EVENT OVERVIEW

SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION

17–20 MARCH 2025 | SHERATON VANCOUVER WALL CENTRE | VANCOUVER, B.C., CANADA

EVENT OVERVIEW

SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION

THE MEETING FOR ADVANCED MATERIALS AND SENSOR SYSTEMS

Cutting-Edge Research

Close-Knit Community

17–20 March 2025
Sheraton Vancouver Wall Centre
Vancouver, B.C., Canada

Download the SPIE Conference and Exhibition App

Enhance your SPIE conference experience

Download the mobile app to enrich your meeting experience. View events, exhibitors and connect with participants all in the palm of your hand. The app is free, easy to use, and loaded with features designed for planning and connecting on the go.

Make the most of your time with these app features:

» Real-time program updates
» Customize your schedule
» Organize your meeting notes
» Add new connections to your contacts
» Plan exhibitor visits
» Navigate the venue
» Bookmark specific research
» Create meeting reports
» And a whole lot more.

Get the App

Explore the meeting with the SPIE App

CONTENTS

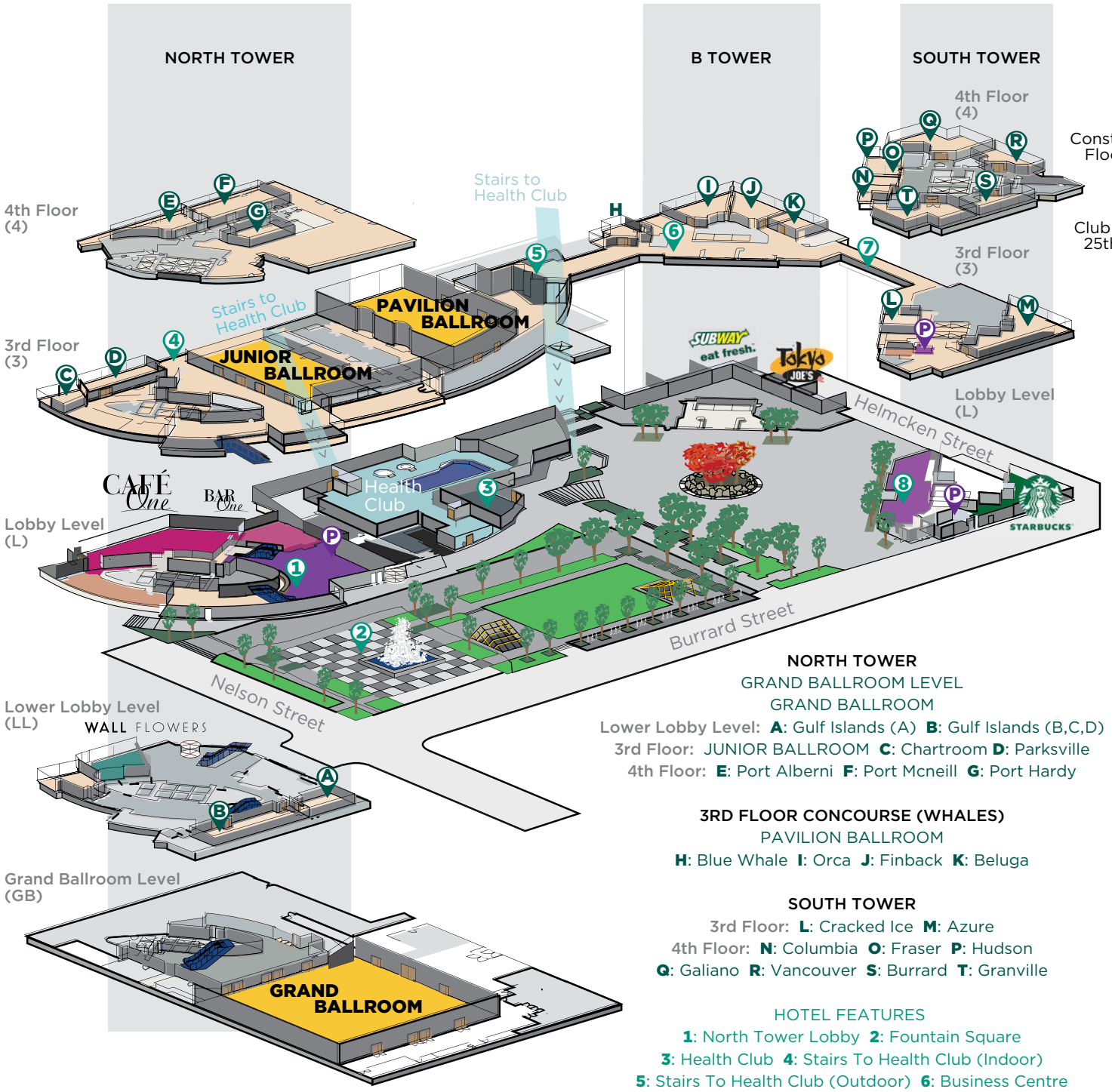
SPIE.

SPIE is the international society for optics and photonics. We bring engineers, scientists, students, and business professionals together to advance light-based science and technology. Over the past five years, we have invested more than $25 million in the international optics community through our advocacy and support, including scholarships, educational resources, travel grants, endowed gifts, and public-policy development.

SPIE International Headquarters: PO Box 10, Bellingham, WA 98227-0010 USA • Tel: +1 360 676 3290 • customerservice@spie.org • www.SPIE.org
SPIE Europe Offices: 2 Alexandra Gate, Ffordd Pengam, Cardiff, CF24 2SA UK • Tel: +44 29 2089 4747 • info@spieeurope.org • www.SPIE.org

spie.org/ssnde
#SPIEsmart

SHERATON VANCOUVER WALL CENTRE



NORTH TOWER
GRAND BALLROOM LEVEL
GRAND BALLROOM
Lower Lobby Level: **A**: Gulf Islands (A) **B**: Gulf Islands (B,C,D)
3rd Floor: JUNIOR BALLROOM **C**: Chartroom **D**: Parksville
4th Floor: **E**: Port Alberni **F**: Port Mcneill **G**: Port Hardy

3RD FLOOR CONCOURSE (WHALES)
PAVILION BALLROOM
H: Blue Whale **I**: Orca **J**: Finback **K**: Beluga

SOUTH TOWER
3rd Floor: **L**: Cracked Ice **M**: Azure
4th Floor: **N**: Columbia **O**: Fraser **P**: Hudson
Q: Galiano **R**: Vancouver **S**: Burrard **T**: Granville

HOTEL FEATURES
1: North Tower Lobby **2**: Fountain Square
3: Health Club **4**: Stairs To Health Club (Indoor)
5: Stairs To Health Club (Outdoor) **6**: Business Centre
7: 3rd Floor Concourse Skywalk **8**: South Tower Lobby

NORTH TOWER

GRAND BALLROOM LEVEL

Welcome to the neighbourhood!

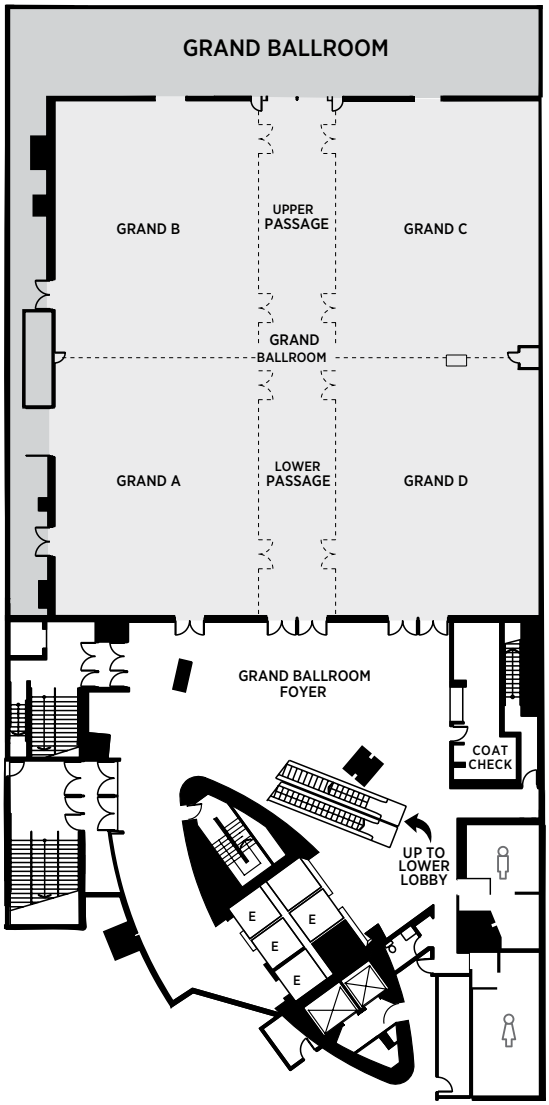
Don't miss what this location has to offer from the many dining options to area discounts, regional history and local attractions.

Flavourhoods of Vancouver:
https://www.destinationvancouver.com/explore-vancouver/places-to-eat

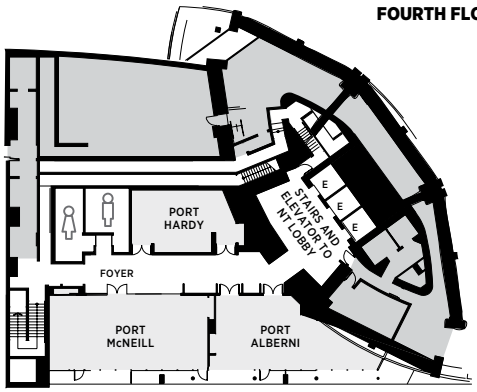
Yaletown – minutes' walk from the venue:
https://www.destinationvancouver.com/neighbourhoods/yaletown

Vancouver Tourist attractions:
https://www.destinationvancouver.com/explore-vancouver/things-to-do

Perks Pass for local merchant discounts:
https://www.destinationvancouver.com/meeting-professionals/services/destination-perks-pass

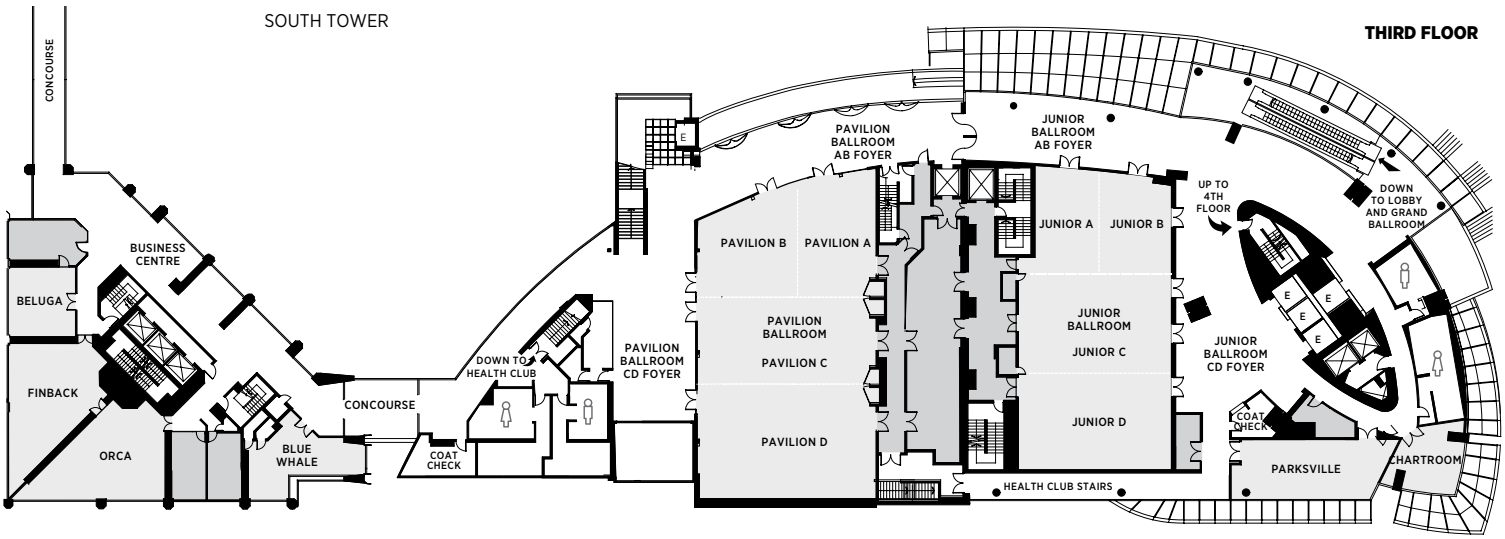


FOURTH FLOOR



SOUTH TOWER

THIRD FLOOR



PLENARY PRESENTATIONS

Smart Structures + NDE plenary sessions feature presentations from a wide range of leaders in the field, with focus on developing research and visions of the future of sensors and materials technologies.

Monday Plenary

17 March 2025 • 8:15 AM - 10:00 AM
Pavilion Ballroom C/D

8:15 AM - 8:20 AM:

Welcome and opening remarks

8:20 AM - 8:30 AM:

2025 SSM Lifetime Achievement Award presented to Branko Glišić, Princeton Univ. (USA)

2025 NDE Lifetime Achievement Award presented to Cliff Lissenden, The Pennsylvania State Univ. (USA)

8:30 AM - 9:15 AM:

Elastocalorics: cool into the future?!

Stefan Seelecke
Saarland Univ. (Germany)

Elastocalorics is an innovative, disruptive heating and cooling technology that—due to its high energy efficiency and absolute climate friendliness—has been declared as the most promising alternative to existing vapor compression technologies by the EU Commission and the US Department of Energy. The lecture gives an overview of preliminary experimental investigations to identify thermodynamically optimized processes as well as the development of different demonstrator concepts as a blueprint for future heating and cooling machines.

9:15 AM - 10:00 AM:

Modeling embodied carbon emissions in U.S. building stock

Ming Hu
Univ. of Notre Dame (USA)

The construction industry is a major contributor to environmental harm through carbon emissions. While there are efforts to lower emissions at the level of individual buildings, broader urban policies can unintentionally increase overall city emissions due to limited urban-scale data and complex, interconnected factors. This research presents a structured framework to develop high-resolution data on urban building stocks, paired with an advanced simulation model. The model quantifies the carbon impacts of different urban planning strategies, helping to identify optimal approaches for mitigating environmental effects. By focusing on the Chicago metropolitan area, the study validates this methodology and explores potential long-term CO_2 emissions under various development scenarios. The study simulated over one million buildings and 350,000 iterations, generating a platform with tailored visualizations. Key findings highlight the significant role of building lifespans on urban carbon emissions, revealing that buildings with a 50-year lifespan produce three times more CO_2 than those with an 80-year lifespan.

Tuesday Plenary

18 March 2025 • 8:15 AM - 10:00 AM
Pavilion Ballroom C/D

8:15 AM - 8:30 AM:

Welcome and opening remarks

SPIE Fellow recognition

8:30 AM - 9:15 AM:

Smart lightweighting of vehicle structures

Marcelo Dapino
The Ohio State Univ. (USA)

This presentation focuses on the lightweighting of vehicle structures by means of two mechanisms. One mechanism is the functionalization of structures through the incorporation of sensors, actuators, and energy harvesting systems based on piezoelectrics and other active materials. The other revolves around advanced manufacturing to enable the integration of carbon fiber into metallic vehicle structures. We have made significant progress toward the functionalization and multi-material integration of vehicle structures through the use of ultrasonic additive manufacturing (UAM), a solid-state metal 3D printing process that allows for seamless joining, embedding, and integration of structural metals, organic polymers, shape memory materials, ceramics, electronics, and high-value components. UAM uses high-power piezoelectric transducers to weld metal foils additively, encapsulate high-value materials into metal structures, and join dissimilar materials. The research activities discussed here are conducted within the Smart Vehicle Concepts Center, a graduated NSF IUCRC that was established to accelerate the transition of advanced materials from the laboratory to the mobility industry.

9:15 AM - 10:00 AM:

Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves

John D. W. Madden
The Univ. of British Columbia (Canada)

Mechanoreceptors in the fingers enable incredible sensitivity and dexterity. We are developing two simple technologies intended to help machines and medical devices detect their surroundings. The first employs capacitive sensors to detect normal forces, shear and proximity. With a dielectric made of elastomer pillars, these are highly compliant, sensitive to sub-kilopascal level stresses, and operate into the megapascals. An array is implemented in a 'smart' roller to record pressure distribution and defects in automated carbon fiber placement. A skin is applied to a robot hand, and a mat is being developed for pressure injury prevention. Using the piezoionic effect, in which pressure driven ion motion creates currents in hydrogels and conducting polymers, we explore a sensing technology that directly connects to the nervous system.

Wednesday Plenary

19 March 2025 • 8:15 AM - 10:00 AM
Pavilion Ballroom C/D

8:15 AM - 8:30 AM:

Welcome and opening remarks

EAP-in-Action Demonstration Awards
Health Monitoring of Structural and Biological Systems Best Student Paper Award

8:30 AM - 9:15 AM:

Structural health monitoring in extreme environments: innovations in sensor technology and digital integration

Didem Ozevin
Univ. of Illinois Chicago (USA)

Real-time monitoring of critical infrastructure in extreme environments—such as high temperatures, radiation exposure, and space constraints—requires highly durable sensors capable of operating reliably throughout the structure's service life. Rapid decision-making is also essential for implementing early warning systems to prevent failures. While structural health monitoring techniques, such as acoustic emission and guided wave ultrasonics, are well-established in conventional settings, their performance is limited under the extreme conditions found in nuclear reactors and space structures. These environments require innovative approaches to sensor development, digital modeling, and data processing. This talk will present the latest advancements in thin-film sensors designed for harsh environments and their integration into digital models, offering a new paradigm for sensor durability and data-driven monitoring.

9:15 AM - 10:00 AM:

Auxetic knot-architectured SMA wearable haptic interfaces

Ilkwon Oh
KAIST (Republic of Korea)

Wearable haptic feedback systems are designed to prioritize user comfort while delivering diverse feedback patterns for immersive interaction in virtual and augmented reality environments. In pursuit of these objectives, a novel multimodal wearable haptic auxetic fabric (WHAF) has been developed, utilizing shape-memory alloy wires structured into an auxetic design. This advanced configuration allows the fabric to expand and contract in three dimensions, providing superior adaptability to various body shapes and sizes. Additionally, the fabric is coated with a microscale layer of Parylene, which creates electrically distinct zones that enable localized actuation, allowing for the conveyance of complex spatiotemporal tactile feedback. Depending on the area of the body where the WHAF is applied, it delivers either cutaneous or kinesthetic feedback, enhancing its functionality as a multimodal interface. When worn on the forearm, for example, it intuitively provides spatiotemporal information for hands-free navigation or teleoperation in virtual environments. When applied to the elbow, it aids users in achieving specific movements, such as guided elbow flexion, functioning akin to a personalized exercise assistant.

Thursday Plenary

20 March 2025 • 8:15 AM - 10:00 AM
Pavilion Ballroom C/D

8:15 AM - 8:30 AM:

Welcome and opening remarks

Craig F. Bohren Best Student Presentation Award

8:30 AM - 9:15 AM:

The use of detection theory to inform decision making in SHM/NDE

Michael Todd
Univ. of California, San Diego (USA)

Detection theory, developed during the era of radar imaging, is a method to discriminate among information-bearing patterns in data. It is fundamentally rooted in hypothesis testing. This presentation introduces the two general approaches to detection theory—Neyman-Pearson and Bayesian—and applies them to some applications in SHM/NDE. The generalization of Bayesian detection theory is then applied to optimal SHM/NDE system design.

9:15 AM - 10:00 AM:

Active vibration control of large, optical space structures

Steven Griffin
Boeing LTS Inc. (USA)

In the late 1990's, large, optical space structures were a hot topic. The astronomical community was planning the next big space telescopes after the success of the Hubble telescope, the Strategic Defense Initiative was exploring a Space-Based LASER for missile defense and other large, space telescopes were the subject of government and astronomical organizations. Common to all of these applications was the desire for a stiff telescope structure that had significant vibration damping. Since these two requirements are usually inversely related, the idea of incorporating smart structures using active damping and piezoceramic sensors and actuators became the subject of a large research effort at Air Force Research Lab—Advanced Composites with Embedded Sensors and Actuators.

25TH ANNUAL EAP-IN-ACTION SESSION AND DEMONSTRATION

The EAP-in-Action session has shared advances through technical demonstrations for over 20 years. Attendees can see materials in action and see the latest technologies showcased each year.

17 March 2025 • 4:30 PM - 5:45 PM | Pavilion Ballroom C/D

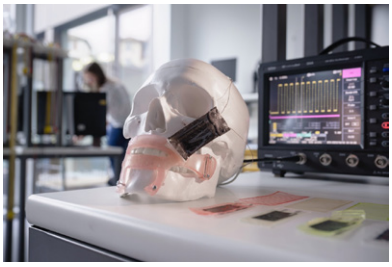
The EAP-in-Action Session and Demonstration is part of the Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025 conference.

This session highlights some of the latest capabilities and applications of Electro-active Polymers (EAP) materials where the attendees are shown demonstrations of these materials in action. Attendees interact directly with technology developers and are given a "hands-on" experience with this emerging technology. The first Human/EAP-Robot Arm Wrestling Contest was held during this session of the 2005 EAPAD conference.

Session Chair:

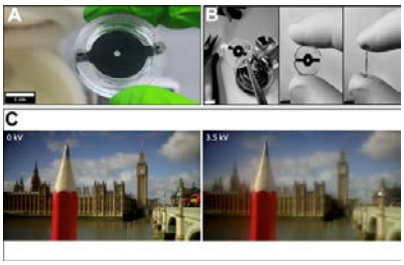
Iain Anderson
The Univ. of Auckland (New Zealand)

EAP DEMONSTRATIONS



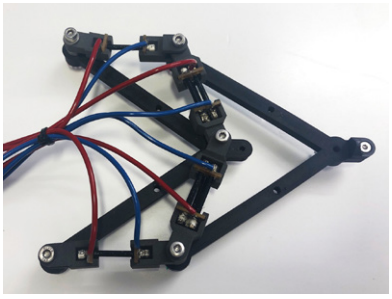
Dielectric elastomer actuators (DEAs) for the restoration of facial movements

Stefania Konstantinidi, Simon Holzer, Yoan Civet, and **Yves Perriard,** Ecole Polytechnique Fédérale de Lausanne (EPFL) (Switzerland)



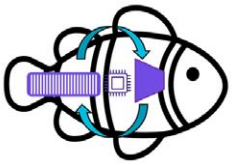
Locomoting DE-tensegrity soft-robot

Julian Kunze, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)



Sensitive and robust Tactile Fingertip™ technology for humanoid hands

Lenore Rasmussen and **Calum Briggs,** Ras Labs., Inc. (USA)



Stretch, release, and powered: silicone rubber-based batteries

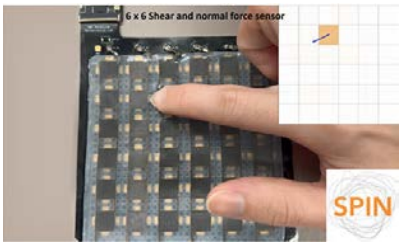
Saul Utrera-Barrios, Christopher Daniel Woolridge, Romisa Fakhari, and **Anne Ladegaard Skov,** Danish Polymer Ctr., Technical Univ. of Denmark (Denmark)

The Circle: a thin elastomeric tunable lens with large focal range

Giacomo Sasso, Queen Mary Univ. of London (United Kingdom) and Univ. degli Studi di Firenze (Italy), **Stephen Remillard,** North Seattle Community College (USA), **James J. C. Busfield,** Queen Mary Univ. of London (United Kingdom), and **Federico Carpi,** Univ. degli Studi di Firenze (Italy)

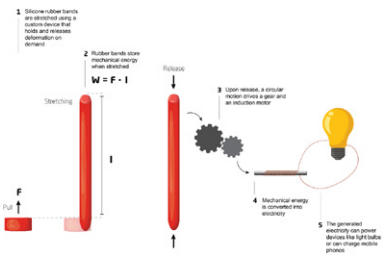
Electroactive polymer powered bioinspired aquatic drones

Arne Bruns, Robin Millward Cooney, Iain A. Anderson, Biomimetics Lab, Univ. of Auckland (New Zealand), and **Sina Martin,** Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany)



Sensing rollers, robot skin, and active socks

Xiulun Yin, Sukhneet Dhillon, Charles Picciotto, Nima Bakshi, Chrys Morton, Ying Li, Jian Gao, Adriana Cowan, Rafaela Zamataro, Yiman Mandy Chen, Ruth Tau, Devyani McLaren, Rubia Guerra, Preeti Vyas, Sadan Wani, Justin K.M. Wyss, Chenglong Zhang, Siying Wu, Naghmeh Zaghi, Erfan Taatizadeh, Adam T. Clare, Anoush Poursartip, Karon E. MacLean, and **John D. W. Madden,** The Univ. of British Columbia (Canada), **Ryusuke Ishizaki** and **Takeshi Ohsato,** Honda Frontier Robotics (Japan), and **Kentaro Takagi,** Toyohashi Univ. (Japan)



TECHNICAL EVENTS

Meet peers interested in the same topics and explore the latest research, hear different perspectives, and participate in engaging discussions. Reconnect with old friends and discover new partnerships.

