2022 CALL FOR PAPERS

SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION

6–10 March 2022
Long Beach, California, USA

SUBMIT ABSTRACTS BY
25 AUGUST 2021

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SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION

Conferences and Courses
6–10 March 2022
Long Beach, California, USA

Present and discuss the latest research next year in Long Beach

The leading event that features advanced sensing and materials

Smart Structures + NDE is the meeting where research is shared in technologies for automotive, aerospace, civil infrastructure, Industry 4.0, advanced materials and sensor systems for NDE, and structural health monitoring.

Each year this important community comes together to share and discuss current research, hear the latest breakthroughs, and connect with colleagues. The 2022 Call for Papers is now open.

Review the topic areas and see where your research fits best.

ABSTRACT SUBMISSIONS ARE DUE 25 AUGUST.

Submit your abstract today: **www.spie.org/ssncall**

An invitation to participate

SPIE Smart Structures + Nondestructive Evaluation looks forward to gathering again in person next year. At this event you'll experience five days of thought-provoking sessions, plenary talks, and networking events that will bring the community together again in an attractive and safe location.

This meeting represents a unique community for reporting state-of-the-art research and development in sensors, advanced materials, and structural health monitoring. The event includes the latest technologies for automotive, aerospace, civil infrastructure, Industry 4.0, advanced materials and sensor systems for NDE, and structural health monitoring.

Come share with—and learn from—world experts, researchers, and innovators discussing advancements in nondestructive evaluation technologies, info-tech sensors and wearable systems, EAPAD devices, and more.

We hope you will consider submitting an abstract and sharing your latest work with your community in Long Beach next year.

Until then—with much anticipation and appreciation,

Your 2022 Smart Structures + NDE Chairs

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SPIE remains committed to advancing light-based research and meeting the needs of our constituents by providing you with an opportunity for sharing your work and connecting you with the global science and engineering community. SPIE Smart Structures + Nondestructive Evaluation 2022 is scheduled to take place as planned, and we look forward to your participation.

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www.spie.org/signup

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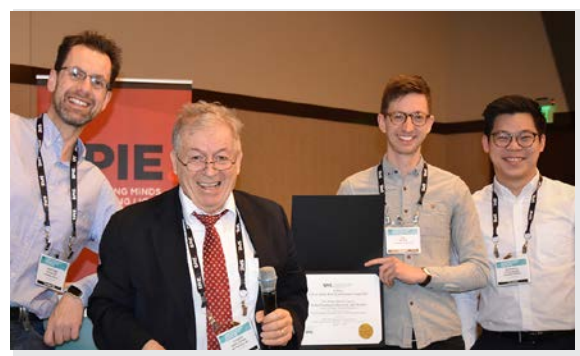

RECOGNIZING THE BRIGHTEST MINDS

See the 2021 list of award winners, and review the nomination process for 2022.

Awards at SPIE Smart Structures + NDE

The awards presented at Smart Structures + Nondestructive Evaluation 2022 represent four categories of excellence across various disciplines:

- **SPIE SSM/NDE Lifetime Achievement Awards**
- **SPIE Best Student Paper Contest**
- **Bioinspiration, Biomimetics, and Bioreplication Best Student Paper Award**
- **EAP-In-Action Demonstration Awards**

To review the nomination process and criteria for each award, visit: spie.org/ssnawards

Bioinspiration, Biomimetics, and Bioreplication XII (SSN01)

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

Conference Co-Chairs: **Mato Knez,** CIC nanoGUNE Consolider (Spain); **Akhlesh Lakhtakia,** The Pennsylvania State Univ. (United States)

Program Committee: **Javaan S. Chahl,** Univ. of South Australia (Australia); **Chih-Hung Chang,** Oregon State Univ. (United States); **Vincenzo Fiumara,** Univ. degli Studi della Basilicata (Italy); **Laurent A. Francis,** Univ. Catholique de Louvain (Belgium); **Alon Gorodetsky,** Univ. of California, Irvine (United States); **Olaf Karthaus,** Chitose Institute of Science and Technology (Japan); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Torben A. Lenau,** Technical Univ. of Denmark (Denmark); **Bert Müller,** Univ. Basel (Switzerland); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Akira Saito,** Osaka Univ. (Japan)

Conference Co-Sponsor:

Optical Society of Southern California

Bioinspiration, biomimetics, and bioreplication arise from a flow of ideas and concepts from nature into a great variety of technoscientific disciplines. The main aim is to develop novel devices with tailored functionalities and improved capacities. This is a rapidly evolving and highly multidisciplinary field that embraces aspects related to physics, chemistry, biology, engineering, materials science, nanotechnology, neuroscience, mechanical properties, computing and control, design integration, optimization, multifunctionality, multicontrollability, cost effectiveness, design for environment, as well as arts and humanities.

The 12th edition of this conference welcomes contributions from industry, academia, and government research organizations. Topics of interest cover any relevant scientific or technological aspects of bioinspiration, biomimetics, and bioreplication, from theoretical considerations, production, and characterization to practical applications.

Topics include, but are not limited to:

- fundamental processes (aerodynamics, adhesion, superhydrophobicity and self-cleaning, nano and microfluidics, structural colors, optics, rheology, photonics, locomotion, visual systems)
- materials (biomaterials, composites, structural materials, high-strength membranes, ultralightweight structures, self-healing materials)
- devices (sensors, multifunctional devices, miniature devices, neuromorphic devices and systems, photonic devices)
- applications (robotics, architecture, biomedicine and pharmaceutics, marine uses, communications and informatics, artificial muscles, functional/decorative coatings, construction, transportation, manufacturing)
- energy efficiency, resource efficiency, waste management, and biobeneficial bioinspiration.

The conference will include several invited talks, contributed talks, and posters.

BEST STUDENT PAPER AWARD

The Bioinspiration, Biomimetics, and Bioreplication XII conference chairs will choose the Best Student Paper Award from their conference. This award is sponsored by the Optical Society of Southern California. A cash prize will be given to the first, second, and third place winners.

