Ostachowicz, The Szewalski Institute of Fluid-Flow Machinery (Poland) . . . . [8695-116]

5:20 pm: **The PRICONA algorithm for biological spectra normalization,** Rocco Romano, Rosangela Canonico, Fausto Acernese, Univ. degli Studi di Salerno (Italy); Pietro Luigi Indovina, Univ. degli Studi di Napoli Federico II (Italy); Fabrizio Barone, Univ. degli Studi di Salerno (Italy) . . . . [8695-117]

5:40 pm: **Structural damage detection based on Teager energy operator,** Wei Xu, Hohai Univ. (China); Wieslaw M. Ostachowicz, The Szewalski Institute of Fluid-Flow Machinery (Poland); Maosen Cao, Hohai Univ. (China); Zhongqing Su, The Hong Kong Polytechnic Univ. (Hong Kong, China) . . . . [8695-118]

Conference end.

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General Information

Registration

Onsite Registration and Badge Pick-Up Hours

San Diego Town & Country Resort and Convention Center, Golden Foyer

Sunday 10 March . . . . 12:00 pm to 5:00 pm

Monday 11 March . . . . 7:00 am to 5:00 pm

Tuesday 12 March. . . . 7:30 am to 4:00 pm; 5:30 pm to 7:00 pm

Wednesday 13 March . . . . 7:45 am to 4:00 pm

Thursday 14 March . . . . 7:45 am to 11:00 am

Conference Registration
Includes admission to all conference sessions, daily plenaries, panels, technical events, Welcome and Poster receptions, admission to the Exhibition, coffee breaks, and a choice of print proceedings or CD. Student pricing does not include proceedings.

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Courses and workshops are priced separately. Course-only registration includes your selected course(s), course notes, coffee breaks, and admittance to the exhibition. Course prices include applicable taxes. Onsite, please go to SPIE Registration after you pick up your badge.

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Author / Presenter Information

Audiovisual Desk and Preview Station
Golden Foyer

Monday through Thursday . . . . 7:30 am to 5:00 pm

All conference rooms have a computer workstation, projector, screen, lapel microphone, and laser pointer. All presenters are requested to come to Audiovisual Desk with their memory devices or laptops to confirm their presentation display settings.

Posters
Tuesday 12 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 12 March . . . . 10:00 am to 4:00 pm

Wednesday 13 March . . . . 10:00 am to 4:00 pm

Onsite Services

Internet Access
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Complimentary wired Internet access is available; attendees can hook up their laptops or use provided workstations.

  Also, our host hotel guest rooms at the San Diego Town and Country Resort & Convention Center are equipped with high speed wireless Internet. This service is complimentary for SPIE hotel guests. Access is limited to the guest room areas. The password for connection is available when you check in at hotel or you may dial ext. 1234 to get a password.

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Free Conference Apps are available for iPhone and Android smart phones. See website for link.

MSI Business Center

Grand Exhibit Hall corridor

Monday through Friday . . . . .8:00 am to 5:00pm

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An urgent message line is available during registration hours: 619.908.5040

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Continental

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A full continental breakfast is available for SPIE hotel guests located in the Tiki Pavilion. Please wear your badge and have your Town & Country room key when you arrive.

Monday through Thursday . . . . 7:00 to 8:15 am

Coffee Breaks

Complimentary coffee will be served twice daily. Check individual conference listings for exact times and locations.

Monday .10:00 to 10:30 and 3:30 to 4:00
Lion Fountain Court

Tuesday & Wednesday . . . . .10:30 to 11:00 and 3:30 to 4:00
Exhibition Hall (Golden Ballroom)

Thursday . . . . .10:00 to 10:30 and 3:30 to 4:00
Lion Fountain Court

Lunch Options

Rose Garden next to the Royal Palm Ballrooms

Daily. . . . . 11:30 am to 1:30 pm

A grab and go station with hot and cold snacks, deli sandwiches, salads, pastries and beverages are available for purchase. Cash and credit cards accepted. If you have more time and want to sit, the Terrace Café, Charlie's Sports Bar and Trellises Restaurant are open as well.

   For evening dining, Trellises Restaurant, The Terrace Deli, Charlie's Sports Bar and Kelly's Steakhouse & Piano Bar are open. Check for the Special SPIE value meal offered.

Desserts

Complimentary tickets for dessert snacks are included in course and conference attendee registration packets.

Travel/Transportation

Flying to San Diego

San Diego International Airport (SAN) is conveniently located three miles northwest of downtown San Diego.

Public Transportation

SuperShuttle offers a discount fare of $10 one way for SS/NDE attendees. Discount does not apply without a reservation. Book Online or call 1-800-258-3826 and refer to SPIE Smart Structures or group code SPIE. After claiming your luggage, locate the 'Shuttle for Hire' Island and ask the Transportation Coordinator for a Supershuttle van.

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Taxi service from San Diego Airport to the Town & Country Resort & Convention Center is approximately $24 depending on traffic.

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Town & Country Resort and Convention Center is located at 500 Hotel Circle North in the Mission Valley area of San Diego, California at Hotel Circle North and Fashion Valley Road. To reach the hotel from north or south, take I-5 to I-8 east. Follow I-8 east to the "Hotel Circle" exit. From I-805, take I-8 west to the Hotel Circle exit and proceed to Hotel Circle North.

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Parking for overnight guests is complimentary. Non-guests pay $8 per day.

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San Diego, California's second largest city and the United States seventh largest, where blue skies keep watch on 70 miles of beaches and a gentle Mediterranean climate begs for a day of everything and nothing. Bordered by Mexico, the Pacific Ocean, the Anza-Borreg Desert and the Laguna Mountains, San Diego County's 4200 square miles offer immense options for business and pleasure.

For more information about San Diego, visit their website. www.sandiego.com

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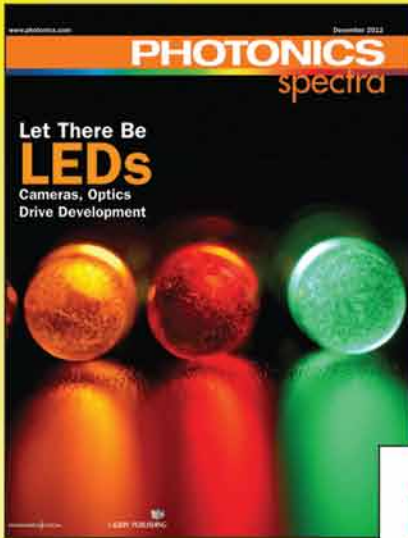
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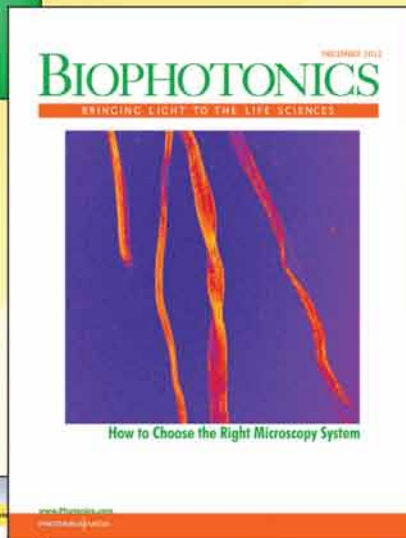
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