Health Monitoring of Structural and Biological Systems Best Student Paper Session

18 March 2025 • 4:10 PM - 5:55 PM | Pavilion Ballroom A

Finalists for the Health Monitoring of Structural and Biological Systems Best Student Paper Award will present their papers and answer questions in this special session.

FINALIST PRESENTATIONS:

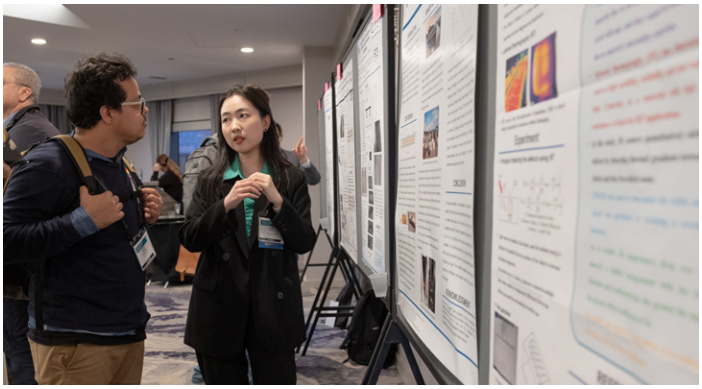
13437-15 | **Zero group velocity nonlinear ultrasonics for fatigue crack detection**
Presenter: **Runye Lu,** Shanghai Jiao Tong Univ. (China)

13437-16 | **Nonlinear guided wave-path interactions for damage detection and imaging of composite storage tanks**
Presenter: **Houfu Jiang,** Shanghai Jiao Tong Univ. (China)

13437-24 | **Non-contact non-destructive evaluation via air-coupled focused ultrasound and laser vibrometry**
Presenter: **Haoyu Fu,** Shanghai Jiao Tong Univ. (China)

13437-35| **Directional guided wave control on composite structures leveraging apodized frequency steerable acoustic transducer**
Presenter: **Shulong Zhou,** Shanghai Jiao Tong Univ. (China)

13437-62 | **Ultrasonic testing for online state estimation of prismatic Li-ion battery cells**
Presenter: **Shengyuan Zhang,** Nanyang Technological Univ. (Singapore)



Poster Session

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C

Poster Setup and Pre-Session Viewing:
Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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 session.

Poster authors, view poster presentation guidelines and set-up instructions at **http://spie.org/SS/Poster-Guidelines**

Adapting for Tomorrow: Smart and Bioinspired Materials for a Resilient Planet: Joint Panel Session with 13430 and 13433

19 March 2025 • 3:30 PM - 5:00 PM | Junior Ballroom B

This panel session aims to explore the intersection of sustainability with smart, adaptive, and biomaterials, aligning with broader initiatives to integrate sustainable practices into materials research. We recognize that addressing sustainability challenges in these cutting-edge fields requires a holistic approach that considers not only the scientific advancements but also their societal impact, environmental footprint, and economic viability. By examining smart, adaptive, and biomaterials through the lens of sustainability, we seek to foster discussions on how these innovative materials can contribute to sustainable development goals while minimizing potential negative impacts on our planet and society.

This session features invited panelists and a keynote.

PANEL ORGANIZERS:

Zoubeida Ounaies, The Pennsylvania State Univ. (USA)

Mariantonieta Gutierrez Soto, The Pennsylvania State Univ. (USA)

Akhlesh Lakhtakia, The Pennsylvania State Univ. (USA)

This panel is a joint event between the conferences on Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 and Multifunctional Materials and Structures.

Panel Keynote

Nanocellulose: a versatile building block for sustainable bio-based materials

Prof. Feng Jiang
The University of British Columbia

Professor Feng Jiang is an Associate Professor at The University of British Columbia, where he also holds a Tier II Canada Research Chair in Sustainable Functional Biomaterials. His work focuses on the sustainable isolation and modification of lignocellulosic nanomaterials and the advanced manufacturing of bio-based products for thermal, environmental, electrical, and energy applications. A prolific scholar, Professor Jiang has published over 100 articles in top-tier journals including Nature Materials, Chemical Reviews, and Advanced Materials. He has delivered more than 100 invited presentations globally and serves as an editor for Carbohydrate Polymers. His contributions have earned him numerous awards, such as the 2021 ACS CELL KINGFA Young Investigator Award and the 2024 UBC Killam Faculty Research Prize. Professor Jiang's research has resulted in 6 patents and extensive media coverage across platforms like CBC and CTV. He plays key leadership roles in the ACS CELL Division and TAPPI Nano Division.

SOCIAL AND NETWORKING EVENTS

These events provide the opportunity to network, learn, and discuss research with professionals from around the world.

SPIE Community Lounge

3rd Floor, Orca Room

Relax and recharge in the SPIE Community Lounge. Decompress with some hands-on activities during your break times.

Community Networking Lunch

17-20 March 2020 | 12:00 PM - 1:30 PM

Grand Ballroom A
Join your colleagues between technical sessions and continue the discussion over lunch provided by SPIE.

All-Symposium Welcome Reception

17 March 2025 • 6:00 PM - 7:30 PM
Sheraton Wall Centre, Grand Ballroom A

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

AWARD ANNOUNCEMENTS

2025 Lifetime Achievement Award Winners

17 March 2025 | 8:20 AM - 8:30 AM

Join us in congratulating these winners as we acknowledge their contributions to the fields of Smart Structures and Materials and Nondestructive Evaluation and Structural Health Monitoring.

Smart Structures and Materials (SSM) Lifetime Achievement Award

Branko Glišić
Princeton Univ. (USA)

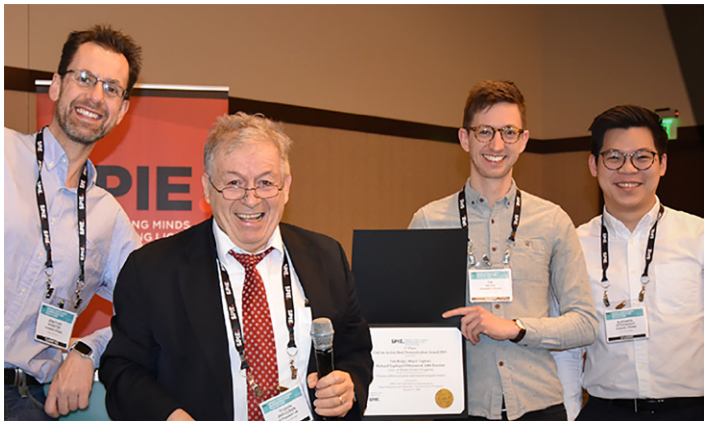
Nondestructive Evaluation (NDE) Lifetime Achievement Award

Cliff Lissenden
The Pennsylvania State Univ. (USA)

Health Monitoring of Structural and Biological Systems Best Student Paper Award

19 March 2025 • 8:15 AM-8:30 AM

The Health Monitoring of Structural and Biological Systems conference committee will choose the Best Student Paper Award from their conference. Applicants will then submit an extended abstract for review, and selected finalists will present in a special session at the Smart Structures + Nondestructive Evaluation meeting. A certificate will be given to the first, second, and third place winners.



EAP-In-Action Demonstration Awards

19 March 2025 • 8:15 AM - 8:30 AM

As part of the Electroactive Polymer Actuators and Devices (EAPAD) conference, the EAP-in-Action Demonstration Session has been held over the past 24 years. New electroactive polymer materials and application areas are continuing to emerge and this session offers up-close demonstrations of EAP materials and devices in action from industry and academia. There is never a dull moment at this session which features everything from early university prototypes to products. The demonstration format enables interaction between the developers and potential users as well as a “hands-on” experience with our emerging technology.

Award certificates will be given to the three best EAP-in-Action demonstrations. The judges will assess the presenters’ performance as well as the quality and content of the demos.

Craig F. Bohren Best Student Presentation Award

20 March 2025 • 8:15 AM - 8:30 AM

The Biologically Inspired Materials, Processes, and Systems (BIMPS) conference chairs choose the Best Student Presentation Award from their conference. This award is sponsored by an SPIE Fellow. A cash prize will be given to the first, second, and third place winners.

SYMPOSIUM CHAIRS

Haiying Huang
The Univ. of Texas at Arlington (USA)

Hani Naguib
Univ. of Toronto (Canada)

SYMPOSIUM CO-CHAIRS

Asha J. Hall
DEVCOM Army Research Lab. (USA)

Jae-Hung Han
KAIST (Republic of Korea)

CONFERENCE 13430
Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025

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

Conference Co-Chairs: **Mato Knez,** CIC nanoGUNE Consolider (Spain); **Raúl J. Martín-Palma,** Univ. Autónoma de Madrid (Spain)

17 - 19 March 2025 | Junior Ballroom B (Third Floor)
(Session 1 in Pavilion Ballroom D)

CONFERENCE 13431
Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025

Conference Chair: **Stefan S. Seelecke,** Saarland Univ. (Germany)

Conference Co-Chairs: **Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **John D. W. Madden,** The Univ. of British Columbia (Canada)

17 - 20 March 2025 | Pavilion Ballroom D (Third Floor)

CONFERENCE 13432
Active and Passive Smart Structures and Integrated Systems XIX

Conference Chair: **Xiaopeng Li,** Toyota Research Institute, North America (United States)

Conference Co-Chairs: **Yangyang Chen,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Guoliang Huang,** Peking Univ. (China); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Christopher Sugino,** Stevens Institute of Technology (United States); **Serife Tol,** Univ. of Michigan (United States); **Jinkyu Yang,** Seoul National Univ. (Republic of Korea)

17 - 20 March 2025 | Junior Ballroom C (Third Floor)

CONFERENCE 13433
Multifunctional Materials and Structures

Conference Chair: **Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (United States)

Conference Co-Chairs: **Russell W. Mailen,** Auburn Univ. (United States); **Fulvio Pinto,** Univ. of Bath (United Kingdom); **Aimy Wissa,** Princeton Univ. (United States)

17 - 20 March 2025 | Port McNeil (Fourth Floor)
(Wednesday panel Junior Ballroom B, Third Floor)

CONFERENCE 13434
Soft Mechatronics and Wearable Systems 2025

Conference Chair: **Ilkwon Oh,** KAIST (Republic of Korea)

Conference Co-Chairs: **Woon-Hong Yeo,** Georgia Institute of Technology (United States); **Wei Gao,** Caltech (United States)

17 - 20 March 2025 | Junior Ballroom D (Third Floor)

CONFERENCE 13435
Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025

Conference Chair: **Maria Pina Limongelli,** Politecnico di Milano (Italy)

Conference Co-Chairs: **Ching Tai Ng,** The Univ. of Adelaide (Australia); **Didem Ozevin,** Univ. of Illinois Chicago (United States)

17 - 19 March 2025 | Junior Ballroom A (Third Floor)

CONFERENCE 13436
Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIX

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

Conference Co-Chairs: **Andrew L. Gyekenyesi,** Ohio Aerospace Institute (United States); **Peter J. Shull,** The Pennsylvania State Univ. (United States); **H. Felix Wu,** U.S. Dept. of Energy (United States)

17 - 20 March 2025 | Pavilion Ballroom B (Third Floor)

CONFERENCE 13437
Health Monitoring of Structural and Biological Systems XIX

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

Conference Co-Chairs: **Kara J. Peters,** North Carolina State Univ. (United States); **Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

17 - 20 March 2025 | Pavilion Ballroom A,
Sessions 4-7 Junior Ballroom B (Third Floor)

CONFERENCE 13438
Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025

Conference Chair: **Christopher Niezrecki,** Univ. of Massachusetts Lowell (United States)

Conference Co-Chair: **Saman Farhangdoust,** Embry-Riddle Aeronautical Univ. (United States)

18 - 19 March 2025 | Port Hardy (Fourth Floor)

EVENT SCHEDULE

	CONF. 13430 Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 Chair: Akhlesh Lakhtakia 17–19 March 2025 Junior Ballroom B (Third Floor)	CONF. 13431 Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025 Chair: Stefan S. Seelecke 17–20 March 2025 Pavilion Ballroom D (Third Floor)	CONF. 13432 Active and Passive Smart Structures and Integrated Systems XIX Chair: Xiaopeng Li 17–20 March 2025 Junior Ballroom C (Third Floor)	CONF. 13433 Multifunctional Materials and Structures Chair: Mariantonieta Gutierrez Soto 17–20 March 2025 Port McNeil (Fourth Floor)
MONDAY 17 MARCH				
MORNING 8:15 AM - 10:00 AM	**Monday Plenary** Pavilion Ballroom C/D (Third Floor) **Welcome and Opening Remarks** **2025 SSM Lifetime Achievement Award** **2025 NDE Lifetime Achievement Award** **Elastocalorics: cool into the future?!** *(Plenary Presentation),* **Stefan S. Seelecke,** Saarland Univ. (Germany) **Modeling embodied carbon emissions in U.S. building stock** *(Plenary Presentation),* **Ming Hu,** Univ. of Notre Dame (USA)			
	COFFEE BREAK			
		10:30 AM - 12:00 PM SESSION 1: **Twist-Based EAPs**	10:30 AM - 11:15 AM MONDAY KEYNOTE: **Towards non-Abelian behavior in topological continuous elastic waveguides** *(Keynote Presentation)* 11:15 AM - 12:15 PM SESSION 1: **Metamaterials and Metastructures I**	10:30 AM - 12:10 PM SESSION 1: **Compliant Mechanisms and Metamaterials I**
AFTERNOON	LUNCH BREAK			
	1:30 PM - 3:30 PM NOTE ROOM CHANGE Pavilion Ballroom D SESSION 1: **Soft Robotics:** *Joint Session with 13430 and 13431*	1:30 PM - 3:30 PM SESSION 2: **Soft Robotics:** *Joint Session with 13430 and 13431*	1:45 PM - 3:05 PM SESSION 2: **Phononic Crystals and Acoustic/Elastic Metamaterials**	1:40 PM - 3:00 PM SESSION 2: **Materials Addressing Societal Issues I**
	COFFEE BREAK			
		4:30 PM - 5:45 PM NOTE ROOM CHANGE Pavilion Ballroom C/D (Third Floor) **EAP-in-Action Demonstration Session**	3:55 PM - 5:35 PM SESSION 3: **Piezoelectric Metamaterials**	3:00 PM - 3:40 PM SESSION 3: **Fabrication and Manufacturing of Multifunctional Materials and Structures I**

	CONF. 13434 Soft Mechatronics and Wearable Systems 2025 Chair: Ilkwon Oh 17–20 March 2025 Junior Ballroom D (Third Floor)	CONF. 13435 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025 Chair: Maria Pina Limongelli 17–19 March 2025 Junior Ballroom A (Third Floor)	CONF. 13436 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIX Chair: Tzuyang Yu 17–20 March 2025 Pavilion Ballroom B (Third Floor)	CONF. 13437 Health Monitoring of Structural and Biological Systems XIX Chair: Zhongqing Su 17–20 March 2025 Pavilion Ballroom A (Third Floor)		CONF. 13438 Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025 Chair: Christopher Niezrecki 18–19 March 2025 Port Hardy (Fourth Floor)
MONDAY 17 MARCH						
				See full details and updates at **spie.org/ssnde** or on the **SPIE App**		
	10:30 AM - 12:00 PM SESSION 1: **Mechanical Metamaterials and Mechanics**	10:30 AM - 12:00 PM SESSION 1: **Fiber Optic Sensors and Implementation I**	10:30 AM - 11:50 AM SESSION 1: **NDT for Sustainable Energy and Society**	10:30 AM - 11:10 AM Pavilion Ballroom A (Third Floor) **Monday Keynote** **A 15-year journey of a new NDE method based on solitary waves** **Piervincenzo Rizzo,** Univ. of Pittsburgh (USA) ***Sessions 1-3 run concurrently with sessions 4-7*** **NOTE ROOM CHANGE**		
				11:10 AM - 12:50 PM Pavilion Ballroom A (Third Floor) SESSION 1: **Special Session: Guided Waves for SHM and NDE I**	11:10 AM - 12:10 PM Junior Ballroom B (Third Floor) SESSION 4: **Biomedical Smart Structures and Devices**	
	1:00 PM - 3:10 PM SESSION 2: **Wearable Electronics I**	1:30 PM - 3:00 PM SESSION 2: **Fiber Optic Sensors and Implementation II**	1:20 PM - 2:20 PM SESSION 2: **NDT for Multifunctional Materials**	2:10 PM - 3:30 PM SESSION 2: **Special Session: Guided Waves for SHM and NDE II**	1:40 PM - 2:20 PM SESSION 5: **Special Session: Robotic and Autonomous Nondestructive Evaluation** 2:20 PM - 3:00 PM SESSION 6: **Laser-Ultrasonics-Driven SHM and NDT**	
	3:40 PM - 6:10 PM SESSION 3: **Design and Processing**	3:30 PM - 5:40 PM SESSION 3: **Sensor Design and Implementation**	3:10 PM - 4:30 PM SESSION 3: **Acoustic and Ultrasonic NDT Techniques**	3:50 PM - 6:10 PM SESSION 3: **Special Session: Recent Advances in Nonlinear Ultrasonics-Based NDE and SHM**	3:50 PM - 5:30 PM SESSION 7: **Artificial Intelligence-Driven SHM**	

Event Schedule continued on next page

EVENT SCHEDULE

	CONF. 13430 Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 Chair: Akhlesh Lakhtakia 17–19 March 2025 Junior Ballroom B (Third Floor)	CONF. 13431 Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025 Chair: Stefan S. Seelecke 17–20 March 2025 Pavilion Ballroom D (Third Floor)	CONF. 13432 Active and Passive Smart Structures and Integrated Systems XIX Chair: Xiaopeng Li 17–20 March 2025 Junior Ballroom C (Third Floor)	CONF. 13433 Multifunctional Materials and Structures Chair: Mariantonieta Gutierrez Soto 17–20 March 2025 Port McNeil (Fourth Floor)
TUESDAY 18 MARCH				
MORNING 8:15 AM - 10:00 AM	**Tuesday Plenary** Pavilion Ballroom C/D (Third Floor) **Welcome and Opening Remarks** **Smart lightweighting of vehicle structures** *(Plenary Presentation)*, **Marcelo J. Dapino,** The Ohio State Univ. (USA) **Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves** *(Plenary Presentation)*, **John D. W. Madden,** The Univ. of British Columbia (Canada)			
	COFFEE BREAK			
	10:30 AM - 11:50 AM SESSION 2: **Locomotion**	10:30 AM - 12:00 PM SESSION 3: **Advanced Systems and Applications I**	10:30 AM - 11:50 AM SESSION 4: **Metamaterials and Metastructures II**	10:30 AM - 12:10 PM SESSION 4: **Fabrication and Manufacturing of Multifunctional Materials and Structures II**
	11:50 AM - 12:10 PM SESSION 3: **Computational Modeling**			
AFTERNOON	LUNCH BREAK			
	1:40 PM - 2:30 PM SESSION 4: **Materials I**	1:30 PM - 3:20 PM SESSION 4: **Hydraulic EAPs**	1:20 PM - 2:20 PM SESSION 5: **Autonomous Materials and Structures**	1:40 PM - 3:40 PM SESSION 5: **Materials Addressing Societal Issues II**
	2:30 PM - 3:30 PM SESSION 5: **Materials II**		2:20 PM - 3:20 PM SESSION 6: **Willis Metamaterials**	
	COFFEE BREAK			
		3:50 PM - 5:40 PM SESSION 5: **Soft Robotics**	4:10 PM - 5:10 PM SESSION 7: **Passive and Active Vibration Isolation Systems**	4:10 PM - 5:10 PM SESSION 7: 6 **Materials Addressing Societal Issues III**
EVENING 6:00 PM - 8:00 PM	**POSTER SESSION** | Grand Ballroom C			

	CONF. 13434 Soft Mechatronics and Wearable Systems 2025 Chair: Ilkwon Oh 17–20 March 2025 Junior Ballroom D (Third Floor)	CONF. 13435 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025 Chair: Maria Pina Limongelli 17–19 March 2025 Junior Ballroom A (Third Floor)	CONF. 13436 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIX Chair: Tzuyang Yu 17–20 March 2025 Pavilion Ballroom B (Third Floor)	CONF. 13437 Health Monitoring of Structural and Biological Systems XIX Chair: Zhongqing Su 17–20 March 2025 Pavilion Ballroom A (Third Floor)	CONF. 13438 Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025 Chair: Christopher Niezrecki 18–19 March 2025 Port Hardy (Fourth Floor)
TUESDAY 18 MARCH					
	10:30 AM - 12:20 PM SESSION 4: **Wearable Electronics II**	10:30 AM - 11:40 AM SESSION 4: **Applications of Smart Sensory Systems to Civil Structures I**	10:30 AM - 12:10 PM SESSION 4: **VR AND OTHER SIMULATION TECHNIQUES**	10:30 AM - 11:10 AM Pavilion Ballroom A (Third Floor) **Tuesday Keynote** **Flexible ultrasound transducers for wearable biomedical sensing and imaging,** **Xiaoning Jiang,** North Carolina State Univ. (USA)	10:30 AM - 11:10 AM **Tuesday Keynote** **Physics-based and data-driven digital twinning of offshore wind turbines using sensor measurements,** **Babak Moaveni,** Tufts Univ. (USA)
				11:10 AM - 12:50 PM SESSION 8: **Special Session: Guided Waves for SHM and NDE III**	11:10 AM - 12:30 PM SESSION 1: **Digital Twins, AI, and Machine Learning for Energy Systems**
	1:50 PM - 3:40 PM SESSION 5: **Wearable Electronics III**	1:30 PM - 2:40 PM SESSION 5: **Applications of Smart Sensory Systems to Civil Structures II**	2:00 PM - 2:20 PM SESSION 5: **LDV and Laser Ultrasound Techniques**	2:20 PM - 3:40 PM SESSION 9: **Structural Health Monitoring (SHM) I**	2:00 PM - 3:20 PM SESSION 2: **Digital Twins: NDE 4.0, Modeling, and Prognostics I**
			2:20 PM - 3:20 PM SESSION 6: **Special Session: Multifunctional Composite Material and Structures**		
	4:10 PM - 5:30 PM SESSION 6: **Printing and Fabrication**	3:10 PM - 5:40 PM SESSION 6: **Advances in Sensing Technology**	3:20 PM - 4:20 PM DISCUSSION: **Challenges in VR/ Simulation, LDV/ Laser Ultrasound, & Multifunctional Composite Materials**	4:10 PM - 5:55 PM **Health Monitoring of Structural and Biological Systems Best Student Paper Session**	3:50 PM - 5:30 PM SESSION 3: **Digital Twins: NDE 4.0, Modeling, and Prognostics II**

See full details and updates at **spie.org/ssnde** or on the **SPIE App**

Event Schedule continued on next page

EVENT SCHEDULE

WEDNESDAY 19 MARCH

MORNING 8:15 AM - 10:00 AM

Wednesday Plenary
Pavilion Ballroom C/D (Third Floor)
Welcome and Opening Remarks
EAP-in-Action Demonstration Awards
Health Monitoring of Structural and Biological Systems Best Student Paper Award
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration *(Plenary Presentation)*, **Didem Ozevin,** Univ. of Illinois Chicago (USA)
Auxetic knot-architectured SMA wearable haptic interfaces *(Plenary Presentation)*, **Il-Kwon Oh,** KAIST (Republic of Korea)