ABSTRACTS DUE: 25 AUGUST 2021

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Electroactive Polymer Actuators and Devices (EAPAD) XXIV (SSN02)

Conference Chair: **Iain A. Anderson,** The Univ. of Auckland (New Zealand)

Conference Co-Chairs: **John D. W. Madden,** The Univ. of British Columbia (Canada); **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Program Committee: **Barbar J. Akle,** Lebanese American Univ. (Lebanon); **Yoseph Bar-Cohen,** Jet Propulsion Lab. (United States); **Ray H. Baughman,** The Univ. of Texas at Dallas (United States); **Holger Böse,** Fraunhofer-Institut für Silicatforschung ISC (Germany); **Eric Cattan,** Univ. Polytechnique Hauts-de-France (France); **Hyouk Ryeol Choi,** Sungkyunkwan Univ. (Korea, Republic of); **Marco Fontana,** Scuola Superiore Sant'Anna (Italy); **Edwin W. H. Jager,** Linköping Univ. (Sweden); **Giedrius Janušas,** Kaunas Univ. of Technology (Lithuania); **Martin Kaltenbrunner,** Johannes Kepler Univ. Linz (Austria); **Christoph Keplinger,** Univ. of Colorado Boulder (United States); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Soo Jin Adrian Koh,** Max-Planck-Institut für Intelligente Systeme (Germany); **Gabor M. Kovacs,** CTsystems AG (Switzerland); **Maarja Kruusmaa,** Tallinn Univ. of Technology (Estonia); **Jinsong Leng,** Harbin Institute of Technology (China); **Tiefeng Li,** Zhejiang Univ. (China); **Jürgen Maas,** Technische Univ. Berlin (Germany); **Il-Kwon Oh,** KAIST (Korea, Republic of); **Toribio F. Otero,** Univ. Politécnica de Cartagena (Spain); **Qibing Pei,** Univ. of California, Los Angeles (United States); **Aaron D. Price,** Western Univ. (Canada); **Jonathan M. Rossiter,** Univ. of Bristol (United Kingdom); **Stefan S. Seelecke,** Univ. des Saarland (Germany); **Jun Shintake,** The Univ. of Electro-Communications (Japan); **Anuvat Sirivat,** Chulalongkorn Univ. (Thailand); **Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark); **Geoffrey M. Spinks,** Univ. of Wollongong (Australia); **Ji Su,** NASA Langley Research Ctr. (United States); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **Rocco Vertechy,** Univ. degli Studi di Bologna (Italy); **Frédéric Vidal,** Univ. de Cergy-Pontoise (France); **Thomas Wallmersperger,** TU Dresden (Germany); **Jian Zhu,** The Chinese Univ. of Hong Kong, Shenzhen (China)

Electroactive Polymers (EAP) are enabling many new opportunities in health, wearable tech, space, robotics, and other industries. Their characteristics include the ability to undergo larger displacements than almost any other class of smart materials, the pliability needed for biomimetic and other mechanically flexible systems, and low density. Of particular interest is their potential to augment, improve upon, and one day, replace biological muscles. Besides their attractive characteristics as actuators, they are enabling new types of generators and sensors. We are providing a forum where researchers can share their knowledge and inventions to improve our community's understanding of EAP performance, modeling of electro-mechanics and chemistry, techniques of processing and characterization, control electronics, and new applications for EAP. In summary, this conference is seeking to advance our knowledge of, promote the development of, and increase the recognition of EAP technology.

Papers are solicited on but not limited to the following EAP related topics:

- advances in actuation, sensing, and proprioception using polymer materials, as well as carbon-based and inorganic materials, plus Transduction via electrical, thermal, optical/electromagnetic or other forms of energy
- theoretical models, analysis, and simulation, including computational chemistry
- measurement, testing, and characterization methods
- manufacturing technologies, including electroding, synthesis, processing, shaping, and fabrication
- design and engineering of actuators, sensors, and their integration into devices and systems
- technology from miniature scale (MEMS, micro, and nano) to large devices
- applications in artificial muscles, robotics, biomimetics, energy harvesting, medical, industry, etc.
- driving electronics, system integration, and packaging
- control algorithms for devices and their implementation in software and hardware.

2022 EAPAD KEYNOTE PRESENTATION

Our Keynote for 2022 will be Professor **Allison Okamura** from Stanford University, director of the CHARM Lab (https://charm.standford.edu), who will talk about her lab's latest developments in haptic devices that allow touch-based information transfer between humans and intelligent systems, enabling communication in a salient but private manner that frees other sensory channels. She will broaden our understanding of the wearable design space for haptics beyond the fingertips and show us how actuator selection plays a key role.

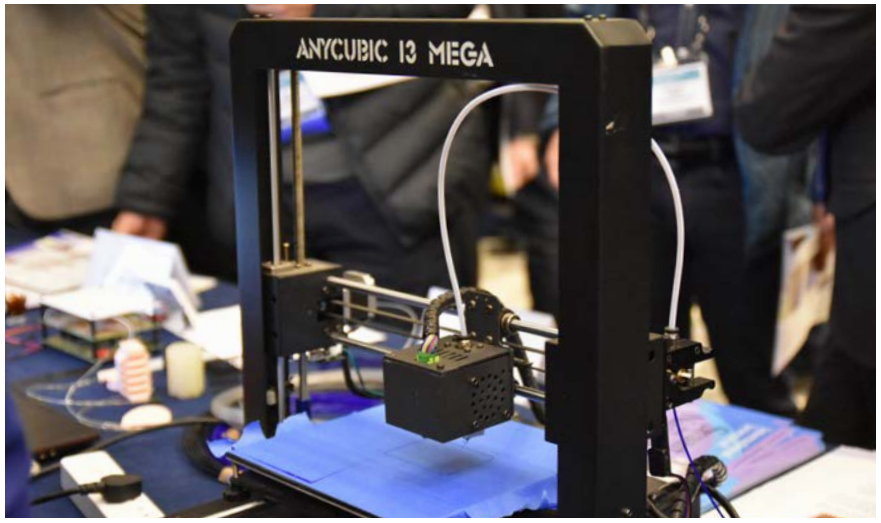
EAP-IN-ACTION DEMONSTRATION SESSION

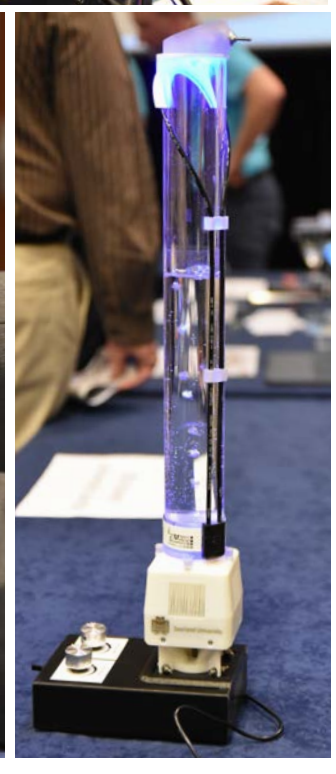
This industry and academic session, held annually as part of the SPIE's EAPAD conference, is an opportunity to showcase working Electroactive Polymer materials and applications. State-of-the-art capabilities that make EAP one of the leading "actuators-of-choice" are on display. New materials and application areas are continuing to emerge and this session offers up-close demonstrations of EAP materials in action. The demonstration format enables interaction between the technology developers and potential users as well as a "hands-on" experience with this emerging technology. An award will be given to the three best EAP-in-Action demonstrations. Details can be found on the SPIE Awards page.