COFFEE BREAK

CONF. 13430 Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 Chair: Akhlesh Lakhtakia 17–19 March 2025 Junior Ballroom B (Third Floor)	CONF. 13431 Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025 Chair: Stefan S. Seelecke 17–20 March 2025 Pavilion Ballroom D (Third Floor)	CONF. 13432 Active and Passive Smart Structures and Integrated Systems XIX Chair: Xiaopeng Li 17–20 March 2025 Junior Ballroom C (Third Floor)	CONF. 13433 Multifunctional Materials and Structures Chair: Mariantonieta Gutierrez Soto 17–20 March 2025 Port McNeil (Fourth Floor)
11:00 AM - 12:00 PM SESSION 6: **Devices**	10:30 AM - 12:30 PM SESSION 6: **Haptics**	10:30 AM - 11:50 AM SESSION 8: **Energy Harvesting and Scavenging I**	10:30 AM - 11:50 AM SESSION 7: **Smart Material Characterization I**

AFTERNOON

LUNCH BREAK

2:00 PM - 3:00 PM SESSION 7: **Materials and Devices**	2:00 PM - 3:40 PM SESSION 7: **Advanced Systems and Applications II**	1:30 PM - 2:10 PM SESSION 9: **Energy Harvesting and Scavenging II** 2:10 PM - 3:10 PM SESSION 10: **Magneto Rheological Systems**	2:00 PM - 3:00 PM SESSION 8: **Compliant Mechanisms and Metamaterials II**

COFFEE BREAK

3:30 PM - 5:00 PM **Adapting for Tomorrow: Smart and Bioinspired Materials for a Resilient Planet:** Joint Panel Session with 13430 and 13433 **Nanocellulose: a versatile building block for sustainable bio-based materials** *(Keynote Presentation)* **Feng Jiang,** The Univ. of British Columbia (Canada)	4:10 PM - 6:00 PM SESSION 8: **Novel EAP Fabrication Methods**	3:40 PM - 4:20 PM SESSION 11: **Smart Sensing** 4:20 PM - 5:20 PM SESSION 12 **SMA- and Piezo-Based Materials and Systems**	3:30 PM - 5:00 PM NOTE ROOM CHANGE Junior Ballroom B (Third Floor) **Adapting for Tomorrow: Smart and Bioinspired Materials for a Resilient Planet:** Joint Panel Session with 13430 and 13433 **Nanocellulose: a versatile building block for sustainable bio-based materials** *(Keynote Presentation)* **Feng Jiang,** The Univ. of British Columbia (Canada)

	CONF. 13434 Soft Mechatronics and Wearable Systems 2025 Chair: Ilkwon Oh 17–20 March 2025 Junior Ballroom D (Third Floor)	CONF. 13435 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025 Chair: Maria Pina Limongelli 17–19 March 2025 Junior Ballroom A (Third Floor)	CONF. 13436 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIX Chair: Tzuyang Yu 17–20 March 2025 Pavilion Ballroom B (Third Floor)	CONF. 13437 Health Monitoring of Structural and Biological Systems XIX Chair: Zhongqing Su 17–20 March 2025 Pavilion Ballroom A (Third Floor)	CONF. 13438 Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025 Chair: Christopher Niezrecki 18–19 March 2025 Port Hardy (Fourth Floor)
WEDNESDAY 19 MARCH					
				See full details and updates at **spie.org/ssnde** or on the **SPIE App**	
	10:30 AM - 12:20 PM SESSION 7: **Soft Robotics I**	10:30 AM - 11:40 AM SESSION 7: **Advances in Sensing Technologies for Composites**	10:30 AM - 12:00 PM SESSION 7: **NDT for Additive Manufacturing**	10:30 AM - 11:10 AM Pavilion Ballroom A (Third Floor) **Wednesday Keynote** **Metamaterial-controlled nonlinear ultrasonic guided waves for structural health monitoring, Yanfeng Shen,** Shanghai Jiao Tong Univ. (China) 11:10 AM - 12:30 PM SESSION 10: **Structural Health Monitoring (SHM) II**	10:30 AM - 11:50 AM SESSION 4: **AI and Machine Learning for NDE/ SHM-Imaging**
	1:40 PM - 3:40 PM SESSION 8: **Soft Robotics II**	1:30 PM - 3:20 PM SESSION 8: **Innovative Sensor Materials I**	1:30 PM - 3:00 PM SESSION 8: **Radar and Thermal NDT Techniques**	2:00 PM - 3:20 PM SESSION 11: **Structural Health Monitoring (SHM) III**	1:20 PM - 3:20 PM SESSION 5: **AI and Machine Learning for Industry Applications of NDE/SHM I**
	4:10 PM - 5:50 PM SESSION 9: **Wearable Haptics**	3:50 PM - 5:40 PM SESSION 9: **Innovative Materials and Sensors II**	3:30 PM - 5:10 PM SESSION 9: **Machine Learning, Deep Learning, and AI Techniques** 5:10 PM - 6:10 PM DISCUSSION: **Challenges in NDT for Additive Manufacturing, Radar/ Thermal NDT, & ML/Deep Learning/ AI**	3:50 PM - 5:50 PM SESSION 12: **Special Session: Optical Sensing and Machine Learning for SHM and NDE I**	

Event Schedule continued on next page

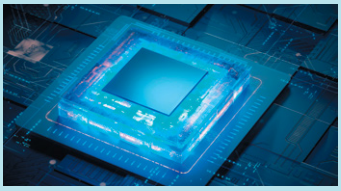
EVENT SCHEDULE

	CONF. 13430 Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 Chair: Akhlesh Lakhtakia 17–19 March 2025 Junior Ballroom B (Third Floor)	CONF. 13431 Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025 Chair: Stefan S. Seelecke 17–20 March 2025 Pavilion Ballroom D (Third Floor)	CONF. 13432 Active and Passive Smart Structures and Integrated Systems XIX Chair: Xiaopeng Li 17–20 March 2025 Junior Ballroom C (Third Floor)	CONF. 13433 Multifunctional Materials and Structures Chair: Mariantonieta Gutierrez Soto 17–20 March 2025 Port McNeil (Fourth Floor)
THURSDAY 20 MARCH				
MORNING 8:15 AM - 10:00 AM	**Thursday Plenary** Pavilion Ballroom C/D (Third Floor) **Welcome and Opening Remarks** **Craig F. Bohren Best Student Presentation Award** **The use of detection theory to inform decision making in SHM/NDE** *(Plenary Presentation)* **Michael D. Todd,** Univ. of California, San Diego (USA) **Active vibration control of large, optical space structures** *(Plenary Presentation)* **Steven F. Griffin,** Boeing LTS Inc. (USA)			
	COFFEE BREAK			
		10:30 AM - 11:50 AM SESSION 9: **EAP Fiber Technology**	10:30 AM - 12:30 PM SESSION 13: **Modeling, Optimization, Signal Processing, Control, and Design of Integrated System**	10:30 AM - 12:10 PM SESSION 9: **Smart Material Characterization II**
AFTERNOON	LUNCH BREAK			
		1:20 PM - 2:20 PM SESSION 10: **Experimental Methods**		
		COFFEE BREAK		
		2:50 PM - 4:10 PM SESSION 11: **Ionic EAPs**		

Application tracks

Application tracks enable attendees to group and explore presentations in the conference programs to more easily plan their event schedule around the topic of interest. Application track filters span across all conferences at an SPIE event. The ability to group presentations has the reciprocal benefit of helping authors' presentations be more easily found.

See website for a full listing of presentations in each of these tracks: **spie.org/ssnde**



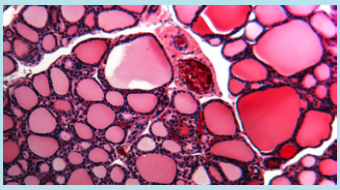
AI/ML

Papers that showcase the use of artificial intelligence, machine learning, and deep learning to create and implement intelligent systems across multiple sectors, technologies, and applications.

Sustainability

Papers that highlight the use of optics and photonics for renewable energy, natural resource management, sustainable manufacturing, and greenhouse gas mitigation in support of the UN Sustainable Development Goals.

	CONF. 13434 Soft Mechatronics and Wearable Systems 2025 Chair: Ilkwon Oh 17–20 March 2025 **Junior Ballroom D (Third Floor)**	CONF. 13435 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025 Chair: Maria Pina Limongelli 17–19 March 2025 **Junior Ballroom A (Third Floor)**	CONF. 13436 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIX Chair: Tzuyang Yu 17–20 March 2025 **Pavilion Ballroom B (Third Floor)**	CONF. 13437 Health Monitoring of Structural and Biological Systems XIX Chair: Zhongqing Su 17–20 March 2025 **Pavilion Ballroom A (Third Floor)**	CONF. 13438 Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025 Chair: Christopher Niezrecki 18–19 March 2025 **Port Hardy (Fourth Floor)**
		THURSDAY 20 MARCH			
			 See full details and updates at **spie.org/ssnde** or on the **SPIE App**		
	10:30 AM - 12:40 PM SESSION 10: **Wearable Electronics IV**		**10:30 AM - 11:50 AM** **SESSION 10:** **Digital Image Correlation and Vision-based Techniques**	10:30 AM - 11:30 AM SESSION 13: **Special Session: NDE and SHM of Battery Materials, Structures, and Systems**	
			11:50 AM - 12:50 PM DISCUSSION: **Challenges in Digital Image Correlation and Vision-based Techniques**	11:30 AM - 11:50 AM SESSION 14: **Special Session: Optical Sensing and Machine Learning for SHM and NDE II**	
	1:40 PM - 3:30 PM SESSION 11: **Energy Devices and Monitoring**			1:40 PM - 3:00 PM SESSION 15: **Sensors and Sensor Networks**	
	COFFEE BREAK				
	4:00 PM - 5:50 PM SESSION 12: **Functional Materials**			3:00 PM - 3:40 PM SESSION 16: **Special Session: 3D-Printed Sensors and Advanced Composites**	



Translational Research

Papers that highlight the transition from bench to bedside using the latest photonics technologies, tools, and techniques for healthcare.

3D printing

Papers that highlight the innovative use of optics and photonics in multidisciplinary applications for multidimensional manufacturing.

GENERAL INFORMATION

Badge pick up and registration hours

Sheraton Wall Centre - 3rd Floor, Junior Ballroom Foyer

Sunday 16 March	3:00 PM - 6:00 PM
Monday 17 March	7:30 AM–5:00 PM
Tuesday 18 March	7:30 AM–5:00 PM
Wednesday 19 March	7:30 AM–5:00 PM
Thursday 20 March	7:30 AM–3:00 PM

SPIE Registration Desk

3rd Floor, Junior Ballroom Foyer - Open during registration hours

Registration payments
If you are planning to register onsite, please do so at the "Need to Register" laptop station. Your credit card payment will be processed during registration. If you wish to pay with cash or check, you will be directed to the SPIE Registration Desk once you have completed registration for final payment.

If you have already registered and wish to add a course, workshop, or special event, you may do this online by signing into your SPIE account.

Receipt and Certificate of Participation
Preregistered attendees who need an SPIE-stamped receipt or attendees who need a Certificate of Participation may obtain those at the SPIE Registration Desk.

Badge Corrections
Badge corrections can be made at the SPIE Registration Desk. Please mark your badge with your changes before approaching the counter.

Speaker check-in and preview station

Parksville Room, 3rd Floor - Open during registration hours

All speakers must stop at Speaker Check-In to upload and preview their slide presentation files at least two hours before their scheduled session or the day before if they present in the first session. Speakers are not able to present using their own devices. All conference rooms are equipped with a laptop, projector, screen, lapel microphone, and laser pointer.

Internet access

Hotel lobbies, meeting rooms, and registration area

Complimentary wireless internet access is provided in meeting rooms and lobbies on the conference room levels. Instructions will be posted onsite.

SPIE Conference app and event information

This useful tool allows you to search and browse the program, special events, participants, courses, and more. It is free and available for iPhone and Android phones. If you don't already have it, Download the SPIE App.

Luggage & coat check

Sheraton Wall Centre - Hotel Lobby

Complimentary luggage, package, and coat storage are available.

Business Center Office

1st floor

Printing services are available.

Child Care Services

West Childcare Connection - 778-991-4443
www.childcarevancouver.com

SPIE does not imply an endorsement or recommendation of these services. They are provided on an "information only" basis for your further analysis and decision. Other services may be available.

Gender-inclusive restroom

Gender-inclusive restrooms are available near the SPIE registration desk.

Mother's Room

4th Floor, Blue Whale - Open during registration hours

The Mothers' Room is a lockable room intended for nursing mothers. There is no storage or running water. There is a refrigerator available in this space. The key can be picked up from the SPIE Registration Desk.

Quiet Room

3rd Floor, Beluga - Open during registration hours

The Quiet Room is intended for silent meditation, reflection, and prayer. No mobile devices or computer use is allowed, and no food or beverages are allowed.

Lost and found

3rd Floor, Junior Ballroom Foyer

Found items will be kept at the SPIE Registration Desk in the Registration area during the meeting and available only during registration hours. At the end for the meeting, all found items will be turned over to the Sheraton Wall Centre. Visit ileftmystuff.com and use hotel identification number 26256 to locate your lost item or call the hotel directly at +1 604-893-7366.

Food and beverage services

Coffee Breaks
3rd Floor, Pavilion Ballroom Foyer

Complimentary coffee
Monday - Thursday . . . . . 7:30 AM - 4:00 PM

Community Networking Lunch
3rd Floor, Grand Ballroom A
Monday-Thursday . . . . . 12:00 PM - 1:30 PM

Food and refreshments for purchase
Sheraton Wall Centre, Hotel Lobby

Starbucks
Open 6:00 AM to 6:30 PM

Recharge with a specialty Starbucks drink and grab a breakfast sandwich or pastry to-go.

Cafe One
Open 6:30 AM to 10:00 PM daily

Enjoy refined Canadian cuisine with an emphasis on West Coast dishes.

In-Room Dining - See hotel instructions
Relax in the comfort of your room as you enjoy breakfast, lunch, dinner, or even a late-night snack from our In-Room Dining Menu.
Restaurants and entertainment

Restaurants and entertainment

Vancouverites know their city's culinary scene. They know where to find the best tower of fresh seafood, the finest house-made charcuterie, the most delicious taco truck, and the best list of B.C. wines. They are entirely capable of having a stand-up argument about which sushi restaurant is the best, even if both restaurants are exquisite.

And the city's restaurants, wine bars, tasting rooms, cocktail dens, food trucks, farmer's markets and bakeries are absolutely deserving of this passion. www.destinationvancouver.com

CONFERENCE 13430

Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025

17 - 19 March 2025 | Junior Ballroom B (Third Floor) (Session 1 in Pavilion Ballroom D)

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

Conference Co-Chair(s): **Mato Knez,** CIC nanoGUNE Consolider (Spain); **Raúl J. Martín-Palma,** Univ. Autónoma de Madrid (Spain)

Program Committee: **Javaan Singh Chahl,** Univ. of South Australia (Australia); **Chih-Hung Chang,** Oregon State Univ. (United States); **Alessandro Chiolerio,** Istituto Italiano di Tecnologia (Italy); **Frank E. Fish,** West Chester Univ. (United States); **Ranajay R. Ghosh,** Univ. of Central Florida (United States); **Hendrik Hölscher,** Karlsruher Institut für Technologie (Germany); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Bert Müller,** Univ. Basel (Switzerland); **Zoubeida Ounaies,** The Pennsylvania State Univ. (United States); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Akira Saito,** Osaka Univ. (Japan); **Silvia Vignolini,** Univ. of Cambridge (United Kingdom); **Luat T. Vuong,** Univ. of California, Riverside (United States)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

SESSION 1: SOFT ROBOTICS: JOINT SESSION WITH 13430 AND 13431

17 March 2025 • 1:30 PM - 3:30 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Akhlesh Lakhtakia**, The Pennsylvania State Univ. (United States); **Stefan S. Seelecke**, Saarland Univ. (Germany)

13431-5 • 1:30 PM - 2:10 PM
Active soft materials paving the way for deep biomimetic robotics (Keynote Presentation)
Author(s): **Koichi Suzumori,** Institute of Science Tokyo (Japan)

13430-1 • 2:10 PM - 2:30 PM
Scalable, 3D-Printed phantom of a California sea lion pelvis for veterinary blood extraction training with real-time feedback
Author(s): **Nazanin Minaian**, **Daniel Fisher**, **Abdulkarem Sennain, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

13430-2 • 2:30 PM - 2:50 PM
Design and performance optimization of tubular IPMC actuators for biomedical applications
Author(s): **Nadia Triki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Saarland University, Department Systems Engineering (Germany); **Stefan Seelecke,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und

Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

13430-3 • 2:50 PM - 3:10 PM
Analysis of torsional response in pneumatic artificial muscles
Author(s): **Frank Cianciarulo**, **Eric Kim, Norman Wereley,** Univ. of Maryland, College Park (United States)

13431-6 • 3:10 PM - 3:30 PM
A tensegrity-based locomoting soft robot actuated by rolled dielectric elastomer transducers
Author(s): **Julian Kunze,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **David Herrmann,** Ostbayerische Technische Hochschule Regensburg (Germany); **Julian Kobes,** Univ. des Saarlandes (Germany); **Paul Motzki,** Univ. des Saarlandes (Germany), Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Stefan Seelecke**, **Gianluca Rizzello,** Univ. des Saarlandes (Germany); **Valter Böhm,** Ostbayerische Technische Hochschule Regensburg (Germany)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 2: LOCOMOTION

18 March 2025 • 10:30 AM - 11:50 AM | Junior Ballroom B (Third Floor)
Session Chair(s): **Mato Knez**, CIC nanoGUNE (Spain)

13430-4 • 10:30 AM - 11:00 AM
Development of bio-inspired amphibious AUVs based on the morphological and swimming kinematics of secondarily aquatic vertebrates *(Invited Paper)*
Author(s): **Frank E. Fish,** West Chester Univ. (United States); **Rebecca K Kramer-Bottiglio,** Yale University (United States); **Megan C Leftwich,** George Washington University (United States); **James L Tangorra, Harry G Kwatny,** Drexel University (United States)

13430-5 • 11:00 AM - 11:30 AM
Development of a biomimetic Milky Way dark sky compass *(Invited Paper)*
Author(s): **Javaan S. Chahl**, **Timothy McIntyre**, **Samuel Teague, Yiting Tao,** Univ. of South Australia (Australia)

13430-6 • 11:30 AM - 11:50 AM
Multidisciplinary design optimization of the flapping-wing air vehicle using artificial neural network surrogate model
Author(s): **Hyeong-Seok Ko**, **Hyeon-Ho Yang,** KAIST (Korea, Republic of); **Jae-Hyuk Lim,** Jeonbuk National Univ. (Korea, Republic of); **Jae-Hung Han,** KAIST (Korea, Republic of)

SESSION 3: COMPUTATIONAL MODELING

18 March 2025 • 11:50 AM - 12:10 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Mato Knez**, CIC nanoGUNE (Spain)

13430-8 • 11:50 AM - 12:10 PM
Biomimetic holonomic systems for neuromorphic computing
Author(s): **Charanraj Mohan,** Istituto Italiano di Tecnologia (Italy); **Marco Crepaldi,** Politecnico di Torino (Italy); **Alessandro Chiolerio,** Istituto Italiano di Tecnologia (Italy)

Lunch Break 12:10 PM - 1:40 PM

SESSION 4: MATERIALS I

18 March 2025 • 1:40 PM - 2:30 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Javaan Singh Chahl**, Univ. of South Australia (Australia)

13430-10 • 1:40 PM - 2:10 PM
Scalable bio-inspired manufacturing from molecules to industrial-scale bio-inspired materials for built environments *(Invited Paper)*
Author(s): **Chih-Hung Chang,** Oregon State Univ. (United States)

13430-11 • 2:10 PM - 2:30 PM
A novel approach to multifunctional thin film coatings for biomedical and food safety applications
Author(s): **Mato Knez,** CIC nanoGUNE (Spain)

SESSION 5: MATERIALS II

18 March 2025 • 2:30 PM - 3:30 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Raúl J. Martín-Palma**, Univ. Autónoma de Madrid (Spain)

13430-12 • 2:30 PM - 2:50 PM
Experimental study of the skeletal adaptations of deep-sea glass sponges
Author(s): **Nicco Ulbricht**, **Harry Jang,** NYU Tandon School of Engineering (United States); **Giorgio Amati,** CINECA (Italy); **Giacomo Falcucci,** Univ. degli Studi di Roma "Tor Vergata" (Italy), Harvard Univ. (United States); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States)

13430-13 • 2:50 PM - 3:10 PM
Bimodal functionality of highly conductive nanostructured silver film towards improved performance of photosystem I-based graphene photocathode
Author(s): **Dorota Kowalska,** Institute of Physics, Nicolaus Copernicus Univ. (Poland); **Marcin Szalkowski,** Institute of Physcis, Nicolaus Copernicus Univ. (Poland); **Malgorzata Kiliszek,** Ctr. of New Technologies, Univ. of Warsaw (Poland); **Ersan Harputlu,** Tarsus Univ. (Turkey); **Miriam Izzo,** Ctr. of New Technologies, Univ. of Warsaw (Poland); **Gokhan Unlu,** Pamukkale Univ. (Turkey); **Sebastian Mackowski,** Institute of Physics, Nicolaus Copernicus Univ. (Poland); **Kasim Ocakoglu,** Tarsus Univ. (Turkey); **Joanna Kargul,** Ctr. of New Technologies, Univ. of Warsaw (Poland)

13430-14 • 3:10 PM - 3:30 PM
Convective phenomenon in Oldroyd-B bio-nanofluids under the influence of magnetic field in a permeable medium
Author(s): **Jeevanpreet Kaur, Urvashi Gupta,** Panjab Univ. (India)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 11:00 AM

SESSION 6: DEVICES

19 March 2025 • 11:00 AM - 12:00 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Alessandro Chiolerio**, Istituto Italiano di Tecnologia (Italy)

13430-16 • 11:00 AM - 11:20 AM
Cooperative effects in pixelated metasurface absorbers for terahertz waves using graphene and vanadium dioxide
Author(s): **Pankaj Kumar,** Dhirubhai Ambani Institute of Information and Communication Technology (India)

13430-17 • 11:20 AM - 11:40 AM
Bioinspired rubber composites for superior ice traction: enhancing winter safety through innovative laboratory testing in tribology
Author(s): **Sara Zahmatkesh, Reza Rizvi,** York Univ. (Canada)

13430-18 • 11:40 AM - 12:00 PM
Bioinspired piezoresistive strain sensors based on PEDOT and metal nanoparticles
Author(s): **Rehab Ramadan,** Univ. Autónoma de Madrid (Spain), Minia Univ. (Egypt); **Raúl J. Martín-Palma,** Univ. Autónoma de Madrid (Spain)

Lunch Break 12:00 PM - 2:00 PM

SESSION 7: MATERIALS AND DEVICES

19 March 2025 • 2:00 PM - 3:00 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Chih-Hung Chang**, Oregon State Univ. (United States)

13430-20 • 2:00 PM - 2:20 PM
Taking advantage of biological binders to solidify granular material: manufacture and recyclability of lignin-based biopolymer composites
Author(s): **Barney H. Miao**, **Andrew C. Lesh,** Stanford Univ. (United States); **David J. Loftus,** NASA Ames Research Ctr. (United States); **Michael Lepech,** Stanford Univ. (United States)

13430-21 • 2:20 PM - 2:40 PM
Verification of Morpho-type optical diffuser fabricated by feasible 3D design
Author(s): **Akira Saito**, **Shuta Sakamoto**, **Kazuma Yamashita**, **Takuma Hattori, Yuji Kuwahara,** Osaka Univ. (Japan)

13430-22 • 2:40 PM - 3:00 PM
Biomimetic super-cholesteric materials
Author(s): **Akhlesh Lakhtakia,** The Pennsylvania State Univ. (United States)

Coffee Break 3:00 PM - 3:30 PM

ADAPTING FOR TOMORROW: SMART AND BIOINSPIRED MATERIALS FOR A RESILIENT PLANET: JOINT PANEL SESSION WITH 13430 AND 13433

19 March 2025 • 3:30 PM - 5:00 PM | Junior Ballroom B (Third Floor)

View Full Details: spie.org/ssn/adapting-for-tomorrow
3:30 – 3:40 PM: **Introduction**

3:40 – 4:05 PM: **Keynote by Prof. Feng Jiang**

4:05 – 5:00 PM: **Moderated panel discussion**

This panel is a joint event between the conferences on Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 and Multifunctional Materials and Structures.

13430-23 • 3:40 PM - 4:05 PM
Nanocellulose: a versatile building block for sustainable bio-based materials (Keynote Presentation)
Author(s): **Feng Jiang,** The Univ. of British Columbia (Canada)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

CONFERENCE 13431

Electroactive Polymer Actuators, Sensors, and Devices (EAPAD) 2025

17 - 20 March 2025 | Pavilion Ballroom D (Third Floor)

Conference Chair(s): **Stefan S. Seelecke,** Saarland Univ. (Germany)

Conference Co-Chair(s): **Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **John D. W. Madden,** The Univ. of British Columbia (Canada)

Program Committee: **Barbar J. Akle,** Lebanese American Univ. (Lebanon); **Iain A. Anderson,** The Univ. of Auckland (New Zealand); **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 Janusas,** Kaunas Univ. of Technology (Lithuania); **Martin Kaltenbrunner,** Johannes Kepler Univ. Linz (Austria); **Christoph Keplinger,** Max-Planck-Institut für Intelligente Systeme (Germany); **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); **Jinsong Leng,** Harbin Institute of Technology (China); **Tiefeng Li,** Zhejiang Univ. (China); **Jürgen Maas,** Technische Univ. Berlin (Germany); **Paul Motzki,** Saarland Univ. (Germany); **Il-Kwon Oh,** KAIST (Korea, Republic of); **Qibing Pei,** Univ. of California, Los Angeles (United States); **Cédric Plesse,** CY Cergy Paris Univ. (France); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Aaron D. Price,** Western Univ. (Canada); **Gianluca Rizzello,** Saarland Univ. (Germany); **Jonathan M. Rossiter,** Univ. of Bristol (United Kingdom); **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jun Shintake,** The Univ. of Electro-Communications (Japan); **Anuvat Sirivat,** The Petroleum and Petrochemical College (Thailand); **Geoffrey M. Spinks,** Univ. of Wollongong (Australia); **Ji Su,** NASA Langley Research Ctr. (United States); **Rocco Vertechy,** Univ. degli Studi di Bologna (Italy); **Thomas Wallmersperger,** TU Dresden (Germany); **Jian Zhu,** The Chinese Univ. of Hong Kong, Shenzhen (China)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: TWIST-BASED EAPS

17 March 2025 • 10:30 AM - 12:00 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Stefan S. Seelecke**, Saarland Univ. (Germany)

13431-1 • 10:30 AM - 11:00 AM
Actuation, mechanical energy harvesting, and refrigeration using coiled or plied polymer or carbon nanotube yarns *(Invited Paper)*
Author(s): **Ray H. Baughman,** The Univ. of Texas at Dallas (United States)

13431-2 • 11:00 AM - 11:20 AM
Work out: Measuring the energy output of artificial muscle
Author(s): **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **Sukhneet K. Dhillon**, **Ying Li**, **Adriana J. Cowan**, **Ardeshir Bahi,** The Univ. of British Columbia (Canada); **Geoffrey M. Spinks,** Univ. of Wollongong (Australia); **John D. W. Madden,** The Univ. of British Columbia (Canada)

13431-3 • 11:20 AM - 11:40 AM
Understanding actuation mechanisms of twisted and coiled polymer actuators using finite element model
Author(s): **Gurmeet Singh, Umesh Gandhi,** Toyota Research Institute, North America (United States)

13431-4 • 11:40 AM - 12:00 PM
Development of twisted and coiled actuator driven stockings for controlling edema and promoting venous return
Author(s): **Sukhneet K. Dhillon**, **Ying Li**, **Anastasia Vogl**, **Adriana J. Cowan**, **Rafaela Zamataro**, **Kentaro Takagi, John D. W. Madden,** The Univ. of British Columbia (Canada)

Lunch Break 12:00 PM - 1:30 PM

SESSION 2: SOFT ROBOTICS: JOINT SESSION WITH 13430 AND 13431

17 March 2025 • 1:30 PM - 3:30 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Akhlesh Lakhtakia**, The Pennsylvania State Univ. (United States); **Stefan S. Seelecke**, Saarland Univ. (Germany)

13431-5 • 1:30 PM - 2:10 PM
Active soft materials paving the way for deep biomimetic robotics (Keynote Presentation)
Author(s): **Koichi Suzumori,** Institute of Science Tokyo (Japan)

13430-1 • 2:10 PM - 2:30 PM
Scalable, 3D-Printed phantom of a California sea lion pelvis for veterinary blood extraction training with real-time feedback
Author(s): **Nazanin Minaian**, **Daniel Fisher**, **Abdulkarem Sennain, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

13430-2 • 2:30 PM - 2:50 PM
Design and performance optimization of tubular IPMC actuators for biomedical applications
Author(s): **Nadia Triki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Saarland University, Department Systems Engineering (Germany); **Stefan Seelecke,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

13430-3 • 2:50 PM - 3:10 PM
Analysis of torsional response in pneumatic artificial muscles
Author(s): **Frank Cianciarulo**, **Eric Kim, Norman Wereley,** Univ. of Maryland, College Park (United States)

13431-6 • 3:10 PM - 3:30 PM
A tensegrity-based locomoting soft robot actuated by rolled dielectric elastomer transducers
Author(s): **Julian Kunze,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **David Herrmann,** Ostbayerische Technische Hochschule Regensburg (Germany); **Julian Kobes,** Univ. des Saarlandes (Germany); **Paul Motzki,** Univ. des Saarlandes (Germany), Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Stefan Seelecke**, **Gianluca Rizzello,** Univ. des Saarlandes (Germany); **Valter Böhm,** Ostbayerische Technische Hochschule Regensburg (Germany)

Coffee Break 3:30 PM - 4:00 PM

EAP-IN-ACTION DEMONSTRATION SESSION

17 March 2025 • 4:30 PM - 5:45 PM | Pavilion Ballroom C/D (Third Floor)
Session Chair(s): **Iain A. Anderson**, The Univ. of Auckland (New Zealand)
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. Attendees interact directly with technology developers and are given a "hands-on" experience with this emerging technology. The first Human/EAP-Robot Arm Wrestling Contest was held during this session of the 2005 EAPAD conference.

View the full list, including images, of the planned demonstrations here: spie.org/ssn/eap

13431-201 • 4:30 PM - 5:45 PM
DEMO: Dielectric elastomer actuators (DEAs) for the restoration of facial movements
Author(s): **Stefania Konstantinidi**, **Simon Holzer**, **Marc Favier**, **Andres Osorio Salazar**, **Yoan René Cyrille Civet, Yves Perriard,** EPFL (Switzerland)

13431-202 • 4:30 PM - 5:45 PM
DEMO: Locomoting DE-tensegrity soft-robot
Author(s): **Julian Kunze,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

13431-203 • 4:30 PM - 5:45 PM
DEMO: Sensitive and robust Tactile Fingertip™ technology for humanoid hands
Author(s): **Lenore Rasmussen, Calum R. Briggs,** Ras Labs., Inc. (United States)

13431-204 • 4:30 PM - 5:45 PM
DEMO: Stretch, release, and powered: silicone rubber-based batteries
Author(s): **Saul Ismael Utrera-Barrios**, **Christopher D. Woolridge**, **Romisa Fakhari,** Technical Univ. of Denmark (Denmark); **Anne Ladegaard Skov,** DTU Chemical Engineering (Denmark)

13431-205 • 4:30 PM - 5:45 PM
DEMO: The Circle: a thin elastomeric tunable lens with large focal range
Author(s): **Giacomo Sasso,** Queen Mary Univ. of London (United Kingdom), Univ. degli Studi di Firenze (Italy); **Stephen Remillard,** North Seattle Community College (United States); **James J. C. Busfield,** Queen Mary Univ. of London (United Kingdom); **Federico Carpi,** Univ. degli Studi di Firenze (Italy)

13431-206 • 4:30 PM - 5:45 PM
DEMO: Electroactive polymer powered bioinspired aquatic drones
Author(s): **Arne Bruns**, **Robin Milward Cooney,** The Univ. of Auckland (New Zealand); **Sina Martin,** Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); **Iain A. Anderson,** The Univ. of Auckland (New Zealand)

13431-207 • 4:30 PM - 5:45 PM
DEMO: Sensing rollers, robot skin, and active socks
Author(s): **Xiulun Yin**, **Sukhneet K. Dhillon**, **Charles Picciotto**, **Nima Bakshi**, **Chrys R. Morton**, **Ying Li**, **Jian Gao**, **Adriana J. Cowan**, **Rafaela Zamataro**, **Yiman Chen**, **Ruth Tau**, **Devyani McLaren**, **Rubia Guerra**, **Preeti Vyas**, **Sadan Wani**, **Justin K. M. Wyss**, **Chenglong Zhang**, **Siying Wu**, **Naghmeh Zaghi**, **Erfan Taatizadeh,** The Univ. of British Columbia (Canada); **Adam T. Clare,** The Univ. of British Columbia (United Kingdom); **Anoush Poursartip**, **Karon E. MacLean**, **John D. W. Madden,** The Univ. of British Columbia (Canada); **Ryusuke Ishizaki**, **Takeshi Ohsato,** Honda Research Institute Japan Co., Ltd. (Japan); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 3: ADVANCED SYSTEMS AND APPLICATIONS I

18 March 2025 • 10:30 AM - 12:00 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Anne Ladegaard Skov**, DTU Chemical Engineering (Denmark)

13431-7 • 10:30 AM - 11:10 AM
DEA tunable lenses: expanding horizons by extending the focal range (Keynote Presentation)
Author(s): **Giacomo Sasso**, **Evangelos Koliolios,** Queen Mary Univ. of London (United Kingdom); **Stephen Remillard,** North Seattle Community College (United States); **James J. C. Busfield,** Queen Mary Univ. of London (United Kingdom); **Federico Carpi,** Univ. degli Studi di Firenze (Italy)

13431-8 • 11:10 AM - 11:30 AM
An innovative dynamic hybrid metamaterial structure created for an ultra-light, highly precise and self-correcting Live Mirror
Author(s): **Gil Moretto,** Ctr. de Recherche Astrophysique de Lyon, CNRS (France); **Kritsadi Thetpraphi,** Walailak Univ. (Thailand); **Mariano L. Moreno,** Leibniz-Institut für Neue Materialien gGmbH (Germany); **Dipanjana Saha,** Ctr. de Recherche Astrophysique de Lyon (France); **Peter Konig,** Leibniz-Institut für Neue Materialien gGmbH (Germany); **Johannes Hoerber,** Neotech AMT GmbH (Germany); **Peter Rogin**, **Peter W. de Oliveira,** Leibniz-Institut für Neue Materialien gGmbH (Germany); **Vincent Bruyère,** SIMTEC (France); **Maud Langlois,** Ctr. de Recherche Astrophysique de Lyon, CNRS (France); **Vincenzo Cotroneo,** INAF - Osservatorio Astronomico di Brera (Italy); **Alejandro M. Paola**, **José A. Dieste,** Aitiip Centro Tecnológico (Spain); **Francesca Ribasti,** Ctr. de Recherche Astrophysique de Lyon, CNRS (France)

13431-9 • 11:30 AM - 12:00 PM
Ferroelectric polymers exhibiting giant cross energy coupling and self-actuated electrocaloric heat pump *(Invited Paper)*
Author(s): **Qiming M. Zhang**, **Xin Chen**, **Wenyi Zhu**, **Alex Rattner,** The Pennsylvania State Univ. (United States); **Shihai Zhang,** PolyK Technologies, LLC (United States); **Fabrice Domingues Dos Santos,** Piezotech S.A.S. (France); **Guanchun Rui,** The Pennsylvania State Univ. (United States)

Lunch Break 12:00 PM - 1:30 PM

SESSION 4: HYDRAULIC EAPS

18 March 2025 • 1:30 PM - 3:20 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **John D. W. Madden**, The Univ. of British Columbia (Canada)

13431-10 • 1:30 PM - 2:00 PM
From dielectric elastomers to zipping transducers: challenging the limits of EAP devices *(Invited Paper)*
Author(s): **Giacomo Moretti,** Univ. degli Studi di Trento (Italy)

13431-11 • 2:00 PM - 2:20 PM
High performance HASEL actuators as self-healing trigger devices for lithium-ion batteries
Author(s): **Johannes Ehrlich**, **Peter Löschke**, **Marie Richard-Lacroix**, **Johannes Ziegler, Holger Böse,** Fraunhofer-Institut für Silicatforschung ISC (Germany)

13431-12 • 2:20 PM - 2:40 PM
Electroadhesive electrohydraulic soft actuators
Author(s): **Takumi Shibuya**, **Momoki Kubota, Jun Shintake,** The Univ. of Electro-Communications (Japan)

13431-13 • 2:40 PM - 3:00 PM
HASEL actuators for underwater robots
Author(s): **Robin Milward Cooney**, **Masoumeh Hesam, Iain A. Anderson,** The Univ. of Auckland (New Zealand)

13431-14 • 3:00 PM - 3:20 PM
Vacuum-compatible electrostatic bellow muscles: a new frontier for space applications?
Author(s): **Ion-Dan Sîrbu,** Scuola Superiore Sant'Anna (Italy); **Arianna Mazzotta**, **Virgilio Mattoli,** Istituto Italiano di Tecnologia (Italy); **Daniele Bortoluzzi**, **Giacomo Moretti,** Univ. degli Studi di Trento (Italy); **Marco Fontana,** Scuola Superiore Sant'Anna (Italy)

Coffee Break 3:20 PM - 3:50 PM

SESSION 5: SOFT ROBOTICS

18 March 2025 • 3:50 PM - 5:40 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Iain A. Anderson**, The Univ. of Auckland (New Zealand)

13431-15 • 3:50 PM - 4:20 PM
Leveraging bi-stability and model-based approaches in dielectric elastomer soft robots *(Invited Paper)*
Author(s): **Gianluca Rizzello,** Univ. des Saarlandes (Germany)

13431-16 • 4:20 PM - 4:40 PM
Autonomous soft robotic with distributed DE-electronic networks
Author(s): **Jian Chen**, **Andreas Richter,** TU Dresden (Germany); **E.-F. Markus Vorrath,** TU Dresden (Germany), The Univ. of Auckland (New Zealand)

13431-17 • 4:40 PM - 5:00 PM
Novel soft robotic hand gripper with multilayer DEAs for minimal energy consumption
Author(s): **Mario De Lorenzo**, **Junhao Ni**, **Uwe Marschner**, **Andreas Richter, E.-F. Markus Vorrath,** TU Dresden (Germany)

13431-18 • 5:00 PM - 5:20 PM
Sensitive and robust tactile fingertips for robotic grippers and humanoid hands
Author(s): **Lenore Rasmussen**, **Calum R. Briggs**, **Peter N. Vicars,** Ras Labs., Inc. (United States); **Yanni Sporidis,** Ras Labs. (United States)

13431-68 • 5:20 PM - 5:40 PM
Sensing like a fish: robust soft sensors for fish-like robots
Author(s): **Arne Bruns**, **Gabor Papotti, Iain A. Anderson,** The Univ. of Auckland (New Zealand)

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13431-46 • 6:00 PM - 8:00 PM
Development and validation of a dielectric-elastomer-based artificial urinary sphincter
Author(s): **Quentin De Menech**, **Andres Osorio Salazar**, **Marc Favier**, **Armando Walter**, **Paolo Germano**, **Yoan Civet, Yves Perriard,** EPFL (Switzerland)

13431-47 • 6:00 PM - 8:00 PM
Fully printable plasticized fluorinated terpolymers for mirror active morphing control
Author(s): **Colin Lesenne**, **David Audigier**, **Pierre-Jean Cottinet, Jean-Fabien Capsal,** Institut National des Sciences Appliquées de Lyon (France)

13431-48 • 6:00 PM - 8:00 PM
Soft generators for roadway energy harvesting: a preliminary study on design and fabrication of stacked integrated dielectric elastomer architectures using liquid silicone rubber composites
Author(s): **Gregorio Boccalero,** Lab. de Génie Électrique de Grenoble (France); **Delong He**, **Jinbo Bai,** Lab. de Mécanique Paris-Saclay (France); **Simon Chesné,** Lab. de Mécanique des Contacts et des Structures (France); **Jean-Paul Yonnet, Alain Sylvestre,** Lab. de Génie Électrique de Grenoble (France)

13431-49 • 6:00 PM - 8:00 PM
Maximizing power generation of bi-stable electrostatic energy harvesters in river flow scenarios
Author(s): **Lennart Heib,** Univ. des Saarlandes (Germany); **Giacomo Moretti,** Univ. degli Studi di Trento (Italy); **Gianluca Rizzello,** Univ. des Saarlandes (Germany)

13431-50 • 6:00 PM - 8:00 PM
Model-based investigation of distributed sensing in dielectric elastomer membranes
Author(s): **Gianluca Rizzello,** Univ. des Saarlandes (Germany); **Giacomo Moretti,** Univ. degli Studi di Trento (Italy)

13431-52 • 6:00 PM - 8:00 PM
Development of a broadband underwater acoustic receiver of flextensional type
Author(s): **Yongrae Roh,** Kyungpook National Univ. (Korea, Republic of)

13431-53 • 6:00 PM - 8:00 PM
Multi-layer dielectric elastomers managing swelling of battery systems
Author(s): **Sina Martin**, **Jörg Franke, Florian Risch,** Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany)

13431-54 • 6:00 PM - 8:00 PM
An AgNW/graphene hybrid electrode for durable dielectric elastomer actuator
Author(s): **Haleh Shahsa,** Univ. of Toronto (Canada)

13431-55 • 6:00 PM - 8:00 PM
Force measurements of planar dielectric elastomer actuators
Author(s): **Simon Holzer**, **Stefania Konstantinidi**, **Yoan Civet, Yves Perriard,** EPFL (Switzerland)

13431-56 • 6:00 PM - 8:00 PM
Laser-induced graphene electrodes for electrostatic transducers
Author(s): **Anna Chiara Bressi,** Scuola Superiore Sant'Anna (Italy); **Federico Bertolucci,** Univ. degli Studi di Bologna (Italy); **Ion-Dan Sîrbu,** Scuola Superiore Sant'Anna (Italy); **Rocco Vertechy,** Univ. degli Studi di Bologna (Italy); **Francesco Greco, Marco Fontana,** Scuola Superiore Sant'Anna (Italy)

13431-58 • 6:00 PM - 8:00 PM
Development of a dual-layer structured piezoelectric film for haptic applications
Author(s): **Zhenjin Wang**, **Tomoaki Matsuyama**, **Hiroki Kurita, Fumio Narita,** Tohoku Univ. (Japan)

13431-60 • 6:00 PM - 8:00 PM
Influence of solvent on the piezoresistive properties of carbon-particle-filled elastomers
Author(s): **Carola H. Böhmer**, **Markus Koenigsdorff**, **Joyappa Paradanda Somaiah**, **Johannes Mersch, Gerald Gerlach,** TU Dresden (Germany)

13431-61 • 6:00 PM - 8:00 PM
Robust, low-cost, and stretchable matrix tactile sensor array with anti-ghosting capabilities
Author(s): **Junhao Ni**, **Andreas Richter**, **Gerald Gerlach,** TU Dresden (Germany); **E.-F. Markus Vorrath,** TU Dresden (Germany), The Univ. of Auckland (New Zealand)

13431-62 • 6:00 PM - 8:00 PM
Investigation of local strains in circular dielectric elastomer actuators
Author(s): **Hans Liebscher**, **Markus Koenigsdorff**, **Carola H. Böhmer**, **Johannes Mersch, Gerald Gerlach,** TU Dresden (Germany)

13431-63 • 6:00 PM - 8:00 PM
High-voltage switches based on flexible dielectric elastomers
Author(s): **Carmen Perri,** Univ. des Saarlandes (Germany); **Mario Cerino,** University of applied science (Germany); **Tobias Weber,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **John Heppe,** University of applied science (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

13431-64 • 6:00 PM - 8:00 PM
Multi-dimensional negative-stiffness thermoplastic bias mechanisms for high-stroke dielectric elastomer actuator arrays
Author(s): **Saverio Addario,** Univ. des Saarlandes (Germany); **Alberto Priuli**, **Sebastian Gratz-Kelly,** Lehrstuhl für intelligente Materialsysteme (Germany); **Tobias Willian,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Günter Schultes,** Hochschule für Technik und Wirtschaft des Saarlandes (Germany); **Stefan S. Seelecke, Gianluca Rizzello,** Univ. des Saarlandes (Germany)

13431-66 • 6:00 PM - 8:00 PM
Dielectric elastomer switch with the potential as bricks of cooperative multi-actuator system
Author(s): **Chen Jiao**, **Ashwani S. Tripathi,** TU Dresden (Germany); **Andreas L. P. Hubracht**, **Albert Thelemann,** Technische Univ. Berlin (Germany); **Uwe Marschner**, **Andreas Richter,** TU Dresden (Germany); **Jürgen Maas,** Technische Univ. Berlin (Germany); **E.-F. Markus Vorrath,** TU Dresden (Germany), The Univ. of Auckland (New Zealand)

13431-67 • 6:00 PM - 8:00 PM
Electromechanical analysis of EPIC actuators in varifocal lenses
Author(s): **John Faccinto**, **Preston Giles**, **Jonathan Barboza-Zarate, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

13431-70 • 6:00 PM - 8:00 PM
On the first-order numerical approximation of the exact transfer function of a multi-physics model of IPMC sensors
Author(s): **Kosetsu Ishikawa,** Toyohashi Univ. of Technology (Japan); **Kinji Asaka,** Ritsumeikan Univ. (Japan); **Zicai Zhu,** Xi'an Jiaotong Univ. (China); **Toshiki Hiruta, Kentaro Takagi,** Toyohashi Univ. of Technology (Japan)

13431-71 • 6:00 PM - 8:00 PM
Silicone rubbers as energy storage
Author(s): **Saul Ismael Utrera-Barrios**, **Romisa Fakhari**, **Christopher D. Woolridge, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

13431-72 • 6:00 PM - 8:00 PM
Evaluating post-anneal stretch on twisted and coiled actuators for compression therapy in textiles
Author(s): **Sukhneet K. Dhillon**, **Ying Li**, **Anastasia Vogl**, **Adriana J. Cowan**, **Rafaela Zamataro**, **Kentaro Takagi, John D. W. Madden,** The Univ. of British Columbia (Canada)

13431-73 • 6:00 PM - 8:00 PM
3D-printed stretchable soft sensor for stress, shear, and proximity
Author(s): **Jian Gao,** The Univ. of British Columbia (Canada); **Zhuoheng Wei,** The Chinese Univ. of Hong Kong, Shenzhen (China); **Xiulun Yin,** The Univ. of British Columbia (Canada); **Jian Zhu,** The Chinese Univ. of Hong Kong, Shenzhen (China); **John D. W. Madden,** The Univ. of British Columbia (Canada)

13431-74 • 6:00 PM - 8:00 PM
Scalable wet-spun BaTiO3-incorporated PVDF-TrFE microfibers for pressure-sensing textiles
Author(s): **Siying Wu**, **Xiulun Yin**, **Addie Bahi, John D. W. Madden,** The Univ. of British Columbia (Canada)

13431-75 • 6:00 PM - 8:00 PM
Smart roller: normal and three-axis stress measurement sensor array for automated fiber placement
Author(s): **Xiulun Yin**, **Charles Picciotto**, **Yiman Chen**, **Nima Bakhshi**, **Ziqiang Chen**, **Jian Gao**, **Hanlin Yu**, **Adam T. Clare**, **Anoush Poursartip, John D. W. Madden,** The Univ. of British Columbia (Canada)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 6: HAPTICS