COURSE ON ELECTROACTIVE POLYMER ACTUATORS, SENSORS, AND DEVICES

A course on Electroactive Polymer Actuators, Sensors, and Devices will be scheduled for Sunday 6 March, prior to the start of the symposium. This provides a background on working principles of EAPs, as well as their advantages and challenges. Details and registration information for the course will be online in December.

EAP-IN-ACTION DEMONSTRATION SESSION





This industry session, held annually as part of the SPIE's EAPAD conference has shared advances through technical demonstrations for over 20 years. The session turns the spotlight on Electroactive Polymers (EAP) materials and applications, illustrating the state-of-the-art capabilities that make EAP one of the leading "actuators-of-choice". New materials and application areas are continuing to emerge and this session offers up-close demonstrations of EAP materials in action. The demonstration format enables interaction between the technology developers and potential users as well as a "hands-on" experience with this emerging technology. An award certificate will also be given to the top three Best EAP-in-Action Demonstration Award winners. Details can be found online on the Awards page at www.spie.org/ssnawards.

Active and Passive Smart Structures and Integrated Systems XVI (SSN03)

Conference Chair: **Jae-Hung Han,** KAIST (Korea, Republic of)

Conference Co-Chairs: **Shima Shahab,** Virginia Polytechnic Institute and State Univ. (United States); **Jinkyu Yang,** Univ. of Washington (United States)

Program Committee: **Steven R. Anton,** Tennessee Technological Univ. (United States); **Andres F. Arrieta,** Purdue Univ. (United States); **Hiroshi Asanuma,** Chiba Univ. (Japan); **Diann E. Brei,** Univ. of Michigan (United States); **Matthew Bryant,** North Carolina State Univ. (United States); **Gregory P. Carman,** Univ. of California, Los Angeles (United States); **Eun Jung Chae,** California State Univ., Long Beach (United States); **Seung-Bok Choi,** Inha Univ. (Korea, Republic of); **Amir H. Danesh-Yazdi,** Rose-Hulman Institute of Technology (United States); **Carlos De Marqui Jr.,** Univ. de São Paulo (Brazil); **Alper Erturk,** Georgia Institute of Technology (United States); **Alison B. Flatau,** Univ. of Maryland, College Park (United States); **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawai'i at Manoa (United States); **James M. Gibert,** Purdue Univ. (United States); **Victor Giurgiutiu,** Univ. of South Carolina (United States); **Nam Seo Goo,** Konkuk Univ. (Korea, Republic of); **Faramarz Gordaninejad,** Univ. of Nevada, Reno (United States); **Nakhiah C. Goulbourne,** Univ. of Michigan (United States), The National Science Foundation (United States); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Daniel J. Inman,** Univ. of Michigan (United States); **Hyung-Jo Jung,** KAIST (Korea, Republic of); **Jung-Ryul Lee,** KAIST (Korea, Republic of); **Soobum Lee,** Univ. of Maryland, Baltimore County (United States); **Junrui Liang,** ShanghaiTech Univ. (China); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Zhu Mao,** Univ. of Massachusetts Lowell (United States); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Yi-Chung Shu,** National Taiwan Univ. (Taiwan); **Henry A. Sodano,** Univ. of Michigan (United States); **Jiong Tang,** Univ. of Connecticut (United States); **Lihua Tang,** The Univ. of Auckland (New Zealand); **Serife Tol,** Univ. of Michigan (United States); **Kon-Well Wang,** Univ. of Michigan (United States); **Ya S. Wang,** Texas A&M Univ. (United States); **Norman M. Wereley,** Univ. of Maryland, College Park (United States); **Byeng D. Youn,** Seoul National Univ. (Korea, Republic of); **Haifeng Zhang,** Univ. of North Texas (United States); **Lei Zuo,** Virginia Polytechnic Institute and State Univ. (United States)

In addition to the 250-word summary abstract, authors are welcome to submit an extended abstract (approximately 2 pages long, or 1,000 words) for review purposes.

Acceptance priority will be given to authors who submit a 2-page summary of their work. The file must be a PDF to upload during the abstract submission process. The extended abstract, used for selecting the papers by session organizers, can include figures, test results, and references. The short abstract will be included in the publication that is provided to the conference attendees.

This conference, largely resulting from merge of the former 'Damping and Isolation' and 'Smart Structures and Integrated Systems' conferences, as well as a part of 'Modeling, Signal Processing, and Control' focuses on topics related to design, analysis, fabrication, and testing of active/passive smart dynamic structural systems. Structural vibration, damping, and acoustic control of integrated systems can be enhanced through passive, active, and hybrid approaches. The conference emphasis is on the interplay of actuation, sensing, and processing capabilities to create active systems with new function capabilities. The goal is to create a multidisciplinary forum to bring together developments in diverse application areas in aeronautical, space, marine, transportation, civil applications, etc. The scope of the conference ranges from system level evaluation of smart structures to development, modeling, and optimization of new actuation and sensing techniques for integrated systems. Authors are encouraged to describe developments in active materials, 'smart' structural components, and integration of these and other constituent technologies into advanced systems that hold the potential for expanding the application of active and passive smart structures and integrated systems.

The primary topics for the conference are organized into the following eleven sessions:

- energy harvesting and scavenging
- metamaterials and metastructures
- biological-inspired systems and bio-MEMS
- passive and active vibration isolation systems
- magneto rheological systems
- SMA- and piezo-based materials and systems
- micro- and nano-integrated systems
- aircraft, MAV/UAV, and morphing systems
- smart sensing and signal processing for diagnostics and prognostics
- modeling, optimization, signal processing, control, and design of integrated systems
- acoustics and fluid-structure interaction.

Authors can select the session topic that best fits their work during the abstract submission process.

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Behavior and Mechanics of Multifunctional Materials XVI (SSN04)

Conference Chair: **Ryan L. Harne,** The Pennsylvania State Univ. (United States)

Conference Co-Chair: **Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (United States); **Aimy Wissa,** Univ. of Illinois at Urbana-Champaign Chapter (United States)

Program Committee: **Amir Ameli,** Washington State Univ. Tri-Cities (United States); **Gregory P. Carman,** Univ. of California, Los Angeles (United States); **Constantin Ciocanel,** Northern Arizona Univ. (United States); **Marcelo J. Dapino,** The Ohio State Univ. (United States); **Mohammad H. Elahinia,** The Univ. of Toledo (United States); **Nakhiah C. Goulbourne,** Univ. of Michigan (United States), The National Science Foundation (United States); **Darren J. Hartl,** Texas A&M Univ. (United States); **Daniel J. Inman,** Univ. of Michigan (United States); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Dimitris C. Lagoudas,** Texas A&M Univ. (United States); **Hyeong Jae Lee,** Jet Propulsion Lab. (United States); **Donald J. Leo,** The Univ. of Georgia (United States); **Jiangyu Li,** Univ. of Washington (United States); **Christopher S. Lynch,** Univ. of California, Riverside (United States); **Hani E. Naguib,** Univ. of Toronto (Canada); **William S. Oates,** Florida State Univ. (United States); **Zoubeida Ounaies,** The Pennsylvania State Univ. (United States); **Reza Rizvi,** York Univ. (United States); **Ralph C. Smith,** North Carolina State Univ. (United States); **Vishnu Baba Sundaresan,** The Ohio State Univ. (United States)

In addition to the 250-word summary abstract, authors are welcome to submit an extended abstract (approximately 2 pages long but no more than 9 pages), for review purposes.