19 March 2025 • 10:30 AM - 12:30 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Kentaro Takagi**, Toyohashi Univ. of Technology (Japan)

13431-19 • 10:30 AM - 11:00 AM
Wearable dielectric elastomer haptic devices *(Invited Paper)*
Author(s): **Qibing Pei, Yuxuan Guo,** Univ. of California, Los Angeles (United States)

13431-20 • 11:00 AM - 11:20 AM
A flexible high-fill-factor haptic interface integrating electrostatic valves
Author(s): **Xintong Tong, Herbert Shea,** EPFL (Switzerland)

13431-21 • 11:20 AM - 11:40 AM
Integrated textile-biased dielectric elastomer feedback actuator
Author(s): **Sebastian Gratz-Kelly,** Lehrstuhl für intelligente Materialsysteme (Germany), Univ. des Saarlandes (Germany); **Gianluca Rizzello,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Giacomo Moretti,** Univ. degli Studi di Trento (Italy)

13431-51 • 11:40 AM - 12:00 PM **(CANCELLED)**
A haptic interface with the integration of sensing and actuating based on PVC gel AE-skin
Author(s): **Chengbo Tian**, **Min Yu, Guoxiao Yin,** Nanjing Univ. of Aeronautics and Astronautics (China)

13431-22 • 12:00 PM - 12:30 PM
From the lab to the customer: an EAP commercialisation story *(Invited Paper)*
Author(s): **Benjamin M. O'Brien,** StretchSense (New Zealand)

Lunch Break 12:30 PM - 2:00 PM

SESSION 7: ADVANCED SYSTEMS AND APPLICATIONS II

19 March 2025 • 2:00 PM - 3:40 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Paul Motzki**, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

13431-23 • 2:00 PM - 2:40 PM
The Artificial Muscle Center: dedicated implant projects for soft robotics (Keynote Presentation)
Author(s): **Yves Perriard,** EPFL (Switzerland)

13431-69 • 2:40 PM - 3:00 PM
Stacking up color: enhancing color rendering in the three-primary colors based organic electrochromic devices
Author(s): **Frédéric Vidal**, **Pierre-Henri Aubert, Xavier Sallenave,** CY Cergy Paris Univ. (France)

13431-25 • 3:00 PM - 3:20 PM
Hybrid smart actuator combining electroactive polymers with superelastic TiNiCuCo
Author(s): **Benjamin Zemlin**, **Julian Kunze,** Univ. des Saarlandes (Germany); **Bobby Cozette,** Christian-Albrechts-Univ. zu Kiel (Germany); **Sabrina Curtis,** Khanjur (United States); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany); **Eckardt Quant,** Christian-Albrechts-Univ. zu Kiel (Germany); **Paul Motzki,** Univ. des Saarlandes (Germany)

13431-78 • 3:20 PM - 3:40 PM
S3 Wave Energy Converter story
Author(s): **Emmanuel Taine,** Univ. of Southampton (United Kingdom), SBM Offshore (Monaco); **Aurore Claverie**, **Francois Caille**, **Shili Seima**, **Nicolas Fourdilis,** SBM Offshore (Monaco); **Jean-Marc Hendrikse,** SBM Offshore (France); **Regis Boulard,** SBM Offshore (Monaco)

Coffee Break 3:40 PM - 4:10 PM

SESSION 8: NOVEL EAP FABRICATION METHODS

19 March 2025 • 4:10 PM - 6:00 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Stefan S. Seelecke**, Univ. des Saarlandes (Germany)

13431-27 • 4:10 PM - 4:40 PM
NEXIPAL®: industrial manufacturing of EAP transducers *(Invited Paper)*
Author(s): **Johannes Neuwirth, Andreas Köllnberger,** Wacker Chemie AG (Germany)

13431-65 • 4:40 PM - 5:00 PM
Enhancing dielectric properties of PDMS composites through particle alignment via dielectrophoretic method
Author(s): **Leonardus Depari**, **Milan Shrestha, Hang Tong Edwin Teo,** Nanyang Technological Univ. (Singapore)

13431-31 • 5:00 PM - 5:20 PM
Optimizing 3D printing parameters for enhanced electroactive PVDF formation
Author(s): **Ayatullah Elsayed**, **Garrett Melenka, Siu Ning (Sunny) Leung,** York Univ. (Canada)

13431-59 • 5:20 PM - 5:40 PM
Enhancing piezoelectric and optical properties of PVDF-TrFE films: the role of annealing and cooling rates
Author(s): **Milan Shrestha**, **Leonardus Depari**, **Abhinay Shreeram**, **Hang Tong Edwin Teo**, **Syed Ikhwan Bin Syed Ismail Alsagoff,** Nanyang Technological Univ. (Singapore); **Michael Renaud, Maharaja Sankaralingam,** Continental Automotive Singapore Pte Ltd (Singapore)

13431-32 • 5:40 PM - 6:00 PM
Dielectric elastomer fiber actuators: empirical studies and simulations
Author(s): **Magdalena Skowyra**, **Romisa Fakhari**, **Florina-Elena Comanici**, **Christopher D. Woolridge**, **Sina Jafarzadeh, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 9: EAP FIBER TECHNOLOGY

20 March 2025 • 10:30 AM - 11:50 AM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Kentaro Takagi**, Toyohashi Univ. of Technology (Japan)

13431-34 • 10:30 AM - 10:50 AM
Advancing textile thread transducers for airflow measurement and characterization
Author(s): **Fabrice Seguin**, **Hankai Wu**, **Laurent Dupont,** IMT Atlantique Bretagne-Pays de la Loire (France); **Sébastien Peralta,** CY Cergy Paris Univ. (France); **Cédric Cochrane**, **Vladan Koncar,** Ecole Nationale Supérieure des Arts et Industries Textiles (France); **Cyril Lahuec, Alexandre Khaldi,** IMT Atlantique Bretagne-Pays de la Loire (France)

13431-35 • 10:50 AM - 11:10 AM
Fiber-reinforced strip DEAs with uniform stretch state
Author(s): **Markus Koenigsdorff**, **Carola H. Böhmer,** TU Dresden (Germany); **Stefania Konstantinidi,** EPFL (Switzerland); **Petr Osipov**, **Johannes Mersch,** TU Dresden (Germany); **Yves Perriard,** EPFL (Switzerland); **Gerald Gerlach,** TU Dresden (Germany)

13431-36 • 11:10 AM - 11:30 AM
Contractile dielectric elastomer actuators with embedded active and passive structured fibres
Author(s): **Stefania Konstantinidi,** EPFL (Switzerland); **Markus Koenigsdorff,** TU Dresden (Germany); **Simon Holzer**, **Yoan Civet,** EPFL (Switzerland); **Gerald Gerlach,** TU Dresden (Germany); **Yves Perriard,** EPFL (Switzerland)

13431-33 • 11:30 AM - 11:50 AM **(CANCELLED)**
Fabric actuator combining SMAs and electrostatic clutches
Author(s): **Huapeng Zhang, Herbert Shea,** EPFL (Switzerland)

Lunch Break 11:50 AM - 1:20 PM

SESSION 10: EXPERIMENTAL METHODS

20 March 2025 • 1:20 PM - 2:20 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Giacomo Moretti**, Univ. degli Studi di Trento (Italy)

13431-37 • 1:20 PM - 1:40 PM
Detection of inhomogeneities in dielectric elastomer transducers using thermal imaging
Author(s): **Tobias Willian,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13431-39 • 1:40 PM - 2:00 PM
Characterization of IPMC using scanning electrochemical microscopy
Author(s): **Jung H. Lee, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

13431-40 • 2:00 PM - 2:20 PM
ADEPT: automated dielectric elastomer actuator performance-tester
Author(s): **Tobias Weber**, **Bettina Fasolt**, **Tobias Willian,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Univ. des Saarlandes (Germany); **Sophie Nalbach,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

Coffee Break 2:20 PM - 2:50 PM

SESSION 11: IONIC EAPS

20 March 2025 • 2:50 PM - 4:10 PM | Pavilion Ballroom D (Third Floor)
Session Chair(s): **Stefan S. Seelecke**, Saarland Univ. (Germany)

13431-41 • 2:50 PM - 3:10 PM
An ionic liquid grafted silicone elastomer for artificial muscle applications
Author(s): **Leo Kershaw**, **Liyun Yu, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

13431-42 • 3:10 PM - 3:30 PM
Optimizing actuation in ionic actuators with ionic liquids: the role of ionic liquid ions
Author(s): **Alain Boldini,** New York Institute of Technology (United States)

13431-43 • 3:30 PM - 3:50 PM
Vitrimer ionogels for self-healable flexible ionotronics
Author(s): **Khoa Bui,** CY Cergy Paris Univ. (France), The Univ. of Warwick (United Kingdom); **Giao T. M. Nguyen**, **Cedric Vancaeyzeele**, **Frederic Vidal,** CY Cergy Paris Univ. (France); **Xiao Hu**, **Chaoying Wan,** The Univ. of Warwick (United Kingdom); **Cédric Plesse,** CY Cergy Paris Univ. (France)

13431-45 • 3:50 PM - 4:10 PM
Multi-stimulus responsive soft actuators: integrating bio-inspired designs and intelligent material systems
Author(s): **Indrek Must**, **Kadri Ann Valdur**, **Marie Vihmar**, **Yauheni Sarokin,** Univ. of Tartu (Estonia); **Longfei Chang,** Univ. of Tartu (Estonia), Hefei Univ. (China); **Alvo Aabloo,** Univ. of Tartu (Estonia)

ON-DEMAND POSTERS

The posters listed below are available exclusively for online viewing during the week of SPIE Smart Structures + Nondestructive Evaluation
2025.

13431-57
Tubular actuator using dielectric elastomers and conductive fabric for orthotic applications
Author(s): **Denizcan Koc**, **Jason Chen, Zheng Chen,** Univ. of Houston (United States)

CONFERENCE 13432

Active and Passive Smart Structures and Integrated Systems XIX

17 - 20 March 2025 | Junior Ballroom C (Third Floor)

Conference Chair(s): **Xiaopeng Li,** Toyota Research Institute, North America (United States)

Conference Co-Chair(s): **Yangyang Chen,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Guoliang Huang,** Peking Univ. (China); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Christopher Sugino,** Stevens Institute of Technology (United States); **Serife Tol,** Univ. of Michigan (United States); **Jinkyu Yang,** Seoul National Univ. (Korea, Republic of)

Program Committee: **Amir H. Alavi,** Univ. of Pittsburgh (United States); **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,** SUNY Korea (Korea, Republic of); **Amir H. Danesh-Yazdi,** Rose-Hulman Institute of Technology (United States); **Carlos De Marqui,** Univ. of São Paulo (Brazil); **Alper Erturk,** Georgia Institute of Technology (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); **Jae-Hung Han,** KAIST (Korea, Republic of); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Daniel J. Inman,** Univ. of Michigan (United States); **Hyung-Jo Jung,** KAIST (Korea, Republic of); **Andrew Lee,** North Carolina State Univ. (United States); **Jung-Ryul Lee,** KAIST (Korea, Republic of); **Soobum Lee,** Univ. of Maryland, Baltimore County (United States); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Junrui Liang,** ShanghaiTech Univ. (China); **Zhu Mao,** Worcester Polytechnic Institute (United States); **Jochen Mueller,** Johns Hopkins Univ. (United States); **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Fabio Semperlotti,** Purdue Univ. (United States); **Shima Shahab,** Virginia Polytechnic Institute and State Univ. (United States); **Yi-Chung Shu,** National Taiwan Univ. (Taiwan); **Henry A. Sodano,** Univ. of Michigan (United States); **Yuyang Song,** Toyota Motor North America, Inc. (United States); **Jiong Tang,** Univ. of Connecticut (United States); **Lihua Tang,** The Univ. of Auckland (New Zealand); **Kon-Well Wang,** Univ. of Michigan (United States); **Ya 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,** Univ. of Michigan (United States)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:

- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

MONDAY KEYNOTE

17 March 2025 • 10:30 AM - 11:15 AM | Junior Ballroom C (Third Floor)
Session Chair(s): **Xiaopeng Li**, Toyota Research Institute, North America (United States)

13432-1 • 10:30 AM - 11:15 AM
Towards non-Abelian behavior in topological continuous elastic waveguides (Keynote Presentation)
Author(s): **Fabio Semperlotti,** Purdue Univ. (United States)

SESSION 1: Metamaterials and Metastructures I

17 March 2025 • 11:15 AM - 12:15 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Xiaopeng Li**, Toyota Research Institute, North America (United States); **Yangyang Chen**, Hong Kong Univ. of Science and Technology (Hong Kong, China)

13432-2 MOVED to Session 3 at 5:35 PM • 11:15 AM - 11:35 AM

13432-3 • 11:35 AM - 11:55 AM
Modeling and performance of a metamaterial beam with magnetically coupled resonators
Author(s): **Shuo Wang**, **Chunbo Lan,** Nanjing Univ. of Aeronautics and Astronautics (China); **Guobiao Hu,** The Hong Kong Univ. of Science and Technology (Guangzhou) (China); **Yabin Liao,** Embry-Riddle Aeronautical Univ. (United States)

13432-4 • 11:55 AM - 12:15 PM
Computational design of a large dataset of viscoelastic metastructures for inverse design in low-frequency vibration attenuation
Author(s): **Robin Turlin**, **Thibaut Hirschler,** Univ. de Technologie de Belfort-Montbéliard (France); **Mahdi Bodaghi,** Nottingham Trent Univ. (United Kingdom); **Frédéric Demoly,** Univ. de Technologie de Belfort-Montbéliard (France)

Lunch Break 12:15 PM - 1:45 PM

SESSION 2: PHONONIC CRYSTALS AND ACOUSTIC/ELASTIC METAMATERIALS

17 March 2025 • 1:45 PM - 3:05 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Guoliang Huang**, Peking Univ. (China); **Wei-Hsin Liao**, The Chinese Univ. of Hong Kong (Hong Kong, China)

13432-6 • 1:45 PM - 2:05 PM
Memory-integrated wave-based mechanical computing circuits
Author(s): **Mohamed Mousa**, **Ethan Fort, Mostafa A. Nouh,** Univ. at Buffalo (United States)

13432-7 • 2:05 PM - 2:25 PM
Attenuation of Tollmien-Schlichting waves using a subsurface acoustic diode
Author(s): **Hosam Yousef**, **Rico Schmidt,** Univ. at Buffalo (United States); **Alex Boueri**, **Indradip Roy,** Purdue Univ. (United States); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Carlo Scalo,** Purdue Univ. (United States)

13432-8 • 2:25 PM - 2:45 PM
Dynamic cloaking in elastic thin plates using architected metamaterials
Author(s): **Léo Pradier**, **Baptiste Chomette,** Lab. de Tribologie et Dynamique des Systèmes (France); **Arnaud Hubert,** Lab. Roberval, Univ. de Technologie Compiègne (France); **Manuel Collet,** Lab. de Tribologie et Dynamique des Systèmes (France)

13432-10 • 2:45 PM - 3:05 PM
Wave propagation in a defective locally resonant phononic beam structure
Author(s): **Subhasish Sarkar, Srinivasan Gopalakrishnan,** Indian Institute of Science, Bengaluru (India)

Coffee Break 3:05 PM - 3:55 PM

SESSION 3: PIEZOELECTRIC METAMATERIALS

17 March 2025 • 3:55 PM - 5:55 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Serife Tol**, Univ. of Michigan (United States); **Hyung-Jo Jung**, KAIST (Korea, Republic of)

13432-12 • 3:55 PM - 4:15 PM
Tunable fluid-like metasurface for elastic mode decoupling
Author(s): **YeJeong Shin, Joo Hwan Oh,** Seoul National Univ. (Korea, Republic of)

13432-13 • 4:15 PM - 4:35 PM
Experimental demonstration of surface acoustic wave mode conversion using piezoelectric metamaterials
Author(s): **Joseph Shedleski**, **Sai Aditya Raman Kuchibhatla, Alper Erturk,** Georgia Institute of Technology (United States)

13432-14 • 4:35 PM - 4:55 PM
A nonlinear diatomic piezoelectric metastructure: interleaving linear and nonlinear oscillators for wideband attenuation bands
Author(s): **Luan Angelino**, **Jaime Mosquera-Sánchez, Carlos de Marqui,** Univ. de São Paulo (Brazil)

13432-15 • 4:55 PM - 5:15 PM
Distributed pressure estimation using a piezoelectric array in a cone structure for hypersonic applications
Author(s): **Joseph Shedleski,** Georgia Institute of Technology (United States); **Christopher Sugino,** Stevens Institute of Technology (United States); **Ihab El-Kady,** Sandia National Labs. (United States); **Alper Erturk,** Georgia Institute of Technology (United States)

13432-54 • 5:15 PM - 5:35 PM
A piezoelectric-based, high-frequency flow valve for non-contact excitation of turbomachinery for flutter boundary mapping
Author(s): **Sydney A. Giannuzzi**, **Corbin Gustafson,** Univ. of Central Florida (United States); **Duane McCormick**, **Ulf Jonsson**, **Milos Ilak,** Raytheon (United States); **Jeffrey L. Kauffman,** Univ. of Central Florida (United States)

13432-2 • 5:35 PM - 5:55 PM
Time refraction and reflection in temporal mechanical metabeams: theory and physical observation
Author(s): **Shaoyun Wang,** Univ. of Missouri (United States); **Guoliang Huang,** Peking Univ. (China); **Nan Shao,** Univ. of Missouri (United States)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: METAMATERIALS AND METASTRUCTURES II

18 March 2025 • 10:30 AM - 11:50 AM | Junior Ballroom C (Third Floor)
Session Chair(s): **Fabio Semperlotti**, Purdue Univ. (United States); **Joo Hwan Oh**, Seoul National Univ. (Korea, Republic of)

13432-20 • 10:30 AM - 10:50 AM
Dispersion analysis of EMAT-based metasurface augmented with synthetic impedances for vibration isolation
Author(s): **Joshua Dupont**, **Richard Christenson, Jiong Tang,** Univ. of Connecticut (United States)

13432-22 • 10:50 AM - 11:10 AM
Stress guides in generic static mechanical metamaterials
Author(s): **Aoxi Wang, Changqing Chen,** Tsinghua Univ. (China)

13432-23 • 11:10 AM - 11:30 AM
Merging multiple flexural wave bandgaps in locally resonant phononic beam structure
Author(s): **Subhasish Sarkar, Srinivasan Gopalakrishnan,** Indian Institute of Science, Bengaluru (India)

13432-24 • 11:30 AM - 11:50 AM
Investigating the effects of auxetic structures on galloping energy harvesting performance
Author(s): **Juntong Xing**, **Masoud Rezaei, Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China)

Lunch Break 11:50 AM - 1:20 PM

SESSION 5: AUTONOMOUS MATERIALS AND STRUCTURES

18 March 2025 • 1:20 PM - 2:20 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Mostafa A. Nouh**, Univ. at Buffalo (United States); **Changqing Chen**, Tsinghua Univ. (China)

13432-17 • 1:20 PM - 1:40 PM
Self-powered frequency tuning via energy harvesting
Author(s): **Masoud Rezaei,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Michael Ian Friswell,** Swansea Univ. (United Kingdom); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China)

13432-18 • 1:40 PM - 2:00 PM
Optimization of a novel electromagnetic energy harvester for road infrastructures
Author(s): **Hissam Karim**, **Gregorio Boccalero**, **Florian Dumas, Alain Sylvestre,** Lab. de Génie Électrique de Grenoble (France)

13432-19 • 2:00 PM - 2:20 PM
Resource-efficient FPGA-based machine learning control for active structural damping in shock environments
Author(s): **Trotter Roberts**, **Joud Satme**, **Puja Chowdhury**, **Austin R. J. Downey, Jason Bakos,** Univ. of South Carolina (United States)

SESSION 6: WILLIS METAMATERIALS

18 March 2025 • 2:20 PM - 3:20 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Jiong Tang**, Univ. of Connecticut (United States); **Guoliang Huang**, Peking Univ. (China)

13432-44 • 2:20 PM - 2:40 PM
Biasing self-oscillations in active wires via asymmetric Willis viscosity
Author(s): **Xingbo Pu, Yangyang Chen,** Hong Kong Univ. of Science and Technology (Hong Kong, China)

13432-45 • 2:40 PM - 3:00 PM
Nonreciprocal controllable Willis longitudinal metasurface
Author(s): **Sungwon Lee,** Seoul National Univ. (Korea, Republic of); **Nan Shao,** Univ. of Missouri (United States); **Qian Wu,** Duke Univ. (United States); **Honghua Qian,** Univ. of Missouri (United States); **Joo Hwan Oh,** Seoul National Univ. (Korea, Republic of); **Guoliang Huang,** Peking Univ. (China)

13432-46 • 3:00 PM - 3:20 PM
Retrieving method for elastic Willis metamaterials with mode couplings
Author(s): **Sang Vin Jang**, **Hayoung Chung,** Ulsan National Institute of Science and Technology (Korea, Republic of); **Joo Hwan Oh,** Seoul National Univ. (Korea, Republic of)

Coffee Break 3:20 PM - 4:10 PM

SESSION 7: PASSIVE AND ACTIVE VIBRATION ISOLATION SYSTEMS

18 March 2025 • 4:10 PM - 5:10 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Austin R. J. Downey**, Univ. of South Carolina (United States)

13432-27 • 4:10 PM - 4:30 PM
Design guidelines on piezoelectric transducers properties for multilayer structures hybrid damping: analytical predictions and experimental comparisons
Author(s): **Corentin Camus**, **Kerem Ege**, **Pierre-Jean Cottinet,** Institut National des Sciences Appliquées de Lyon (France); **Lambert Saunier,** SMAC (France); **Alice Aubry,** Pytheas Technology (France); **Claude Richard,** Institut National des Sciences Appliquées de Lyon (France)

13432-30 • 4:30 PM - 4:50 PM **(CANCELLED)**
Kresling origami-inspired nonlinear vibration absorber with quasi-zero stiffness
Author(s): **Yi Wu,** The Univ. of Auckland (New Zealand); **Hesheng Han,** Sun Yat-Sen Univ. (China); **Lihua Tang**, **Vladislav Sorokin**, **Muxuan Guo, Kean C. Aw,** The Univ. of Auckland (New Zealand)

13432-31 • 4:50 PM - 5:10 PM
High-static low-dynamic stiffness systems: a study on quasi-zero stiffness mechanisms for optimal vibration isolation
Author(s): **Houcheng Wu,** Chiang Mai Univ. (Thailand), National Astronomical Research Institute of Thailand (Thailand); **Popefa Charoenvicha**, **Tanawish Masri**, **Pakorn Khonsri**, **Shariff Manuthasna**, **Thanayuth Panyalert**, **Peerapong Torteeka,** National Astronomical Research Institute of Thailand (Thailand); **Chakkapong Chamroon,** Chiang Mai Univ. (Thailand)

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13432-62 • 6:00 PM - 8:00 PM
Analytical and experimental verification of morphing bistable composites for aerospace thermal management
Author(s): **Maxwell Booth**, **Juan Ortega**, **Ossyris Bury, Jeffrey L. Kauffman,** Univ. of Central Florida (United States)

13432-63 • 6:00 PM - 8:00 PM
Design of weight function for using response level in active vibration control of elevator rope
Author(s): **Tomohito Shimazu**, **Nanako Miura,** Kyoto Institute of Technology (Japan); **Tetsu Ogawa,** Toshiba Elevator and Building Systems Corp. (Japan)

13432-64 • 6:00 PM - 8:00 PM
Multiband reflective optical tracking system
Author(s): **Po-Yu Hsu**, **Jiun-Woei Huang,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan); **Shu-Sheng Lee,** National Taiwan Ocean Univ. (Taiwan); **Hsiang-Chieh Lee,** Graduate Institute of Photonics and Optoelectronics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan); **Chih-Kung Lee,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan)

13432-65 • 6:00 PM - 8:00 PM
On the implementation of flexible pendulum vibration absorbers in a multi degree-of-freedom system
Author(s): **Jessus Edmman Hernández-Ibarra**, **Hugo Francisco Abundis-Fong,** Instituto Tecnológico de Pachuca, Tecnológico Nacional de México (Mexico); **Luis Gerardo Trujillo-Franco,** Instituto Politécnico Nacional (Mexico); **Alejandro E. Dzul,** Instituto Tecnologico de la Laguna, Tecnológico Nacional de México (Mexico)

13432-66 • 6:00 PM - 8:00 PM
Energy harvesting from flow induced vibration by using an energy concentration pipe based on passive jet control
Author(s): **Junlei Wang,** Zhengzhou Univ. (China)

13432-50 • 6:00 PM - 8:00 PM
Solution to the contact problem of multilayer capacitive dielectric elastomer sensor: laser-engraved elastomer buffer layer
Author(s): **Artem Prokopchuk**, **Arthur Ewert**, **Johannes D. M. Menning**, **Andreas Richter**, **Berthold Schlecht**, **Thomas Wallmersperger**, **E.-F. Markus Vorrath, Mario De Lorenzo,** TU Dresden (Germany)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 8: ENERGY HARVESTING AND SCAVENGING I

19 March 2025 • 10:30 AM - 11:50 AM | Junior Ballroom C (Third Floor)
Session Chair(s): **Jae-Hung Han**, KAIST (Korea, Republic of); **Guoliang Huang**, Peking Univ. (China)

13432-33 • 10:30 AM - 10:50 AM
Harnessing human motion energy by a rolling-swing electromagnetic energy harvester with counter-rotations
Author(s): **Peilun Yin**, **Lihua Tang**, **Cuipeng Xia, Kean C. Aw,** The Univ. of Auckland (New Zealand)

13432-36 • 10:50 AM - 11:10 AM **(CANCELLED)**
A multi-directional and multi-modal galloping piezoelectric energy harvester with V-shaped beam
Author(s): **Cuipeng Xia**, **Lihua Tang,** The Univ. of Auckland (New Zealand); **Tianle Meng,** Imperial College London (United Kingdom); **Kean C. Aw, Peilun Yin,** The Univ. of Auckland (New Zealand)

13432-37 • 11:10 AM - 11:30 AM
Predicting dynamic responses of piezoelectric energy harvesters using long short-term memory (LSTM) neural networks
Author(s): **Yabin Liao,** Embry-Riddle Aeronautical Univ. (United States); **Feng Qian,** The Pennsylvania State Univ. (United States); **Ruiyang Zhang,** Southeast Univ. (China); **Chunbo Lan,** Nanjing Univ. of Aeronautics and Astronautics (China)

13432-38 • 11:30 AM - 11:50 AM
Investigating electrode pattern effects on piezoelectric energy harvesting using cGAN and eFEA integration
Author(s): **Chin-Yu Bai**, **Mikail F. Lumentut, Yi-Chung Shu,** National Taiwan Univ. (Taiwan)

Lunch Break 11:50 AM - 1:30 PM

SESSION 9: ENERGY HARVESTING AND SCAVENGING II

19 March 2025 • 1:30 PM - 2:10 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Peilun Yin**, The Univ. of Auckland (New Zealand); **Hyung-Jo Jung**, KAIST (Korea, Republic of)

13432-39 • 1:30 PM - 1:50 PM
A MEMS electrostatic energy harvester with quasi-zero stiffness control for ultra-low-frequency operation
Author(s): **Cuong Phu Le,** Norwegian Univ. of Science and Technology (Norway); **Binh D. Truong,** Univ. of Michigan (United States)

13432-40 • 1:50 PM - 2:10 PM
Vibration modes switching induced triple frequency up-converting and the application in wireless sensing
Author(s): **Jiawen Xu**, **Bihan Wu, Jingxiong Wang,** Southeast Univ. (China)

SESSION 10: MAGNETO RHEOLOGICAL SYSTEMS

19 March 2025 • 2:10 PM - 3:10 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Yangyang Chen**, Hong Kong Univ. of Science and Technology (Hong Kong, China)

13432-41 • 2:10 PM - 2:30 PM
A hybrid magnetorheological material for enhanced controllable dynamic range in vibration control applications
Author(s): **Youjin Kim**, **SeoHyun Min**, **Chanwoo Lee, Hyung-Jo Jung,** KAIST (Korea, Republic of)

13432-42 • 2:30 PM - 2:50 PM
On real-time hybrid simulation of semi-active control utilizing MR dampers
Author(s): **Nicholas Nguyen**, **Richard Christenson, Jiong Tang,** Univ. of Connecticut (United States)

13432-43 • 2:50 PM - 3:10 PM
Numerical investigation of a smart control system for enhancing seismic performance in the horizontal and vertical vibrations of a cabinet
Author(s): **SeoHyun Min**, **Youjin Kim**, **Chanwoo Lee, Hyung-Jo Jung,** KAIST (Korea, Republic of)

Coffee Break 3:10 PM - 3:40 PM

SESSION 11: SMART SENSING

19 March 2025 • 3:40 PM - 4:20 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Haifeng Zhang**, Univ. of North Texas (United States)

13432-48 • 3:40 PM - 4:00 PM
A self-powered piezoelectric sensor with dual-branch CNN for timing belt health monitoring
Author(s): **Yu-Zhi Wang**, **Yu-Cheng Lo, Yi-Chung Shu,** National Taiwan Univ. (Taiwan)

13432-49 • 4:00 PM - 4:20 PM
Lorentz attractor excitation-based bolt loosening identification using enhanced transformer
Author(s): **Jiawen Xu**, **Zengying You, Xian Wang,** Southeast Univ. (China)

SESSION 12: SMA- AND PIEZO-BASED MATERIALS AND SYSTEMS

19 March 2025 • 4:20 PM - 5:20 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Jiong Tang**, Univ. of Connecticut (United States)

13432-51 • 4:20 PM - 4:40 PM
Development of a vibration-based deicing system for aircraft wings
Author(s): **Michael Matthias**, **Denis Becker**, **Thorsten Koch,** Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit LBF (Germany); **Chris Davies,** Parker Maggitt (United Kingdom); **Salvatore Ameduri,** CIRA - Italian Aerospace Research Centre (Italy)

13432-52 • 4:40 PM - 5:00 PM
Enhanced shape memory alloy-driven Fin Ray gripper system
Author(s): **Shivaani Anitha Sivakumar,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany); **Tom Gorges,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Yannik Goergen,** Univ. des Saarlandes (Germany); **Sophie Nalbach,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

13432-55 • 5:00 PM - 5:20 PM
Design and development of a miniature self-propelled ultrasonic piezoelectric plate motor
Author(s): **Ting-Jui Wang,** National Taiwan Univ. (Taiwan); **Yu-Hsiang Hsu,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan); **Chih-Kung Lee,** National Taiwan Univ. (Taiwan), Institute of Applied Mechanics, National Taiwan Univ. (Taiwan)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 13: MODELING, OPTIMIZATION, SIGNAL PROCESSING, CONTROL, AND DESIGN OF INTEGRATED SYSTEM

20 March 2025 • 10:30 AM - 12:30 PM | Junior Ballroom C (Third Floor)
Session Chair(s): **Xiaopeng Li**, Toyota Research Institute, North America (United States); **Jianuo Huang**, Univ. of Michigan (United States)

13432-56 • 10:30 AM - 10:50 AM
Lithium niobate based one-port SAWR sensor for vibration and acceleration measurement
Author(s): **Haifeng Zhang**, **Mitali Hardik Desai**, **Shuai Ju, Swarnalatha Veerla,** Univ. of North Texas (United States)

13432-57 • 10:50 AM - 11:10 AM
Design of a deployable solar concentrator using Fresnel lenses for space-based solar power applications
Author(s): **Yang-Woo Seong**, **Keon-Ik Jang**, **Hyun-Jung Kim, Jae-Hung Han,** KAIST (Korea, Republic of)

13432-58 • 11:10 AM - 11:30 AM
Precision control of a multi-axis robotic arm using sliding mode control with PID control method
Author(s): **Chingwei Wang**, **Yu-Hsiang Hsu, Chih-Kung Lee,** National Taiwan Univ. (Taiwan)

13432-59 • 11:30 AM - 11:50 AM
Modeling material nonlinearities in ultrasonic power transmission through metals
Author(s): **Yehia Zakaria**, **Ahmed Allam,** Univ. of Cincinnati (United States); **Ihab El-Kady,** Sandia National Labs. (United States)

13432-60 • 11:50 AM - 12:10 PM
Modeling post-process indenting using the discrete element method for particle density control in additively manufactured dampers
Author(s): **Samuel Roberts,** Univ. of South Carolina (United States); **Yanzhou Fu,** Benedict College (United States); **Joud Satme,** Univ. of South Carolina (United States); **Daniel Kiracofe,** Beehive Industries (United States); **Austin R. J. Downey, Lang Yuan,** Univ. of South Carolina (United States)

13432-61 • 12:10 PM - 12:30 PM
Power optimization for an oscillating surge wave energy converter with motion amplitude constraints
Author(s): **Binh D. Truong**, **Jianuo Huang, Lei Zuo,** Univ. of Michigan (United States)

ON-DEMAND POSTERS

The posters listed below are available exclusively for online viewing during the week of SPIE Smart Structures + Nondestructive Evaluation 2025.

13432-5
Numerical study of a locally resonant frictional metamaterial for seismic vibration control of liquid storage tanks
Author(s): **Shayan Khosravi, Mohsen Amjadian,** The Univ. of Texas Rio Grande Valley (United States)

13432-32
Frequency up-conversion electromagnetic energy harvester for generating electrical power from vibration of beams under moving load
Author(s): **MD Ismail Monsury**, **Adamaris Sanchez**, **Mohsen Amjadian, Constantine Tarawneh,** The Univ. of Texas Rio Grande Valley (United States)

CONFERENCE 13433

Multifunctional Materials and Structures

17 - 20 March 2025 | Port McNeil (Fourth Floor) (Wednesday panel Jr. Ballroom B, Third Floor)

Conference Chair(s): **Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (United States)

Conference Co-Chair(s): **Russell W. Mailen,** Auburn Univ. (United States); **Fulvio Pinto,** Univ. of Bath (United Kingdom); **Aimy Wissa,** Princeton Univ. (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); **Ryan L. Harne,** The Pennsylvania State Univ. (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,** Ohio Univ. (United States); **Jiangyu Li,** Southern Univ. of Science and Technology (China); **Christopher S. Lynch,** Univ. of California, Riverside (United States); **Hani E. Naguib,** Univ. of Toronto (Canada); **William S. Oates,** Florida A&M Univ. - Florida State Univ. (United States); **Zoubeida Ounaies,** The Pennsylvania State Univ. (United States); **Reza Rizvi,** York Univ. (Canada); **Ralph C. Smith,** North Carolina State Univ. (United States); **Vishnu Baba Sundaresan,** Defense Advanced Research Projects Agency (United States)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: COMPLIANT MECHANISMS AND METAMATERIALS I

17 March 2025 • 10:30 AM - 12:10 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Mariantonieta Gutierrez Soto**, The Pennsylvania State Univ. (United States)

13433-1 • 10:30 AM - 11:10 AM
U.S. interstate and air traffic maps: creating a multilayered lattice material as a component within nonlinear structures (Keynote Presentation)
Author(s): **Ann Sychterz, Sagnik Paul,** Univ. of Illinois (United States)

13433-2 • 11:10 AM - 11:30 AM
Design optimization of flexible kerf structures under quasi-static loading
Author(s): **Hudaa Chaudhry, Mary I. Frecker,** The Pennsylvania State Univ. (United States)

13433-3 • 11:30 AM - 11:50 AM
Inflatable bistable Kresling structures as deployable towers
Author(s): **Andrew Nelson**, **Karan Sah, Russell W. Mailen,** Auburn Univ. (United States)

13433-9 • 11:50 AM - 12:10 PM
Experiments and modeling of a shape memory alloy tension spring heat engine
Author(s): **Ryan Foster, John A. Shaw,** Univ. of Michigan (United States)

Lunch Break 12:10 PM - 1:40 PM

SESSION 2: MATERIALS ADDRESSING SOCIETAL ISSUES I

17 March 2025 • 1:40 PM - 3:00 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Fulvio Pinto**, Univ. of Bath (United Kingdom)

13433-5 • 1:40 PM - 2:00 PM
Macroscale characterization of dielectrophoresis effect on particulate based ferroelectric composites
Author(s): **Robin Collet, Christopher Lynch,** Univ. of California, Riverside (United States)

13433-7 • 2:00 PM - 2:20 PM
Pushing the boundaries of green composites: a novel robust inspection system for damage identification and classification in NFRPs

Author(s): **Rachel Zammit-Mangion**, **Matt Hutchins,** Univ. of Bath (United Kingdom); **WeeLiam Khor,** Coventry Univ. (United Kingdom); **Yichen Chen,** Univ. of Cambridge (United Kingdom); **Francesco Ciampa,** Politecnico di Bari (Italy); **Fulvio Pinto,** Univ. of Bath (United Kingdom)

13433-8 • 2:20 PM - 2:40 PM
Development of high-performance miniaturized UV-activated sensors for real-time nitrate detection in water and soil
Author(s): **Farbod Aleaziz, Fariborz Taghipour,** The Univ. of British Columbia (Canada)

13433-10 • 2:40 PM - 3:00 PM
Indentation-driven machine learning approach for estimating rate-dependency in cohesive-frictional materials
Author(s): **Hamed Esmaeili, Reza Rizvi,** York Univ. (Canada)

SESSION 3: FABRICATION AND MANUFACTURING OF MULTIFUNCTIONAL MATERIALS AND STRUCTURES I

17 March 2025 • 3:00 PM - 3:40 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Russell W. Mailen**, Auburn Univ. (United States)

13433-12 • 3:00 PM - 3:20 PM
Printable ink formulation of piezoelectric ceramic on glass substrates for haptic feedback
Author(s): **Abhinay Sreeram**, **Milan Shrestha**, **Syed Ikhwan Syed Ismail Alsagoff**, **Hang Tong Edwin Teo,** Nanyang Technological Univ. (Singapore); **Maharaja Sankaralingam**, **Michael Renaud, Leonardus Depari,** Continental Automotive Singapore Pte., Ltd. (Singapore)

13433-13 • 3:20 PM - 3:40 PM
The establishment of a transferable sensing model for flexible piezoelectric composites based on a cross-scale approach
Author(s): **Weixuan Zhang**, **Yanheng Guo, Yishou Wang,** Xiamen Univ. (China)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: FABRICATION AND MANUFACTURING OF MULTIFUNCTIONAL MATERIALS AND STRUCTURES II

18 March 2025 • 10:30 AM - 12:10 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Russell W. Mailen**, Auburn Univ. (United States)

13433-14 • 10:30 AM - 11:10 AM
Development of programmable physical systems to enhance mobility (Keynote Presentation)
Author(s): **Umesh Gandhi,** Toyota Research Institute (United States)

13433-15 • 11:10 AM - 11:30 AM
A novel method to incorporate particles into endless fiber-reinforced polymers with process evaluation and analysis of the filler distribution
Author(s): **Dominik Santl,** Airbus Defence and Space (Germany); **Josef Ganslmaier,** Univ. der Bundeswehr München (Germany); **Matthias Bleckmann,** Wehrwissenschaftliches Institut für Werk- und Betriebsstoffe (Germany); **Philipp Höfer,** Univ. der Bundeswehr München (Germany)

13433-16 • 11:30 AM - 11:50 AM
Deep learning-based microstructure reconstruction for characterizing the electromechanical property of nanomaterial networks
Author(s): **Cameron J. Maloney**, **Lucas G. Taliaferro**, **Jonathan D. Ventura, Long Wang,** California Polytechnic State Univ., San Luis Obispo (United States)

13433-17 • 11:50 AM - 12:10 PM
A computational design framework for the development of high-performance metal-matrix hybrid composite for thermal management applications
Author(s): **Syed Sohail Akhtar,** King Fahd Univ. of Petroleum & Minerals (Saudi Arabia)

Lunch Break 12:10 PM - 1:40 PM

SESSION 5: MATERIALS ADDRESSING SOCIETAL ISSUES II

18 March 2025 • 1:40 PM - 3:40 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Mariantonieta Gutierrez Soto**, The Pennsylvania State Univ. (United States)

13433-26 • 1:40 PM - 2:20 PM
Design and actuation of magneto active compliant mechanisms (Keynote Presentation)
Author(s): **Taylor Greenwood, Mary I. Frecker,** The Pennsylvania State Univ. (United States)

13433-18 • 2:20 PM - 2:40 PM **(CANCELLED)**
Next-gen self-powered wearables: pioneering thermoelectric foam with enhanced CNT/PDMS and PEDOT:PSS for sustainable tech advancements
Author(s): **Rui Yang (Sunny) Liu, Hani E. Naguib,** Univ. of Toronto (Canada)

13433-19 • 2:40 PM - 3:00 PM
Advanced mycelium-cellulose composite materials for insulation applications: a permeability study
Author(s): **Juliana Calabria-Holley,** Univ. of Bath (United Kingdom)

13433-20 • 3:00 PM - 3:20 PM
The utilization of greenhouse gas CO2 in the production of low-carbon concrete material
Author(s): **Shipeng Zhang,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

13433-21 • 3:20 PM - 3:40 PM
Wave attenuation of a metabarrier through analytical dispersive properties for seismic performance
Author(s): **David Caballero-Russi, Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (United States)

Coffee Break 3:40 PM - 4:10 PM

SESSION 6: MATERIALS ADDRESSING SOCIETAL ISSUES III

18 March 2025 • 4:10 PM - 5:10 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Fulvio Pinto**, Univ. of Bath (United Kingdom)

13433-22 • 4:10 PM - 4:30 PM
Increasing access to smart materials and structures through undergraduate research
Author(s): **Russell W. Mailen,** Auburn Univ. (United States)

13433-23 • 4:30 PM - 4:50 PM
Resistive and capacitive optimizations of laser-induced graphene
Author(s): **Abolfazl A. Kohestani**, **Cuiying Jian, Gerd Grau,** York Univ. (Canada)

13433-25 • 4:50 PM - 5:10 PM
Modulus tunability in hierarchical architectures: a machine learning-enabled approach
Author(s): **Liuchao Jin**, **Kang Zhang**, **Sicong Zhou**, **Guoquan Xie, Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China)

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13433-39 • 6:00 PM - 8:00 PM
The efficient inscription of the surface relief gratings in novel polyimides with fluorine-substituted azobenzene
Author(s): **Dorota Kowalska,** Nicolaus Copernicus Univ. (Poland); **Jolanta Konieczkowska,** Ctr. of Polymer and Carbon Materials PAN (Poland); **Dariusz Chomicki**, **Abdallah Guerchi**, **Robert Czaplicki,** Nicolaus Copernicus Univ. (Poland); **Ewa Schab-Balcerzak,** Ctr. of Polymer and Carbon Materials PAN (Poland); **Beata Derkowska-Zielińska,** Nicolaus Copernicus Univ. (Poland)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: SMART MATERIAL CHARACTERIZATION I

19 March 2025 • 10:30 AM - 11:50 AM | Port McNeil (Fourth Floor)
Session Chair(s): **Fulvio Pinto**, Univ. of Bath (United Kingdom)

13433-27 • 10:30 AM - 10:50 AM
Development and implementation of screen printed flexible piezoelectric sensor-based PI/PZT composite for high temperature
Author(s): **Elsa Dos Santos**, **Guilhem Rival, Pierre-Jean Cottinet,** Institut National des Sciences Appliquées de Lyon (France)

13433-28 • 10:50 AM - 11:10 AM
Structural-acoustic coupled modeling of a tunable membrane-type acoustic metamaterial with experimental validation
Author(s): **Hongshan Pan,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Duo Zhang,** The Hong Kong Polytechnic Univ. (China); **Badreddine Assouar,** Univ. de Lorraine (France); **Hongbin Fang,** Fudan Univ. (China); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

13433-29 • 11:10 AM - 11:30 AM
Temperature-induced variations in magneto-viscoelastic behavior of magnetorheological elastomers: an experimental study
Author(s): **Amin Saber, Ramin Sedaghati,** Concordia Univ. (Canada)

13433-40 • 11:30 AM - 11:50 AM
Hollow liquid crystal elastomer fiber used as versatile platform towards functional composites
Author(s): **Yuyang Song,** Toyota Research Institute North America (United States); **Jerry H. Qi**, **Mingzhe Li,** Georgia Institute of Technology (United States); **Shinnosuke Shimokawa,** Toyota Research Institute, North America (United States)

Lunch Break 11:50 AM - 2:00 PM

SESSION 8: COMPLIANT MECHANISMS AND METAMATERIALS II

19 March 2025 • 2:00 PM - 3:00 PM | Port McNeil (Fourth Floor)
Session Chair(s): **Long Wang**, California Polytechnic State Univ., San Luis Obispo (United States)

13433-30 • 2:00 PM - 2:20 PM
Strain amplifying mechano-luminescent mechanical metamaterials
Author(s): **William Fawcett**, **Rebecca Barber, Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States)

13433-32 • 2:20 PM - 2:40 PM
Mechano-optoelectronic properties and conjugated polymeric nanostructures of air-brushed poly(3-hexylthiophene)-based thin films
Author(s): **Cason Jones**, **Mackenzie Moreland**, **Aaron Madrid**, **Adrian Salustri**, **Carlos Neri Soto,** New Mexico Institute of Mining and Technology (United States); **Myeong-Lok Seol,** NASA Ames Research Ctr. (United States); **Youngmin Lee,** New Mexico Institute of Mining and Technology (United States); **Jessica Koehne,** NASA Ames Research Ctr. (United States); **Kyungtae Kim,** The Ctr. for Integrated Nanotechnologies (United States); **Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States)

13433-33 • 2:40 PM - 3:00 PM
Analysis of the multilayer microperforated panel for enhanced noise absorption using numerical and experimental approaches
Author(s): **Duo Zhang,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Badreddine Assouar,** Univ. de Lorraine (France); **Sichen Yuan,** The Univ. of Alabama (United States); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Coffee Break 3:00 PM - 3:30 PM

ADAPTING FOR TOMORROW: SMART AND BIOINSPIRED MATERIALS FOR A RESILIENT PLANET: JOINT PANEL SESSION WITH 13430 AND 13433

19 March 2025 • 3:30 PM - 5:00 PM | Junior Ballroom B (Third Floor)

View Full Details: spie.org/ssn/adapting-for-tomorrow
3:30 – 3:40 PM: **Introduction**

3:40 – 4:05 PM: **Keynote by Prof. Feng Jiang**

4:05 – 5:00 PM: **Moderated panel discussion**

This panel is a joint event between the conferences on Biologically Inspired Materials, Processes, and Systems (BIMPS) 2025 and Multifunctional Materials and Structures.