Acceptance priority will be given to authors who submit a supplemental file of their work. The file must be a PDF to upload during the abstract submission process. The extended abstract, used for selecting the papers by session organizers, can include figures, test results, and references. The short abstract will be included in the publication that is provided to the conference attendees.

A vision for versatile and autonomous material and structural platforms motivates the research community to advance the materials science, mechanical synthesis, and multiphysics understanding of innovative multifunctional materials.

This conference will bring together researchers across disciplines to share about technical efforts aimed to design, fabricate, manufacture, and characterize novel materials and structural systems that exhibit the core functions of autonomy in engineered matter. These functions include sensory mechanisms, actuation capabilities, adaptive mechanical-material frames, decision-making functionality, and energy capture and conversion processes.

All together, this conference will foster interdisciplinary discussions on recent innovations that scrutinize the behavior and mechanics of multifunctional materials.

Topics of interest may include but are not limited to the design, modeling, and experimental evaluation of:

- sensing and actuation materials
- self-regulating and energy transduction materials
- adaptive, programmable, and cognitive materials and structures
- hybrid matter bridging engineering and biology
- manufacturing and mechanics of multifunctional materials

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Nano-, Bio-, Info-Tech Sensors and Wearable Systems (SSN05)

Conference Chair: **Jaehwan Kim,** Inha Univ. (Korea, Republic of)

Conference Co-Chairs: **Kyo D. Song,** Norfolk State Univ. (United States); **Ilkwon Oh,** KAIST (Korea, Republic of); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States)

Program Committee: **Amir Ameli,** Washington State Univ. Tri-Cities (United States); **Athanassia Athanassiou,** Istituto Italiano di Tecnologia (Italy); **Kean C. Aw,** The Univ. of Auckland (New Zealand); **Wei Chen,** Suzhou Institute of Nano-Tech and Nano-Bionics (SINANO) CAS (China); **Hidemitsu Furukawa,** Yamagata Univ. (Japan); **Srinivasan Gopalakrishnan,** Indian Institute of Science (India); **Masaru Kawakami,** Yamagata Univ. (Japan); **Ajit Khosla,** Yamagata Univ. (Japan); **Joo-Hyung Kim,** Inha Univ. (Korea, Republic of); **Kam K. Leang,** The Univ. of Utah (United States); **Yirong Lin,** The Univ. of Texas at El Paso (United States); **Hani E. Naguib,** Univ. of Toronto (Canada); **Simon Park,** Univ. of Calgary (Canada); **Steve Park,** KAIST (Korea, Republic of); **Yongrae Roh,** Kyungpook National Univ. (Korea, Republic of); **Debiprosad Roy Mahapatra,** Indian Institute of Science (India); **Ashok Srivastava,** Louisiana State Univ. (United States); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **Hiroya Tanaka,** Keio Univ. (Japan); **Tauno Vähä-Heikkilä,** VTT Technical Research Ctr. of Finland (Finland); **Vijay K. Varadan,** The Pennsylvania State Univ. (United States); **Wei-Chih Wang,** Univ. of Washington (United States); **Woon-Hong Yeo,** Georgia Institute of Technology (United States); **Hargsoon Yoon,** Norfolk State Univ. (United States); **Jianfeng Zang,** Huazhong Univ. of Science and Technology (China); **Xuanhe Zhao,** Massachusetts Institute of Technology (United States)

This conference considers new ideas, technologies, and potential applications across a wide range of disciplines critical to nano-, bio-, and info-technologies-based sensors and wearable systems, as applied to health monitoring of human and complex systems in engineering and medicine.

This year's theme focuses on emerging areas of wearable technology, Internet of Things (IoT), virtual reality and augmented reality, smart textile innovation, organic thin films and printable flex electronics, thought-controlled devices and systems, mobile wearable healthcare systems, wireless power feedback routines and devices for medical technology, smart optical materials technology, long-life micro-power systems, and thermoelectric energy conversion films and systems.

The conference aims to add the following areas to promote interdisciplinary exchange in understanding engineering systems from biological ones: nanowires, carbon nanotubes, magnetic nanotubes, organic electronics, MEMS, bioMEMS, nanostructures, nanoelectronics, microfluidics, high selectivity and sensitivity biological and chemical sensors, detection of harmful chemical and biological agents, microsensors for radioactivity, low power consumption physical and chemical sensors, security electronics, reliability and failure aspects, biomedical applications, biomimetics, fast DNA sequencing, smart drug delivery, polymer electronics, nano-optics, analytical techniques at the nanoscale, nano-assembly behavior, nano-integration, noise aspects and information technology at nanoscale, multifunctional nanosystems, and nano/bio interface.

It will also focus on advanced methods for the testing, reliability, packaging, and metrology of micro-and nano-scale materials and devices. Papers are solicited on, but not limited to, the following or related topics:

WEARABLE TECHNOLOGIES AND INTERFACING WITH INDUSTRIES

- e-textile based smart garments
- health monitoring e-bra, e-bro, and e-band aid
- monitoring health conditions with flexible wireless EEG, EOG, EMG sensors
- smart communication module with smart phone, Wi-Fi, GSM, GPRS
- panel with industries pursuing the wearable technology
- organic thin film and printable electronics
- integration of flex electronics for wearable devices
- wearable power
- smart textiles
- textile-based supercapacitors.

3D PRINTING AND SMART SENSOR SYSTEM INNOVATION

- 3D printing of materials (e.g., metal, polymer, ceramic, composites, etc.)
- Internet of Things (IoT) in 3D printing
- 3D printing in biomedical and medical applications; tissue engineering, surgery, orthopedics, healthcare
- 3D printing of nano and microsensor systems
- 3D printing for space
- 3D printing of textile garments, nanosensors and integration.

NOVEL MATERIALS AND INTEGRATION TECHNOLOGIES

- nanomaterials
- carbon materials
- 3D nanostructures
- biomaterials
- nanowires
- integration of nano-and micro-sensors with microelectronics
- integration of sensors with flexible organic electronics
- novel nanomaterials for wearable systems
- materials for flexible RFID systems.

continued➡

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

(SSN05) *continued*

SMART OPTICAL MATERIALS AND DEVICE APPLICATIONS
- field coupling techniques for control and operation
- refractive index shifters
- smart optics and active lens
- characterization methodology of smart materials
- new device concepts with smart optical materials
- bandgap energy model and restructuring
- error-free temporal and spatial tenability.

ENERGY MATERIALS AND LONG-LASTING MICRO-POWER SYSTEM
- energetic materials with quantum modification
- mobilization of deep level potential-well
- enhanced surface energy for artificial catalysis
- micro-power device concepts for long-life operation
- emerging and nascent materials for micro-power devices.

INTEGRATED NANO- AND MICRO-STRUCTURES
- smart sensors, smart actuators
- smart microsystems
- nanosystems
- drug delivery systems
- nondestructive methods for nano-engineered materials, nano-structures, and nano-devices.

REMOTE CONTROL AND COMMUNICATION
- micro-antenna, rectenna
- remote sensing
- RF MEMS
- reconfigurable antenna
- microwave and millimeter wave components and devices.

SIMULATION, MODELING, AND IT SOFTWARE
- CAD/CAM for nanosystems
- design tools for integrated MEMS and NEMS
- electro-thermo-mechanical modeling
- microfluidics modeling
- virtual and augmented reality.

APPLICATIONS IN ENGINEERING AND MEDICINE
- thermoelectric energy conversion systems
- thin-film hybrid PV/thermoelectric solar panels
- biomedical
- pharmaceutical
- human-computer interactions
- brain-computer interface; brain-machine interface
- electroactive-polymer-based artificial muscles
- surgical procedures and nanosystems implementation
- wireless power feedback routines and devices for medical applications.

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Submit your abstract today: **www.spie.org/ssncall**

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems (SSN06)

Conference Chair: **Daniele Zonta,** Univ. degli Studi di Trento (Italy), Univ. of Strathclyde (United Kingdom)

Conference Co-Chairs: **Branko Glisic,** Princeton Univ. (United States); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Program Committee: **Hiroshi Asanuma,** Chiba Univ. (Japan); **Chih-Chen Chang,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Alison B. Flatau,** Univ. of Maryland, College Park (United States); **Faramarz Gordaninejad,** Univ. of Nevada, Reno (United States); **Benjamin L. Grisso,** Naval Surface Warfare Ctr. Carderock Div. (United States); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Jung-Wuk Hong,** KAIST (Korea, Republic of); **Neil A. Hoult,** Queen's Univ. (Canada); **Haiying Huang,** The Univ. of Texas at Arlington (United States); **Ying Huang,** North Dakota State Univ. (United States); **Mohammad Reza Jahanshahi,** Purdue Univ. (United States); **Gi-Woo Kim,** Inha Univ. (Korea, Republic of); **Jeong-Tae Kim,** Pukyong National Univ. (Korea, Republic of); **Simon Laflamme,** Iowa State Univ. (United States); **Hui Li,** Harbin Institute of Technology (China); **Jian Li,** The Univ. of Kansas (United States); **Suyi Li,** Clemson Univ. (United States); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Maria Pina Limongelli,** Politecnico di Milano (Italy); **Chin-Hsiung Loh,** National Taiwan Univ. (Taiwan); **Kenneth J. Loh,** Univ. of California, San Diego (United States); **Theodore E. Matikas,** Univ. of Ioannina (Greece); **Norbert G. Meyendorf,** Univ. of Dayton (United States); **Akira Mita,** Keio Univ. (Japan); **Isabel M. Morris,** New Mexico Institute of Mining and Technology (United States); **Rebecca Napolitano,** The Pennsylvania State Univ. (United States); **Ching Tai (Alex) Ng,** The Univ. of Adelaide (Australia); **Yi-Qing Ni,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Hae Young Noh,** Carnegie Mellon Univ. (United States); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States); **Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States); **Liming W. Salvino,** Office of Naval Research (Singapore); **Fabio Semperlotti,** Purdue Univ. (United States); **Wei Song,** The Univ. of Alabama (United States); **Wieslaw J. Staszewski,** AGH Univ. of Science and Technology (Poland); **R. Andrew Swartz,** Michigan Technological Univ. (United States); **Tyler N. Tallman,** Purdue Univ. (United States); **Jiong Tang,** Univ. of Connecticut (United States); **Marco Torbol,** Ulsan National Institute of Science and Technology (Korea, Republic of); **Enrico Tubaldi,** Univ. of Strathclyde (United Kingdom); **Ming L. Wang,** Northeastern Univ. (United States); **Xingwei Wang,** Univ. of Massachusetts Lowell (United States); **Ya Wang,** Texas A&M Univ. (United States); **Yang Wang,** Georgia Institute of Technology (United States); **Rosalind M. Wynne,** Villanova Univ. (United States); **Fuh-Gwo Yuan,** North Carolina State Univ. (United States)

This conference requires a 500-word Review Abstract during the submission process

Advanced sensors, smart materials, and smart structures technology represent an emerging multidisciplinary field that has unlimited potential of broad engineering applications. This particular conference focuses on the new sensor technologies and phenomena that apply to the civil, mechanical, and aerospace engineering fields. To name a few, these applications include structural health monitoring (SHM), nondestructive evaluation (NDE), damage/deterioration assessment, security and emergency management, and asset management. The potential benefits of applying advanced sensors, smart materials, and smart structures technology to civil, mechanical and aerospace systems are many and they cover improved system reliability, enhanced system performance and functionality, enhanced security, decreased life cycle costs, and reduction of physical dimensions and weight.

Researchers in academia, government laboratories, and industry are making progress in advancing the state of the art of the sensor-based technologies addressed by this conference. This conference will provide a forum to bring together experts in the relevant but diverse fields to discuss recent advances and future challenges including international research collaboration.

Papers on new and emerging technologies are solicited; examples of topics of interest are given in (but not limited to) the list below:

NEW TECHNOLOGICAL ADVANCES
- machine learning
- human-centric sensing and control
- low-cost smart materials
- large-scale monitoring systems
- multifunctional sensors sensor networks and autonomous operation
- sensors for harsh and extreme environments
- sensors using wireless systems
- fiber optic sensing
- photonic, phononic, and phoxonic crystal sensors
- computer vision and image analysis techniques
- active and semi-active control systems
- wearable sensors for biomedical applications.

MODELING OF SMART MATERIALS AND SENSOR PERFORMANCE
- sensor integration with structure
- sensor behavior
- reliability investigations
- smart material response under loads and strain.

DESIGN ENGINEERING AND IMPLEMENTATION
- design/characterization/creation of multifunctional sensory systems
- smart components, devices, and sub-assemblies
- novel materials for sensing, actuation, and design

continued➡

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Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems (SSN06) *continued*

- smart systems for evaluation, detection, monitoring, and control
- sensor standardization.