13430-23 • 3:40 PM - 4:05 PM
Nanocellulose: a versatile building block for sustainable bio-based materials (Keynote Presentation)
Author(s): **Feng Jiang,** The Univ. of British Columbia (Canada)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 9: SMART MATERIAL CHARACTERIZATION II

20 March 2025 • 10:30 AM - 12:10 PM | Port McNeil (Fourth Floor)

13433-34 • 10:30 AM - 10:50 AM
Influence of 3D printing process parameters on the anisotropic viscoelastic behavior of thermoplastic polyurethane (TPU)
Author(s): **Ragab Etiwa**, **Stephen Melly, Aleksander Czekanski,** York Univ. (Canada)

13433-35 • 10:50 AM - 11:10 AM
Visco-hyperelastic computational model for injection-molded thermoplastic polyurethane
Author(s): **Stephen Melly**, **Ragab Etiwa, Aleksander Czekanski,** York Univ. (Canada)

13433-36 • 11:10 AM - 11:30 AM
Temperature-dependent modeling of magnetorheological elastomers: a continuum approach using modified strain energy functions
Author(s): **Amin Saber, Ramin Sedaghati,** Concordia Univ. (Canada)

13433-37 • 11:30 AM - 11:50 AM
Study on the coupling effect of a plate-type piezoelectric vibrator and a polymer-based rod array
Author(s): **Syun-Shih Pan,** National Taiwan Univ. (Taiwan); **Yu-Hsiang Hsu, Chih-Kung Lee,** National Taiwan Univ. (Taiwan), Graduate School of Advanced Technology (Taiwan)

13433-38 • 11:50 AM - 12:10 PM
Regional activation of a composite plate using selective actuation from multiple piezoelectric actuators
Author(s): **Yi-Chia Chen**, **Yu-Hsiang Hsu,** National Taiwan Univ. (Taiwan); **Chih-Kung Lee,** National Taiwan Univ. (Taiwan), Graduate School of Advanced Technology (Taiwan)

CONFERENCE 13434

Soft Mechatronics and Wearable Systems 2025

17 - 20 March 2025 | Junior Ballroom D (Third Floor)

Conference Chair(s): **Ilkwon Oh,** KAIST (Korea, Republic of)

Conference Co-Chair(s): **Woon-Hong Yeo,** Georgia Institute of Technology (United States); **Wei Gao,** Caltech (United States)

Program Committee: **Chi Won Ahn,** National Nanofab Ctr. (Korea, Republic of); **Jeong Min Baik**, **Seunghyun Baik,** Sungkyunkwan Univ. (Korea, Republic of); **Youngsu Cha,** Korea Univ. (Korea, Republic of); **Jun Chen,** UCLA Samueli School of Engineering (United States); **Youngjae Chun,** Univ. of Pittsburgh (United States); **Srinivasan Gopalakrishnan,** Indian Institute of Science, Bengaluru (India); **Min-Woo Han,** Dongguk Univ. (Korea, Republic of); **Robert Herbert,** Louisiana State Univ. (United States); **Jae-Woong Jeong,** KAIST (Korea, Republic of); **Yasser Khan,** The Univ. of Southern California (United States); **Chang-Wan Kim,** Konkuk Univ. (Korea, Republic of); **Gi-Woo Kim,** Inha Univ. (Korea, Republic of); **Heung Soo Kim,** Dongguk Univ. (Korea, Republic of); **Hyun Chan Kim,** Kumoh National Institute of Technology (Korea, Republic of); **Jaehwan Kim,** Inha Univ. (Korea, Republic of); **Jaehwan Kim,** Kumoh National Institute of Technology (Korea, Republic of); **Joo-Hyung Kim,** Inha Univ. (Korea, Republic of); **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of); **Sang-Woo Kim,** Yonsei Univ. (Korea, Republic of); **Yun Soung Kim,** Icahn School of Medicine at Mount Sinai (United States); **Soo Jin Adrian Koh,** Max-Planck-Institut für Intelligente Systeme (Germany); **Jinwoo Lee,** Dongguk Univ. (Korea, Republic of); **Keon Jae Lee,** KAIST (Korea, Republic of); **Yongkuk Lee,** Wichita State Univ. (United States); **Zong-Hong Lin,** National Taiwan Univ. (Taiwan); **Hani E. Naguib,** Univ. of Toronto (Canada); **Tse Nga Ng,** Univ. of California, San Diego (United States); **Simon Park,** Univ. of Calgary (Canada); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Jung Woo Sohn,** Kumoh National Institute of Technology (Korea, Republic of); **Kyo D. Song,** Norfolk State Univ. (United States); **Rassoul Tabassian,** Aarhus Univ. (Denmark); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **Limei Tian,** Texas A&M Univ. (United States); **Wei-Chih Wang,** Univ. of Washington (United States); **Sheng Xu,** Univ. of California, San Diego (United States); **Gil Ho Yoon,** Hanyang Univ. (Korea, Republic of); **Hargsoon Yoon,** Norfolk State Univ. (United States); **Xuanhe Zhao,** Massachusetts Institute of Technology (United States)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:

- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: MECHANICAL METAMATERIALS AND MECHANICS

17 March 2025 • 10:30 AM - 12:00 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Il-Kwon Oh**, KAIST (Korea, Republic of)

13434-1 • 10:30 AM - 11:10 AM
Cogitative mechanical metamaterials with explicit neurons (Keynote Presentation)
Author(s): **Changqing Chen,** Tsinghua Univ. (China)

13434-2 • 11:10 AM - 11:40 AM
The effect of vertical vibration waveform on wall friction induced Brazil-nut effect *(Invited Paper)*
Author(s): **Gil Ho Yoon**, **Myeong Jae Park, Hoo Min Lee,** Hanyang Univ. (Korea, Republic of)

13434-3 • 11:40 AM - 12:00 PM
Generalized valley topological phase for robust wave propagation in armchair-shaped waveguide
Author(s): **Myung-Joon Lee, Il-Kwon Oh,** KAIST (Korea, Republic of)

Lunch Break 12:00 PM - 1:00 PM

SESSION 2: WEARABLE ELECTRONICS I

17 March 2025 • 1:00 PM - 3:10 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Woon-Hong Yeo**, Georgia Institute of Technology (United States)

13434-4 • 1:00 PM - 1:30 PM
Skin-interfaced wearable biosensors *(Invited Paper)*
Author(s): **Wei Gao,** Caltech (United States)

13434-5 • 1:30 PM - 2:00 PM
Repurposing compact discs to develop an innovative soft biosensing system *(Invited Paper)*
Author(s): **Ahyeon Koh,** Binghamton Univ. (United States)

13434-6 • 2:00 PM - 2:30 PM
Wireless, batteryless, and packageless acoustic wave devices for epidermal sensing applications *(Invited Paper)*
Author(s): **Prince Mengue**, **Cécile Floer**, **Omar Elmazria, Sami Hage-Ali,** Univ. de Lorraine, CNRS (France)

13434-96 • 2:30 PM - 2:50 PM
Versatile colloidal material patterning process inspired by transfer printing technique
Author(s): **Hohyun Keum,** Korea Institute of Industrial Technology (Korea, Republic of)

13434-8 • 2:50 PM - 3:10 PM **(CANCELLED)**
Motor coordination monitoring using smart insoles
Author(s): **Ya Wang, Ibrahim Almuteb,** Texas A&M Univ. (United States)

Coffee Break 3:10 PM - 3:40 PM

SESSION 3: DESIGN AND PROCESSING

17 March 2025 • 3:40 PM - 6:10 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Jung Woo Sohn**, Kumoh National Institute of Technology (Korea, Republic of)

13434-9 • 3:40 PM - 4:10 PM
AI-based damage assessment of advanced composite laminates *(Invited Paper)*
Author(s): **Heung Soo Kim, Muhammad Muzammil Azad,** Dongguk Univ. (Korea, Republic of)

13434-33 • 4:10 PM - 4:40 PM
Haptic feedback devices for remote tool manipulation in medical procedures *(Invited Paper)*
Author(s): **Amy Kyungwon Han,** Seoul National Univ. (Korea, Republic of)

13434-11 • 4:40 PM - 5:10 PM
Prediction of thermal runaway of pouch-type lithium-ion battery cell using two-way nonlinear mechanical-electrochemical-thermal coupled analysis method *(Invited Paper)*
Author(s): **Hamin Lee**, **Cheonha Park, Chang-Wan Kim,** Konkuk Univ. (Korea, Republic of)

13434-12 • 5:10 PM - 5:30 PM
Micro-origami meets batteries: push the limit of microbatteries
Author(s): **Minshen Zhu,** Technische Univ. Chemnitz (Germany)

13434-13 • 5:30 PM - 5:50 PM
Optimizing specific actuation force of soft composite pneumatic artificial muscles using additively manufactured components
Author(s): **Christopher Clark**, **Frank Cianciarulo, Norman Wereley,** Univ. of Maryland, College Park (United States)

13434-14 • 5:50 PM - 6:10 PM
Sustainable electronic biomaterials for body-compliant devices: fabrication and characterization
Author(s): **Letta Ntuli**, **Alain Nyembwe, Jean Mulopo,** Univ. of the Witwatersrand, Johannesburg (South Africa)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: WEARABLE ELECTRONICS II

18 March 2025 • 10:30 AM - 12:20 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Wei Gao**, Caltech (United States)

13434-15 • 10:30 AM - 11:10 AM
Temperature-responsive variable stiffness bioelectronic devices (Keynote Presentation)
Author(s): **Jae-Woong Jeong,** KAIST (Korea, Republic of)

13434-16 • 11:10 AM - 11:40 AM
A novel photo-responsive hydrogel with optoionic properties for soft iontronics *(Invited Paper)*
Author(s): **Yuhang Hu, Jiehao Chen,** Georgia Institute of Technology (United States)

13434-17 • 11:40 AM - 12:00 PM
Development of a soft-robotic cather assisted fiber scanning microscopic imaging system
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Yu Chang**, **Po-Chen Lin**, **Aditya Sharma,** National Tsing Hua Univ. (Taiwan); **Chileung Tsui**, **Benjamin Estroff,** Univ. of Washington (United States); **Cheng-Jun Tsai,** National Tsing Hua Univ. (Taiwan); **ethan ho,** University of Waterloo (Canada); **kathleen guan,** Univ. of Washington (United States)

13434-18 • 12:00 PM - 12:20 PM
Tissue-interfacing medical devices for mechanotherapy
Author(s): **Sungmin Nam,** Univ. of Michigan (United States)

Lunch Break 12:20 PM - 1:50 PM

SESSION 5: WEARABLE ELECTRONICS III

18 March 2025 • 1:50 PM - 3:40 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Jae-Woong Jeong**, KAIST (Korea, Republic of)

13434-19 • 1:50 PM - 2:20 PM
Soft, sensor-embedded cerebral aneurysm benchtop model towards biomechanical studies of rupture risks *(Invited Paper)*
Author(s): **Anish Maharjan**, **Julio Zuazola**, **Anthony Bui, Robert Herbert,** Louisiana State Univ. (United States)

13434-66 • 2:20 PM - 2:40 PM
Green energy solutions: sustainable triboelectric nanogenerators for energy harvesting and wearable sensors
Author(s): **Araz Rajabi-Abhari, Ning Yan,** Univ. of Toronto (Canada)

13434-21 • 2:40 PM - 3:00 PM
Wireless wearable microneedle electroceuticals for advanced pain treatment with IoT-enabled telemedicine
Author(s): **Heesoo Kim,** KAIST (Korea, Republic of); **Se Kyun Bang,** Korea Institute of Oriental Medicine (Korea, Republic of); **Inho Kang,** KAIST (Korea, Republic of); **Suk-Yun Kang**, **Sanghun Lee,** Korea Institute of Oriental Medicine (Korea, Republic of); **Jae-Woong Jeong,** KAIST (Korea, Republic of)

13434-22 • 3:00 PM - 3:20 PM
Forceful haptics for information delivery, extended reality, and patient care
Author(s): **Matthew T. Flavin,** Georgia Institute of Technology (United States)

13434-23 • 3:20 PM - 3:40 PM
A multifunctional conducting fabric band for wearable sweat monitoring and tactile interaction
Author(s): **Chenglong Zhang**, **Xiulun Yin**, **Siying Wu**, **Jian Gao**, **Xin Zhou**, **Xin Lu**, **Addie Bahi, John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 3:40 PM - 4:10 PM

SESSION 6: PRINTING AND FABRICATION

18 March 2025 • 4:10 PM - 5:30 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Jaehwan Kim**, Kumoh National Institute of Technology (Korea, Republic of)

13434-24 • 4:10 PM - 4:40 PM
3D printed architectures for sensing applications *(Invited Paper)*
Author(s): **Woo Soo Kim,** Simon Fraser Univ. (Canada)

13434-25 • 4:40 PM - 5:10 PM
Control of microstructure and micropatterning of carbon-based functional materials for soft electronics *(Invited Paper)*
Author(s): **Jung Woo Lee,** Pusan National Univ. (Korea, Republic of)

13434-28 • 5:10 PM - 5:30 PM
Addressing unmet needs with 3D printed electronics
Author(s): **Yong Lin Kong,** Rice Univ. (United States)

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13434-57 • 6:00 PM - 8:00 PM
Battery-free, wireless system for continuous simultaneous cardiac and vascular monitoring
Author(s): **Matthew Guess, Woon-Hong Yeo,** Georgia Institute of Technology (United States)

13434-58 • 6:00 PM - 8:00 PM
Stretchable nitrogen dioxide gas sensor using contact-resistance-free side-polished MLCCs
Author(s): **Hyo-Ryoung Lim,** Pukyong National Univ. (Korea, Republic of)

13434-60 • 6:00 PM - 8:00 PM
Biomechanical energy harvesting device for smart wearable systems
Author(s): **Ji-Seok Kim, Il-Kwon Oh,** KAIST (Korea, Republic of)

13434-61 • 6:00 PM - 8:00 PM
Powering unmanned flight using thermoelectric power generation from gas fuel combustion
Author(s): **Rolian Nailor,** Univ. of Washington Tacoma (United States); **Bryan Lee,** Lakeridge High School (United States); **Hee-Seok Kim,** Univ. of Washington Tacoma (United States)

13434-62 • 6:00 PM - 8:00 PM
Solid-state cooling analysis including temperature dependency of thermoelectric material properties
Author(s):

13434-64 • 6:00 PM - 8:00 PM **(CANCELLED)**
Advancing flexible thermoelectric energy harvesting with PEDOT and Bi_2Te_3 composite materials
Author(s): **Suhasini Sathiyamoorthi,** Vellore Institute of Technology (India); **Kumar R.,** SRM Institute of Science and Technology (India); **Pandiyarasan Veluswamy,** Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram (India)

13434-65 • 6:00 PM - 8:00 PM **(CANCELLED)**
Enhancing solar spectrum utilization with wide bandgap semiconductors as photothermal materials for energy harvesting systems
Author(s): **Pandiyarasan Veluswamy**, **Parkavi V., Jayabal K.,** Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram (India)

13434-67 • 6:00 PM - 8:00 PM
PVDF thin film bimorph actuator study for potential MEMS application
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Yu-ren Chen, Chen-Wei Wu,** National Tsing Hua Univ. (Taiwan)

13434-68 • 6:00 PM - 8:00 PM
Sputtering LiPON onto polymer electrolytes to enhance microbattery energy density
Author(s): **Hyunjoon Yoo**, **Woong Oh,** KAIST (Korea, Republic of); **Chi Won Ahn,** National Nanofab Ctr. (Korea, Republic of); **Il-Kwon Oh,** KAIST (Korea, Republic of)

13434-69 • 6:00 PM - 8:00 PM
Cardiac assistive device based on electroactive polymer
Author(s): **Jiyeop Kim**, **Junheon Lee**, **Sein Song,** Seoul National Univ. (Korea, Republic of); **Si-Hyuck Kang,** Seoul National Univ. Bundang Hospital (Korea, Republic of); **Amy Kyungwon Han,** Seoul National Univ. (Korea, Republic of)

13434-70 • 6:00 PM - 8:00 PM
Kresling origami haptic device capable of simultaneous normal and torsion haptic feedback
Author(s): **Sanghyun Lee**, **Taejoon Um**, **Minjae Lee, Amy Kyungwon Han,** Seoul National Univ. (Korea, Republic of)

13434-71 • 6:00 PM - 8:00 PM
Soft elastomeric nanofibers with coaxially embedded liquid metal particles as a conductive filler for epidermal electronics
Author(s): **Joab Dorsainvil,** Binghamton Univ. (United States); **Christopher Tabor,** Air Force Research Lab. (United States); **Ahyeon Koh,** Binghamton Univ. (United States)

13434-72 • 6:00 PM - 8:00 PM
Soft thermoelectric skin for enhanced underwater energy harvesting and thermal management
Author(s): **Dong Hyun Kim, Jinwoo Lee,** Dongguk Univ. (Korea, Republic of)

13434-73 • 6:00 PM - 8:00 PM
High-efficiency breathable thermoelectric skin with multimode radiative cooling and solar heating for enhanced thermal gradient
Author(s): **Farooq Khan, Jinwoo Lee,** Dongguk Univ. (Korea, Republic of)

13434-74 • 6:00 PM - 8:00 PM
Flexible and cost-effective aluminum-based electrode platform for wearable glucose sensors
Author(s): **Hanbyeol Son, Hyo-Ryoung Lim,** Pukyong National Univ. (Korea, Republic of)

13434-75 • 6:00 PM - 8:00 PM
Flexible colorimetric sensor system for real-time gas detection with image-based analysis
Author(s): **Jieun Yeo, Young Min Song,** Gwangju Institute of Science and Technology (Korea, Republic of)

13434-76 • 6:00 PM - 8:00 PM
Extending feeling past the e-skin surface: adding proximity sensing to a soft capacitive force sensor
Author(s): **Chrys R. Morton**, **Sadan Wani**, **Lucy Hua**, **Ying Li**, **Jian Gao**, **Ruixin Qiu,** The Univ. of British Columbia (Canada); **Ryusuke Ishizaki**, **Takeshi Ohsato,** Honda Research Institute Japan Co., Ltd. (Japan); **John D. W. Madden,** The Univ. of British Columbia (Canada)

13434-77 • 6:00 PM - 8:00 PM
Multi-layer soft capacitive sensors: soft vias save space and reduce exposed contacts
Author(s): **Chrys R. Morton**, **Sadan Wani**, **Ying Li**, **Jian Gao**, **Ruixin Qiu,** The Univ. of British Columbia (Canada); **Ryusuke Ishizaki,** Honda Research Institute Japan Co., Ltd. (Japan); **John D. W. Madden,** The Univ. of British Columbia (Canada)

13434-78 • 6:00 PM - 8:00 PM
Low-temperature imidization of polyimide for flexible, stretchable electrodes in wearable electronics
Author(s): **Akib A. Khan, Jong-Hoon Kim,** Washington State Univ. (United States)

13434-79 • 6:00 PM - 8:00 PM
One-step fabrication of microfluidic channels in stacked PDMS layers via picosecond laser ablation
Author(s): **Seongyeop Kim,** Pukyong National Univ. (Korea, Republic of)

13434-80 • 6:00 PM - 8:00 PM
Multifunctional, liquid metal embedded soft materials towards seals with embedded electronics for space applications
Author(s): **Olutofunmi Olaoye**, **Michael Ruiz**, **Caleb Reid**, **Gabriel Freedman, Robert Herbert,** Louisiana State Univ. (United States)

13434-81 • 6:00 PM - 8:00 PM
Localized electric-charged polymeric biomaterials enable patternable nerve fiber outgrowth in vitro
Author(s): **Sophia Selvarajan**, **Isabelle Eskanos**, **Raneen Qasim, Albert Kim,** Univ. of South Florida (United States)

13434-82 • 6:00 PM - 8:00 PM **(CANCELLED)**
PDMS-graphene oxide membrane via vapor-induced phase separation (VIPS) for surface roughness enhancement and single electrode triboelectric nanogenerator for electronic skin applications
Author(s): **Md Mehedi Hasan Apu**, **Asma Akter, Turki Nabieh Baroud,** King Fahd Univ. of Petroleum & Minerals (Saudi Arabia)

13434-83 • 6:00 PM - 8:00 PM
Motion recognition using flexible strain sensor
Author(s): **Su Yeong Jeong, Jung Woo Sohn,** Kumoh National Institute of Technology (Korea, Republic of)

13434-84 • 6:00 PM - 8:00 PM
Pulsation based smart endovascular devices used in cardiac intervention
Author(s): **Mohamed S. Ibrahim**, **Sang-Ho Ye**, **Hassan Beheshti Seresht**, **William R Wagner, Youngjae Chun,** Univ. of Pittsburgh (United States)

13434-85 • 6:00 PM - 8:00 PM
A novel biodegradable microparticle development for the advanced drug delivery in angioplasty balloon
Author(s): **Mohamed S. Ibrahim**, **Hassan Beheshti Seresht**, **Mia C. Chupein**, **Ameya K. Pardeshi,** Univ. of Pittsburgh (United States); **Chang Hun Kum**, **Jae Hwa Cho**, **Gyuhyun Jin,** Osstem Cardio (Korea, Republic of); **Sang Hyun An,** Preclinical Research Ctr, (Korea, Republic of); **Youngjae Chun,** Univ. of Pittsburgh (United States)

13434-86 • 6:00 PM - 8:00 PM
Design and development of a miniature underwater sensor for real-time monitoring of endangered white abalone
Author(s): **Noah Nguyen**, **Kihoon Kim**, **Jan Truong,** Univ. of California, Davis (United States); **Rad Sommer,** Univ. of California (United States); **Hyoyoung Jeong,** Univ. of California, Davis (United States)

13434-87 • 6:00 PM - 8:00 PM
Advancing cardiovascular health through conformal PPG-ECG device networks
Author(s): **Yongkuk Lee,** Wichita State Univ. (United States)

13434-88 • 6:00 PM - 8:00 PM
Rapid and low-cost inkjet printing of multilayered skin-like electrodes for biopotential monitoring
Author(s):

13434-89 • 6:00 PM - 8:00 PM
Development of a wireless ECG monitoring patch with a detachable modular electronics interface
Author(s): **Ashok Chhetry**, **Hodam Kim, Yun Soung Kim,** Icahn School of Medicine at Mount Sinai (United States)

13434-90 • 6:00 PM - 8:00 PM
Application of orthogonal multi-sensor network for deep learning-based damage localization in composite laminates
Author(s): **Muhammad Muzammil Azad**, **Jaehyun Jung, Heung Soo Kim,** Dongguk Univ. (Korea, Republic of)

13434-92 • 6:00 PM - 8:00 PM
Electronic devices using fibrous organic electrochemistry: from diode to transistor
Author(s): **Tuyet-Nhi Lam**, **Hyoungsoon Lee, Seungtae Choi,** Chung-Ang Univ. (Korea, Republic of)

13434-93 • 6:00 PM - 8:00 PM
Advances in GMR nanowire fabrication and future applications
Author(s): **Cecil Manford**, **Langston Forbes-Jackson**, **Thong C. Le, Hargsoon Yoon,** Norfolk State Univ. (United States)

13434-94 • 6:00 PM - 8:00 PM
Shape optimization of 4D printed structures for stiffness maximization
Author(s): **Chang Min Lee**, **Hoo Min Lee, Gil Ho Yoon,** Hanyang Univ. (Korea, Republic of)

13434-95 • 6:00 PM - 8:00 PM
Smart knee brace to guide rehabilitation following anterior cruciate ligament reconstruction
Author(s): **Anthony Del Vecchio,** Lehigh Univ. (United States)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: SOFT ROBOTICS I

19 March 2025 • 10:30 AM - 12:20 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Il-Kwon Oh**, KAIST (Korea, Republic of)

13434-29 • 10:30 AM - 11:10 AM
Artificial muscles for highly dynamic, efficient, and adaptive robots: from materials science to untethered systems (Keynote Presentation)
Author(s): **Christoph Keplinger,** Max-Planck-Institut für Intelligente Systeme (Germany)

13434-30 • 11:10 AM - 11:40 AM
Textile actuators and sensors for soft robotics applications *(Invited Paper)*
Author(s): **Min-Woo Han**, **Ju-Hee Lee**, **Jihun Seong**, **Yeji Han**, **Eunsol Park**, **Haesol Kwak, Suyeon Seo,** Dongguk Univ. (Korea, Republic of)

13434-31 • 11:40 AM - 12:00 PM
Soft helical structure robots with electrohydraulic actuators for locomotion
Author(s): **Sohyun Kim**, **Joohyeon Kang**, **Seunghoon Yoo, Youngsu Cha,** Korea Univ. (Korea, Republic of)

13434-32 • 12:00 PM - 12:20 PM
Developing metal–organic frameworks for dual electrical and magnetic response in soft actuators
Author(s): **Manmatha Mahato, Il-Kwon Oh,** KAIST (Korea, Republic of)

Lunch Break 12:20 PM - 1:40 PM

SESSION 8: SOFT ROBOTICS II

19 March 2025 • 1:40 PM - 3:40 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Youngsu Cha**, Korea Univ. (Korea, Republic of)

13434-10 • 1:40 PM - 2:10 PM
Deep learning-enhanced upper-limb exoskeleton with soft bioelectronics for intention-driven augmentation *(Invited Paper)*
Author(s): **Jinwoo Lee,** Dongguk Univ. (Korea, Republic of)

13434-34 • 2:10 PM - 2:40 PM
Versatile task execution by programmable magnetic assemblies of microrobots *(Invited Paper)*
Author(s): **Jeong Jae Wie,** Hanyang Univ. (Korea, Republic of)