INTEGRATION OF SMART SENSING SYSTEMS
- vehicle health management
- implementation of advanced technologies
- big data and cloud-based analytic
- cyberinfrastructure tools for data management and curation
- integrated asset management
- data-driven decision making
- small-scale and large-scale demonstrations
- smart infrastructure security.

INTERROGATION OF STRUCTURES
- aerospace structures, composites
- geotechnical systems, mining/oil/gas exploration and production
- ship and offshore structures
- pipelines
- civil engineering structures
- monuments of cultural heritage
- conventional, nuclear, and alternative energy systems
- transportation systems and vehicles
- chemical and biochemical systems.

SENSOR DEVELOPMENT AND APPLICATIONS
- Innovative sensor design
- Sensor calibration and validation
- Sensor optimization
- AI technology in sensor development
- Engineering applications of sensors in civil, transportation, mechanical, and aerospace engineering areas

ABSTRACTS DUE: 25 AUGUST 2021

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Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVI (SSN07)

Conference Chair: **H. Felix Wu,** U.S. Dept. of Energy (United States)

Conference Co-Chairs: **Andrew L. Gyekenyesi,** Ohio Aerospace Institute (United States); **Peter J. Shull,** The Pennsylvania State Univ. (United States); **Tzu-Yang Yu,** Univ. of Massachusetts Lowell (United States)

Program Committee: **Holger Böse,** Fraunhofer Institute for Silicate Research (ISC) (Germany); **Christopher C. Bowland,** Oak Ridge National Lab. (United States); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Chih-Hung Chiang,** Chaoyang Univ. of Technology (Taiwan); **Bill Davids,** The Univ. of Maine (United States); **Pei Dong,** George Mason University (United States); **Reinhard Ebert,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Benjamin L. Ervin,** MIT Lincoln Lab. (United States); **Jung-Wuk Hong,** KAIST (Korea, Republic of); **Tsung-Chin Hou,** National Cheng Kung Univ. (Taiwan); **Dryver R. Huston,** The Univ. of Vermont (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Denvid Lau,** City Univ. of Hong Kong (Hong Kong, China); **Kenneth J. Loh,** Univ. of California, San Diego (United States); **Jerome P. Lynch,** Univ. of Michigan (United States); **Oliver J. Myers,** Clemson Univ. (United States); **Piotr Omenzetter,** Univ. of Aberdeen (United Kingdom); **Didem Ozevin,** Univ. of Illinois at Chicago (United States); **Akira Sasamoto,** National Institute of Advanced Industrial Science and Technology (Japan); **Caesar Singh,** U.S. Dept. of Transportation (United States); **Yu-Min Su,** National Kaohsiung Univ. of Applied Sciences (Taiwan); **Jiong Tang,** Univ. of Connecticut (United States); **Edward Zhou,** AECOM (United States)

This conference creates an international forum to address the current state-of-the-art technologies in nondestructive characterization and monitoring of advanced materials and aerospace components, as well as technical challenges concerning infrastructure asset management including commercial/public transportation and public utilities. The inspection technologies encompass a cradle-to-grave timeline allowing for the monitoring of the fabrication process (e.g., advanced/additive manufacturing), assessing initial component quality, in-situ monitoring and system health, as well as evaluating repairs/retrofits. The overall theme focuses on identifying and fostering improvements and new innovations regarding theory, hardware, implementation strategies, interpretation of data/results, and automation. This conference will provide a medium for communication and collaborations among engineers and scientists in the following areas:

- SHM/NDE of advanced materials (e.g., refractories, polymer matrix composites, metal matrix composites, ceramic matrix composites, nanocomposites, foams, high-performance alloys)
- development of NDE and SHM tools for automotive and aerospace components/systems
- multifunctional structural composites and energy storage systems for automotive applications
- multi-modal SHM/NDE techniques and applications
- innovative in-line manufacturing of composites enabled by machine learning and artificial intelligence
- life management and system analysis/design methodologies for diagnostics and prognostics of materials and structures
- civil infrastructure management for roads, highways, rail systems, bridges, buildings, water systems, dams, levees, pipelines, tunnels, chimneys, and power generation (e.g., natural gas, coal, nuclear, wind, hydropower, geothermal, solar, etc.)
- SHM/NDE and material characterization of energy infrastructure (electrical grids, power transmission, pipeline distribution systems, nuclear power plants, and/or oil and gas exploration)
- SHM/NDE sensor development, MEMS/NEMS, intelligent transportation systems, complex cyber-physical systems via control, networking, verification, and real-time systems to protect infrastructure including aeronautics, civil, materials, energy, automotive, medical, chemical, manufacturing, and agriculture
- continuous and life-cycle monitoring, predictive modeling, aging mechanisms for aeronautical, civil, mechanical, and manufacturing engineering structures
- novel materials and sensors/networks for structural repair/retrofit for cost mitigation, improving measurement accuracy, reliability, and safety
- SHM and NDE for additive manufacturing processes and finished parts
- modeling, simulation, and technology development at various scales ranging from nano- and micro- scale to super-large structures
- signal/image processing, data fusion, data mining, signal/image denoising, artificial intelligence, and deep learning for SHM/NDE
- augmented reality (AR), Virtual reality (VR), and mixed reality (MR) for SHM/NDE
- automated and autonomous SHM/NDE using unmanned aerial vehicles/systems (UAV/S) and unmanned underwater vehicles (UUV); urban air mobility systems
- SHM/NDE technologies and applications in homeland security and counterterrorism
- mitigation of man-made and natural hazards in physical infrastructure including buildings, highway infrastructure, bridges, dams, levees, and nuclear power plants
- NDE standards, codes, regulations, and acceptance criteria
- NDE for self-healing, self-sensing materials, structures, and systems
- big data for vehicle health monitoring and redesign of structural components based on sensor data

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Health Monitoring of Structural and Biological Systems XVI (SSN08)

Conference Chair: **Paul Fromme,** Univ. College London (United Kingdom)

Conference Co-Chair: **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Program Committee: **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); **Hadi Fekrmandi,** South Dakota School of Mines and Technology (United States); **Victor Giurgiutiu,** Univ. of South Carolina (United States); **Srinivasan Gopalakrishnan,** Indian Institute of Science (India); **Mohammad Hadi Hafezi,** Oakland Univ. (United States); **Guoliang Huang,** Univ. of Missouri (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States); **Sridhar Krishnaswamy,** Northwestern Univ. (United States); **Tribikram Kundu,** The Univ. of Arizona (United States); **Francesco Lanza di Scalea,** Univ. of California, San Diego (United States); **Zhu Mao,** Univ. of Massachusetts Lowell (United States); **Ernesto Monaco,** Univ. degli Studi di Napoli Federico II (Italy); **Christopher Niezrecki,** Univ. of Massachusetts Lowell (United States); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Xinlin Qing,** Xiamen Univ. (China); **Henrique L. Reis,** Univ. of Illinois at Urbana-Champaign (United States); **Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States); **Alessandro Sabato,** Univ. of Massachusetts Lowell (United States); **Christoph Schaal,** California State Univ., Northridge (United States); **Fabio Semperlotti,** Purdue Univ. (United States); **Yanfeng Shen,** Shanghai Jiao Tong Univ. (China); **Hoon Sohn,** KAIST (Korea, Republic of); **Wieslaw J. Staszewski,** AGH Univ. of Science and Technology (Poland); **Tadeusz Stepinski,** AGH Univ. of Science and Technology (Poland); **Tadeusz Uhl,** AGH Univ. of Science and Technology (Poland); **Wei-Chih Wang,** Univ. of Washington (United States); **Yue-Sheng Wang,** Beijing Jiaotong Univ. (China); **Jinkyu Yang,** Univ. of Washington (United States); **Lingyu Yu,** Univ. of South Carolina (United States); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States)

Since 2001, the conference on Health Monitoring of Structural and Biological Systems has brought together engineers and scientists to exchange ideas and update research findings. The emphasis of this conference is to showcase that non-destructive sensing, sensor array design, signal acquisition and transmission, signal processing, and energy harvesting are integral parts of health monitoring for both structural and biological systems.

The scope of the 2022 conference will be further expanded based on the success of previous years, including emerging and future methods of structural health monitoring: modelling, sensors, signal processing, artificial intelligence, internet of things, diagnosis and prognosis, inspection, system integrity and applications of engineering and biological materials and structures.

Papers are invited on topics including, but not limited to:

ENGINEERING:

- structural health monitoring (SHM)
- guided waves
- nonlinear ultrasonic and guided wave techniques
- elastic and acoustic metamaterials
- emerging and futuristic techniques
- advanced modelling (FEM, FDM, BEM, semi-analytical methods, DPSM, peri-ultrasound, etc.)
- aging, new, and future aircraft structures
- aircraft and aerospace hardware
- civil infrastructure (bridge, buildings, roads, pipelines, etc.)
- energy industry (nuclear, conventional, etc.)
- renewable energy technology (wind, solar, offshore, wave power)
- composites
- additive manufacturing
- sensors and sensor networks
- signal and data processing, imaging
- internet of things (IoT), big data
- artificial intelligence-driven SHM
- energy harvesting
- microelectric and electronic components
- applications of MEMS and integrated or embedded multifunctional sensors
- robotics, automation, and smart structures (e.g., crawlers, wireless, multimedia, internet)
- real-time sensing and testing at extreme environments (temperatures, pressure and vacuum, radiation hazards, toxic and hazardous conditions, etc.)

BIO-DIAGNOSTIC:

- biomaterials and biostructures (e.g., implants, cells, bones, tissues)
- biologically inspired technologies
- medical imaging methods (MRI, CAT scan, ultrasound, radiography and others)
- biomedical smart structures and devices (e.g. smart materials, structures, micro/nanofabrication and applications in biomedical monitoring and diagnosis)
- additive manufactured implants and devices
- NEMS/MEMS and emerging/futuristic techniques.

SPECIAL SESSIONS FOR 2022

RECENT ADVANCES IN NONLINEAR ULTRASONICS-BASED NDE AND SHM

It is of great significance but also a huge challenge to identify small-scale damage in engineering structures in a timely or real-time manner. Motivated by this, nonlinear ultrasonics has been a core of intensive research over the years, and NDE and SHM approaches by exploiting the nonlinear attributes of ultrasonic waves have been deployed in a diversity of fashion. This Special Session welcomes papers reporting on recent advances and breakthroughs in this field, reviewing the state of the art of nonlinear ultrasonics-based NDE and SHM, and bridging academic endeavors and industrial needs. Questions about the session can be forwarded to Prof. Zhongqing Su (zhongqing.su@polyu.edu.hk).

OPTICAL SENSING AND MACHINE LEARNING FOR SHM AND NDE

Advancements in digital cameras and image-processing algorithms have made optical sensing methods attractive tools for structural health monitoring (SHM) and non-destructive evaluation (NDE). The session serves as a platform to explore recent theoretical and experimental efforts in structural dynamics and health monitoring using optical sensing, computer-vision, and machine learning techniques. We invite researchers to contribute original research, case studies, industrial applications, and advancements over the current state of the art. Potential topics include:

- computer-vision-based SHM systems for engineering structures
- optical sensing-based displacement and vibration measurement, system identification, and modal analysis
- improvement of optical sensing and image processing in structural identification
- digital image correlation in the context of SHM and NDE
- image processing and multi-domain data integration for structural and biological systems health monitoring
- photogrammetric measurements in structural and biological systems
- machine learning/deep learning for SHM and NDE
- convolutional neural networks for computer-vision SHM and NDE.

Questions about this session can be forwarded to Dr. Zhu Mao (Zhu_Mao@uml.edu) and Dr. Alessandro Sabato (Alessandro_Sabato@uml.edu).

GUIDED WAVES FOR SHM AND NDE

Guided ultrasonic waves allow for the efficient monitoring of large structures, as long propagation distances and inspection of difficult-to-access areas can be achieved. This has been successfully employed for the Nondestructive Testing (NDT) and Structural Health Monitoring (SHM) of a wide range of isotropic and anisotropic structures and defect types. The special session welcomes papers based on guided wave propagation, scattering, and signal processing, reporting on recent advances, both experimental and simulation based, reviewing the state of the art of guided wave NDE and SHM, and bridging academic research and industrial applications. Questions about the session can be forwarded to Prof. Paul Fromme (p.fromme@ucl.ac.uk).

PHONONIC CRYSTALS AND ACOUSTIC/ELASTIC METAMATERIALS

This session will bring together researchers and engineers from universities, government laboratories and industry to discuss research ideas and recent findings in the field. Potential topics include, but are not limited to:

- Acoustic/elastic metamaterials, phononic crystals, architected materials
- Topological insulators and metamaterials
- Active or programmable metamaterials, Active metastructures
- Linear/nonlinear wave propagation in periodic structures
- Multi-physical and multi-scale mechanics of periodic media across time and length scale

Questions about the session can be forwarded to Prof. Guoliang Huang (huangg@missouri.edu).

Session Organizing Committee:

- Guoliang Huang, University of Missouri (Chair)
- Mostafa Nouh, University at Buffalo, SUNY
- Fabio Semperlotti, Purdue University
- Jinkyu "JK" Yang, University of Washington

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NDE 4.0, Predictive Maintenance, and Communication and Energy Systems in a Globally Networked World (SSN09)

Conference Chair: **Norbert G. Meyendorf,** Fraunhofer IKTS (Germany), Univ. of Dayton (United States)

Conference Co-Chairs: **Saman Farhangdoust,** Florida International Univ. (United States); **Christopher Niezrecki,** Univ. of Massachusetts Lowell (United States)

Program Committee: **Ali Abdul-Aziz,** Kent State Univ. (United States); **Steven R. Anton,** Tennessee Technological Univ. (United States); **Nicolas P. Avdelidis,** Cranfield Univ. (United Kingdom); **Nasrin Azari,** Floodlight Software (United States); **Marija Bertovic,** Federal Institute for Materials Research and Testing (BAM) (Germany); **Leonard J. Bond,** Iowa State Univ. of Science and Technology (United States); **Frank Brueckner,** Fraunhofer IWS (Germany); **Marcelo Dapino,** The Ohio State Univ. (United States); **Kerrie Gath,** Consultant (United States); **Sven Gondrom-Linke,** Volume Graphics GmbH (Germany); **Nathan Ida,** The Univ. of Akron (United States); **Daniel Kanzler,** Applied Validation of NDT (Germany); **Amrita Kumar,** Acellent Technologies, Inc. (United States); **Jung-Ryul Lee,** KAIST (Korea, Republic of); **Zheng Liu,** The Univ. of British Columbia Okanagan (Canada); **Theodore E. Matikas,** Univ. of Ioannina (Greece); **Michele Meo,** Univ. of Bath (United Kingdom); **Alexander Michaelis,** Fraunhofer IKTS (Germany); **Piotr Omenzetter,** Univ. of Aberdeen (United Kingdom); **Martin Oppermann,** TU Dresden, Center of Microtechnical Manufacturing (Germany); **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Kara J. Peters,** North Carolina State Univ. (United States); **Florian Raddatz,** DLR (Germany); **W. Lance Richards,** Armstrong Flight Research Ctr. (United States); **Sascha Schieke,** Molex, LLC (United States); **Lennart Schulenburg,** VisiConsult X-ray Systems & Solutions GmbH (Germany); **Stefano Sfarra,** Univ. of L'Aquila (Italy); **Ripi Singh,** Inspiring Next (United States); **Chris Udell,** Voliro Airborne Robotics (Switzerland); **Bernd Valeske,** Fraunhofer IZFP (Germany); **Johannes Vrana,** Vrana GmbH (Germany); **H. Felix Wu,** U.S. Dept. of Energy (United States); **Christian Wunderlich,** Fraunhofer IKTS (Germany); **Yuan Yao,** National Tsing Hua Univ. (Taiwan); **Dong-Jin Yoon,** Korea Research Institute of Standards and Science (Korea, Republic of)

"Industry 4.0", "Smart Factory", "Digital Twins", the "Internet of Things" are all terms used to indicate a transition toward a smart, networked, and autonomous industrial ecosystem. We are in a quickly evolving industrial revolution that is made possible by the increasing number of "Internet of Things" (IoT) devices for manufacturing, large data acquisition, energy storage, and cloud-based optimized planning and communication. This new machine to machine ecosystem is resulting in an increased efficiency in manufacturing and logistics.

Industrial machinery infrastructure equipped with smart sensors, actuators, and processors is working in local or global networks. This is enabling the monitoring and optimizing of manufacturing facilities with a limited need for human intervention. Simultaneously, there is a paradigm shift in the way components are being manufactured and designed. Industry 4.0 allows producing complex individual components tailored to the needs of the consumers.

Advances in additive manufacturing, including new advances in printer operation and novel materials designed for additive technologies, are enabling a plethora of new applications of embedded smart materials and structures. Utilization of artificial intelligence such as neural networks is one potential avenue. Structural Health Monitoring (SHM) and Nondestructive Evaluation (NDE) devices will be incorporated as part of the initial design of a component and manufactured as one with multi-material printers. The component behavior can be continuously monitored to optimize maintenance and improve the design. Incorporating IoT with embedded smart sensors, processors, and memory modules allows real time information sharing across systems and networks resulting in increased efficiency, economic, and environmental benefits.

Municipalities are utilizing IoT devices to digitally transform infrastructure to improve environmental, financial, and social aspects of urban life. This is accomplished by harnessing data from vast networks of connected cameras, vehicles, and smart infrastructure. The integration of information and communication technology with physical devices connected to the IoT for networking to optimize the efficiency of city operations and services and connect to citizens. The machine to machine ecosystem will continue to expand throughout our cities using the internet for connecting us through our devices and furthering the use of NDE, SHM, blockchain, neural networks, AI, and cybersecurity.

Major topics of interest are:

NDE 4.0

- NDE 4.0 the next generation of NDE (integration of NDE into cyber controlled processes, digital twin, industrial IoT, data security/sovereignty, semantic interoperability, production monitoring and reliability)
- smart sensing and predictive (smart) maintenance
- value proposition of NDE 4.0
- remote NDE and automation for robotic inspection solutions, inspection by UAV systems
- NDE modelling and NDE digital twins
- industry 4.0 for NDE (AI/cloud/AR/blockchain/5G)
- human factors and considerations including humans for NDE 4.0
- NDE using smartphones and tablets, NDE for everybody
- NDE for additive manufacturing
- NDE for electronic packaging, detection of counterfeit components, flexible electronics
- additive manufacturing as an enabler for sensor integration
- multifunctional materials utilized in NDE

DATA ACQUISITION, DATA HANDLING, COMMUNICATION AND SMART SENSOR SYSTEMS

- sensors, adaptive structures, and artificial intelligence
- data collection from embedded sensors for NDE and SHM, multi sensor data fusion
- real time monitoring of the smart factory systems and subsystems
- predictive and prescriptive (smart) maintenance
- cloud-based data integration, communication, and planning
- big data management and processing
- IoT, cybersecurity and protection against attacks by hackers, enhancing NDE for cybersecurity
- revision-safe data formats and storage
- decision making by artificial intelligence, application of neural networks

SMART MATERIALS AND NDE FOR ENERGY SYSTEM AND SMART CITIES

- smart cities and intelligent information and transportation ecosystem enablers
- energy generation and harvesting, photonic energy harvesting, or acoustic/vibration energy harvesting
- green energy systems: wind, hydro power, solar, batteries, fuel cells
- energy storage technologies: chemical, electrical, thermal, kinetic, and gravity energy
- development and application of smart materials for energy systems
- NDE of energy systems (NDE and monitoring of energy storage)
- energy transmission systems, energy distribution systems; wired, wireless, optical, and other techniques

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Satisfy your inner urbanite at downtown Long Beach's vibrant waterfront scene. From eclectic neighborhoods to sandy beaches, you'll find Long Beach to be an urban waterside playground. Visit museums, tour a 1930s ocean liner and watch sea lions at Long Beach's aquarium. Spot dolphins at play on your way to Catalina Island. Or take a short jaunt to Disneyland, Universal Studios Hollywood, or other Southern California attractions.

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Housing opens this fall.

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Registration will open this coming fall

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- Author(s) information
- 250-word abstract for technical review
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- Keywords used in search for your paper (optional)
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