13434-35 • 2:40 PM - 3:00 PM
New azobenzene-containing light-responsive polymers for soft robotics
Author(s): **Beata J. Derkowska-Zielińska**, **Abdallah Guerchi**, **Dorota Kowalska,** Institute of Physics, Nicolaus Copernicus Univ. (Poland); **Vitalii Smokal,** Taras Shevchenko National Univ. of Kyiv (Ukraine); **Robert Czaplicki,** Institute of Physics, Nicolaus Copernicus Univ. (Poland)

13434-36 • 3:00 PM - 3:20 PM
Cable-driven hybrid actuator inspired by Yoshimura origami pattern
Author(s): **Seunghoon Yoo**, **Hyunjun Park, Youngsu Cha,** Korea Univ. (Korea, Republic of)

13434-37 • 3:20 PM - 3:40 PM
Electric and magnetic field-driven actuation of a biomimetic soft robot using engineered Co-MOF
Author(s): **Ashhad Kamal Taseer,** KAIST (Korea, Republic of); **Saewoong Oh,** Georgia Institute of Technology (United States); **Manmatha Mahato, Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 3:40 PM - 4:10 PM

SESSION 9: WEARABLE HAPTICS

19 March 2025 • 4:10 PM - 5:50 PM | Junior Ballroom D (Third Floor)

13434-38 • 4:10 PM - 4:40 PM
Wearable haptic glove and feedback system for hand sensory impairment rehabilitation *(Invited Paper)*
Author(s): **Taewoog Kang**, **Yoon Jae Lee**, **Bruno Rigo**, **Eyas Ayesh**, **Frank L. Hammond, Woon-Hong Yeo,** Georgia Institute of Technology (United States)

13434-39 • 4:40 PM - 5:10 PM
Development of real-time human-machine interfaces for robotic arm control through gesture recognition using touchless carbon nanotube sensors *(Invited Paper)*
Author(s): **Yubin Cheon**, **Heung Soo Kim,** Dongguk Univ. (Korea, Republic of); **Jae-Hyun Chung, Shawn Kim,** Univ. of Washington (United States)

13434-40 • 5:10 PM - 5:30 PM
Soft haptic interface for multidimensional cutaneous feedback in virtual and augmented reality
Author(s): **Nathan Zavanelli, Carmel Majidi,** Carnegie Mellon Univ. (United States)

13434-41 • 5:30 PM - 5:50 PM
SMA knot fabric haptic actuators based on zero Poisson's ratio meta-structure
Author(s): **Wonhee Ji,** KAIST (Korea, Republic of); **Sae-Woong Oh,** Georgia Institute of Technology (Korea, Republic of); **Yang Yang,** KAIST (China); **Il-Kwon Oh,** KAIST (Korea, Republic of)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 10: WEARABLE ELECTRONICS IV

20 March 2025 • 10:30 AM - 12:40 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Robert Herbert**, Louisiana State Univ. (United States)

13434-42 • 10:30 AM - 11:10 AM
E-tattoos and e-skins bridging humans and robots (Keynote Presentation)
Author(s): **Nanshu Lu,** The Univ. of Texas at Austin (United States)

13434-43 • 11:10 AM - 11:40 AM
Streamlining wearable robot personalization with physiological sensors *(Invited Paper)*
Author(s): **Prakyath Kantharaju**, **Hyeongkeun Jeong,** Univ. of Illinois Chicago (United States); **Michael Jacobson,** University of Illinois at Chicago (United States); **Sina Miri, Myunghee Kim,** Univ. of Illinois Chicago (United States)

13434-44 • 11:40 AM - 12:00 PM
Integrating wearable and implantable devices to create in-body networks of electronic therapeutics
Author(s): **Alex Abramson,** Georgia Institute of Technology (United States)

13434-45 • 12:00 PM - 12:20 PM
Augmenting ultrasound for continuous glucose monitoring via a wearable acoustic-readable microneedle patch (ARMP)
Author(s): **Wanglinhan Zhang**, **Jiangang Xu,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Xinjia Li**, **Qiqi Liu,** Shenzhen Institute of Advanced Technology (China); **Guojie Luo,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Jae-Woong Jeong,** KAIST (Korea, Republic of); **Long Meng,** Shenzhen Institute of Advanced Technology (China); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

13434-46 • 12:20 PM - 12:40 PM
Polymer-based fiber optic sensor for non-invasive blood pressure monitoring
Author(s): **Pratheeksha Srinivasu**, **Aditya Sharma**, **Vinayak Ghorapade,** National Tsing Hua Univ. (Taiwan); **Wei-Chih Wang,** Univ. of Washington (United States)

Lunch Break 12:40 PM - 1:40 PM

SESSION 11: ENERGY DEVICES AND MONITORING

20 March 2025 • 1:40 PM - 3:30 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Nanshu Lu**, The Univ. of Texas at Austin (United States)

13434-47 • 1:40 PM - 2:10 PM
Engineering functional polymers for triboelectric nanogenerator *(Invited Paper)*
Author(s): **Juhyuck Lee,** Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of)

13434-48 • 2:10 PM - 2:40 PM
A liquid triboelectric series *(Invited Paper)*
Author(s): **Dongwhi Choi,** Kyung Hee Univ. (Korea, Republic of)

13434-49 • 2:40 PM - 3:00 PM **(CANCELLED)**
Bioinspired electronic skin for energy harvesting and health monitoring: a triboelectric nanogenerator with sweat sensing capabilities
Author(s): **Asma Akter**, **Md Mehedi Hasan Apu, Turki Nabieh Baroud,** King Fahd Univ. of Petroleum & Minerals (Saudi Arabia)

13434-50 • 3:00 PM - 3:30 PM
Wearable skin-pigmentation independent jaundice monitor based on dual-path light-tissue interaction *(Invited Paper)*
Author(s): **Tengfei Gao,** Univ. of California, Davis (United States); **Kihoon Kim,** Univ. of California, Davis (United States), Pusan National Univ. (Korea, Republic of); **Sengju Han**, **Jan Truong,** Univ. of California, Davis (United States); **Min-Ho Seo,** Pusan National Univ. (Korea, Republic of); **Hyoyoung Jeong,** Univ. of California, Davis (United States)

Coffee Break 3:30 PM - 4:00 PM

SESSION 12: FUNCTIONAL MATERIALS

20 March 2025 • 4:00 PM - 5:50 PM | Junior Ballroom D (Third Floor)
Session Chair(s): **Juhyuck Lee**, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of)

13434-51 • 4:00 PM - 4:30 PM
Structural fabrication processes for high-performance, sustainable nanopolymers *(Invited Paper)*
Author(s): **Hyun Chan Kim,** Kumoh National Institute of Technology (Korea, Republic of)

13434-52 • 4:30 PM - 4:50 PM
Highly flexible mechano-luminescence-optoelectronic strip for sensing an in-plane strain on a human body: validation through bike riding
Author(s): **Joseph Gallegos,** New Mexico Institute of Mining and Technology (United States); **Geronimo Macias,** RD Health Sensing Inc. (United States); **Adrian Miramontes, Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States)

13434-53 • 4:50 PM - 5:10 PM
Design variability of conductive yarn embroidery pattern for evaluating the ECG signal quality using wireless signal acquisition unit
Author(s): **Subashini J. M., Pandiyarasan Veluswamy,** Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram (India)

13434-54 • 5:10 PM - 5:30 PM
A smart controllable intravesical bladder outlet occlusion device (CIBOO)
Author(s): **Hassan Beheshti Seresht**, **Mohamed S. Ibrahim,** Univ. of Pittsburgh (United States); **Roger Klein**, **Paul Rusilko,** Univ. of Pittsburgh Medical Ctr. (United States); **Youngjae Chun,** Univ. of Pittsburgh (United States)

13434-55 • 5:30 PM - 5:50 PM
Novel ultrasonic powering receiver design for implantable biomedical microdevices
Author(s): **Sophia Selvarajan, Albert Kim,** Univ. of South Florida (United States)

CONFERENCE 13435

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2025

17 - 19 March 2025 | Junior Ballroom A (Third Floor)

Conference Chair(s): **Maria Pina Limongelli,** Politecnico di Milano (Italy)

Conference Co-Chair(s): **Ching Tai Ng,** The Univ. of Adelaide (Australia); **Didem Ozevin,** Univ. of Illinois Chicago (United States)

Program Committee: **Tommy H. T. Chan,** Queensland Univ. of Technology (Australia); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Maria Feng,** Columbia Univ. (United States); **Dora Foti,** Politecnico di Bari (Italy); **Branko Glisic,** Princeton Univ. (United States); **Benjamin L. Grisso,** Naval Surface Warfare Ctr. Carderock Div. (United States); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Haiying Huang,** The Univ. of Texas at Arlington (United States); **Robin James,** General Motors Co. (United States); **Gi-Woo Kim,** Inha Univ. (Korea, Republic of); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Jian Li,** The Univ. of Kansas (United States); **Jun Li,** Curtin Univ. (Australia); **Suyi Li,** Virginia Polytechnic Institute and State Univ. (United States); **Weibin Li,** Xiamen Univ. (China); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Chin-Hsiung Loh,** National Taiwan Univ. (Taiwan); **Kenneth J. Loh,** Univ. of California, San Diego (United States); **Theodore E. Matikas,** Univ. of Ioannina (Greece); **David B. McCallen,** Lawrence Berkeley National Lab. (United States); **Norbert G. Meyendorf,** Univ. of Dayton (United States); **Isabel M. Morris,** New Mexico Institute of Mining and Technology (United States); **Rebecca Napolitano,** The Pennsylvania State Univ. (United States); **Ehsan Noroozinejad Farsangi,** Western Sydney Univ. (Australia); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States); **Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States); **Fabio Semperlotti,** Purdue Univ. (United States); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Tyler N. Tallman,** Purdue Univ. (United States); **Jiong Tang,** Univ. of Connecticut (United States); **Enrico Tubaldi,** Univ. of Strathclyde (United Kingdom); **Filippo Ubertini,** Univ. degli Studi di Perugia (Italy); **Ya Wang,** Texas A&M Univ. (United States); **Rosalind M. Wynne,** Villanova Univ. (United States); **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ (Taiwan); **Daniele Zonta,** Univ. degli Studi di Trento (Italy), Univ. of Strathclyde (United Kingdom)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: FIBER OPTIC SENSORS AND IMPLEMENTATION I

17 March 2025 • 10:30 AM - 12:00 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

13435-1 • 10:30 AM - 11:00 AM
Fringe analysis of flexural beam as Fabry-Perot resonator for ultrasound attenuation characterization *(Invited Paper)*
Author(s): **Songwei Wang, Haiying Huang,** The Univ. of Texas at Arlington (United States)

13435-2 • 11:00 AM - 11:20 AM
Extracting dispersion curve from frequency response function (FRF) of flexural beams: a Fabry-Perot resonator perspective
Author(s): **Mostafa Rahimi Dizadji**, **Songwei Wang**, **Vahid Jafarpour**, **David Reynoso, Haiying Huang,** The Univ. of Texas at Arlington (United States)

13435-3 • 11:20 AM - 11:40 AM
Use of DFOS to monitor crack opening evolution in FRCM-strengthened reinforced concrete structures
Author(s): **Marco Carlo Rampini,** Politecnico di Milano (Italy); **Mohamed Saidi,** Univ. de Savoie Mont Blanc (France); **Gabriele Cazzulani,** Politecnico di Milano (Italy); **Aron Gabor,** Univ. Claude Bernard Lyon 1 (France)

13435-4 • 11:40 AM - 12:00 PM
Structural health monitoring of Au Sable Light Station using distributed fiber optic sensing and 3D point clouds
Author(s): **Gowshikan Arulananthan**, **Chao-Sheng Wu**, **Nate Opperman**, **Richa D Rakhee**, **Md Zubayer Yeaser**, **Shihang Wang**, **Dilruba J Disha**, **Useok Kim**, **Saleh Z Alshammari**, **Monamy Mustaq**, **Hannah B. Blum, Jesse C. Hampton,** Univ. of Wisconsin-Madison (United States)

Lunch Break 12:00 PM - 1:30 PM

SESSION 2: FIBER OPTIC SENSORS AND IMPLEMENTATION II

17 March 2025 • 1:30 PM - 3:00 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Haiying Huang**, The Univ. of Texas at Arlington (United States)

13435-5 • 1:30 PM - 2:00 PM
A hybrid approach for temperature data loss reconstruction of FBG temperature sensor embedded in prestressed "double-T" slab *(Invited Paper)*
Author(s): **Yitian Liang, Branko Glišić,** Princeton Univ. (United States)

13435-6 • 2:00 PM - 2:20 PM
Multiphysics modeling of high-voltage smart composite electric transport cables for offshore applications
Author(s): **Monssef Drissi Habti,** Univ. Gustave Eiffel (France)

13435-7 • 2:20 PM - 2:40 PM
Applying Fabry-Perot resonator principle for physics-based understanding of bonded piezoelectric wafer active sensor (PWAS)
Author(s): **Vahid Jafarpour, Haiying Huang,** The Univ. of Texas at Arlington (United States)

13435-8 • 2:40 PM - 3:00 PM
Structural health monitoring of complex aerospace structures based on non-intrusive printed piezoelectric
Author(s): **Shweta Paunikara**, **Marc Rebillat,** PIMM Laboratory UMR CNRS-ENSAM-CNAM (France); **Ingo Wirth,** Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM) (Germany); **Nazih Mechbal,** Ecole Nationale Supérieure d'Arts et Métiers (France)

Coffee Break 3:00 PM - 3:30 PM

SESSION 3: SENSOR DESIGN AND IMPLEMENTATION

17 March 2025 • 3:30 PM - 5:40 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Didem Ozevin**, Univ. of Illinois Chicago (United States); **Stewart Sherrit**, Jet Propulsion Lab. (United States)

13435-9 • 3:30 PM - 4:00 PM
Characterization and control of surface parallel mirror actuators *(Invited Paper)*
Author(s): **Stewart Sherrit**, **Diego W. Camacho**, **Carlos M. Gross Jones**, **Eric M. Guevara**, **Carey L. Weisberg**, **Brian Monacelli**, **Scott A. Basinger**, **Jonathan A. Tesch, Keith Coste,** Jet Propulsion Lab. (United States)

13435-10 • 4:00 PM - 4:20 PM
Development of a re-configurable infrasonic sensor array board for planetary exploration applications
Author(s): **Stewart Sherrit**, **Brandon C. Metz**, **Mircea Badescu**, **Max Zappe**, **Abigail Martinez**, **Siddharth Krishnamoorthy**, **James A. Cutts**, **Marco B. Quadrelli, Yoseph Bar-Cohen,** Jet Propulsion Lab. (United States)

13435-11 • 4:20 PM - 4:40 PM
Advanced e-tattoo wireless strain sensors for smart structural health monitoring of composite structures
Author(s): **Hassan Mahmoud, Gilles Lubineau,** King Abdullah Univ. of Science and Technology (Saudi Arabia)

13435-12 • 4:40 PM - 5:00 PM
Thickness gauging using a high-temperature electromagnetic acoustic transducer with optimized magnetic field
Author(s): **Paul Rollet**, **Pierre Bélanger,** Ecole de Technologie Supérieure (Canada); **Cong Zhu Sun**, **Alain Le Duff, Guillaume Painchaud-April,** Evident Industrial (Canada)

13435-13 • 5:00 PM - 5:20 PM
Quantifying uncertainty in InSAR-derived displacement measurements for bridge monitoring
Author(s): **Riccardo Liuzzo**, **Pier Francesco Giordano, Maria Pina Limongelli,** Politecnico di Milano (Italy)

13435-52 • 5:20 PM - 5:40 PM
Design of a variable-thickness morphing wing for enhanced UAV aerodynamic performance
Author(s): **Ahmad Esber, Sunday Olutunde Oyadiji,** The Univ. of Manchester (United Kingdom)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: APPLICATIONS OF SMART SENSORY SYSTEMS TO CIVIL STRUCTURES I

18 March 2025 • 10:30 AM - 11:40 AM | Junior Ballroom A (Third Floor)

13435-15 • 10:30 AM - 11:00 AM
Multitask Learning for Roof Type and Material Segmentation Toward Digital Twinning *(Invited Paper)*
Author(s): **Mohammad Hossein Afsharmovahed**, **Venkata Sriram Siddhardh Nadendla,** Missouri Univ. of Science and Technology (United States); **Tarutal Ghosh Mondal,** Indian Institute of Technology Bhubaneswar (India); **Genda Chen,** Missouri Univ. of Science and Technology (United States)

13435-21 • 11:00 AM - 11:20 AM
Autonomous conversion of point clouds to digital twins constructed from two-node line elements for simplified structural analysis
Author(s): **Farzad Azizi Zade, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

13435-53 • 11:20 AM - 11:40 AM
An adaptive optics microscopy system based on a DMD-assisted lateral shearing interferometer
Author(s): **Yuan-Ming Chiang,** Institute of Applied Mechanics, (Taiwan); **Hong-Je Liu**, **Sin-Ruei Lin**, **Jiun-Woei Huang,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan); **Shu-Sheng Lee,** National Taiwan Ocean Univ. (Taiwan); **Hsiang-Chieh Lee,** Graduate Institute of Photonics and Optoelectronics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan); **Chih-Kung Lee,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan)

Lunch Break 11:40 AM - 1:30 PM

SESSION 5: APPLICATIONS OF SMART SENSORY SYSTEMS TO CIVIL STRUCTURES II

18 March 2025 • 1:30 PM - 2:40 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Genda Chen**, Missouri Univ. of Science and Technology (United States); **Didem Ozevin**, Univ. of Illinois Chicago (United States)

13435-19 • 1:30 PM - 2:00 PM
Digital twin technology for bridge structural health monitoring based on agent model *(Invited Paper)*
Author(s): **Jiayi Yuan**, **Xinteng Ma,** Harbin Institute of Technology (China); **Xiuyan Chen,** Harbin Traffic Intelligent Equipment Technology Co., Ltd. (China); **Yang Liu,** Harbin Institute of Technology (China)

13435-20 • 2:00 PM - 2:20 PM
Efficient repair of aging bridges through smartphone-assisted 3D reconstruction
Author(s): **Raguez Taha, Didem Ozevin,** Univ. of Illinois Chicago (United States)

13435-22 • 2:20 PM - 2:40 PM
Investigation, monitoring, and predictive analysis of precast reinforced structures using sensor networks and photogrammetric techniques
Author(s): **Ahsin Mehmood,** National Univ. of Sciences and Technology (Pakistan)

Coffee Break 2:40 PM - 3:10 PM

SESSION 6: ADVANCES IN SENSING TECHNOLOGY

18 March 2025 • 3:10 PM - 5:40 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Dora Foti**, Politecnico di Bari (Italy)

13435-23 • 3:10 PM - 3:40 PM
Influence of thin film geometry on the behavior of a piezoelectric acoustic emission sensor *(Invited Paper)*
Author(s): **Talha Khan**, **John T. Sabino**, **Chenxi Xu**, **Matthew Daly,** Univ. of Illinois Chicago (United States); **Edward P. Lowenhar,** MISTRAS Group, Inc. (United States); **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13435-24 • 3:40 PM - 4:00 PM
An in-depth analysis for developing SAW gas sensors utilizing various MEMS piezoelectric components through COMSOL
Author(s): **Swarnalatha Veerla**, **Mitali Hardik Desai**, **Shuai Ju**, **Hassna Ouassal**, **Chahil Gopal Patel**, **Rushad Jubair, Haifeng Zhang,** Univ. of North Texas (United States)

13435-25 • 4:00 PM - 4:20 PM
Coplanar capacitive sensing for nondestructive evaluation
Author(s): **Catalin Mandache**, **Dennis Krys**, **Marc Genest, Behnam Ashrafi,** National Research Council Canada (Canada)

13435-26 • 4:20 PM - 4:40 PM
Battery voltage level monitoring and prediction using SAWR based sensor with machine learning algorithm
Author(s): **Haifeng Zhang**, **Mitali Hardik Desai**, **Sreejith Vattaparambil Sreedharan, Kamesh Namuduri,** Univ. of North Texas (United States)

13435-27 • 4:40 PM - 5:00 PM
Drones for location of residential utilities
Author(s): **Anastasia Zagrai,** Socorro High School (United States); **Mostafa Hassanalian,** New Mexico Institute of Mining and Technology (United States)

13435-28 • 5:00 PM - 5:20 PM
Contact-free detection and visualization of guided waves in composites using an optical microphone
Author(s): **Caspar Wasle**, **Florian Heilemann**, **Björn Wohltmann**, **Rebecca Rodeck, Gerko Wende,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

13435-29 • 5:20 PM - 5:40 PM
A flexible sensor-based crack identification method for infrastructure structures
Author(s): **Zheng Zhou**, **Xiang Zhou**, **Yan Wang, Yang Liu,** Harbin Institute of Technology (China)

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13435-46 • 6:00 PM - 8:00 PM
Flexible temperature sensor using laser induced graphene (LIG) based on processing-controlled seebeck contrast
Author(s): **Hassan Mahmoud, Gilles Lubineau,** King Abdullah Univ. of Science and Technology (Saudi Arabia)

13435-47 • 6:00 PM - 8:00 PM
Embedded optical sensing systems
Author(s): **Lidan Cao**, **Rui Wu**, **Andres M. Biondi Vaccariello**, **Sabrina Abedin**, **Guoqiang Cui,** Univ. of Massachusetts Lowell (United States); **Jason Parker**, **Carolyn Westmark,** U.S. Army Combat Capabilities Development Command Soldier Center (United States); **Xingwei Wang,** Univ. of Massachusetts Lowell (United States)

13435-48 • 6:00 PM - 8:00 PM
Bridge bearing fixity evaluation using ANN and low-cost wireless sensing systems
Author(s): **Prakash Bhandari**, **Shinae Jang**, **Song Han**, **Ramesh Malla, Romy Reichenberger,** Univ. of Connecticut (United States)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: ADVANCES IN SENSING TECHNOLOGIES FOR COMPOSITES

19 March 2025 • 10:30 AM - 11:40 AM | Junior Ballroom A (Third Floor)
Session Chair(s): **Filippo Ubertini**, Univ. degli Studi di Perugia (Italy)

13435-30 • 10:30 AM - 11:00 AM
Low-cost biphasic DC data acquisition for monitoring cementitious self-sensing materials *(Invited Paper)*
Author(s): **David P. Wamai**, **Austin R. J. Downey,** Univ. of South Carolina (United States); **Hasan Borke Birgin**, **Antonella D'Alessandro, Filippo Ubertini,** Univ. degli Studi di Perugia (Italy)

13435-31 • 11:00 AM - 11:20 AM
Strain-based damage detection using nonlinear cointegration theory: application to a masonry building model using smart bricks
Author(s): **Mattiacci Michele**, **Andrea Meoni**, **Antonella D'Alessandro,** Univ. degli Studi di Perugia (Italy); **Branko Glisic,** Princeton Univ. (United States); **Filippo Ubertini,** Univ. degli Studi di Perugia (Italy)

13435-32 • 11:20 AM - 11:40 AM
Pavement subsurface spatial displacement monitoring system with embedded passive RF sensors
Author(s): **Kent X. Eng,** Princeton Univ. (United States); **Zygmunt J. Haas,** The Univ. of Texas at Dallas (United States); **Samir R. Das**, **Petar Djurić**, **Milutin Stanaćević,** Stony Brook Univ. (United States); **Branko Glisic,** Princeton Univ. (United States)

Lunch Break 11:40 AM - 1:30 PM

SESSION 8: INNOVATIVE SENSOR MATERIALS I

19 March 2025 • 1:30 PM - 3:20 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Austin R. J. Downey**, Univ. of South Carolina (United States)

13435-34 • 1:30 PM - 2:00 PM
Damage-sensitive electrically conductive mortars: a novel laboratory characterization method and initial numerical simulations *(Invited Paper)*
Author(s): **Andrea Meoni**, **Daniel A. Triana Camacho,** Univ. degli Studi di Perugia (Italy); **Enrique Garcìa-Macìas,** Univ. de Granada (Spain); **Antonella D'Alessandro, Filippo Ubertini,** Univ. degli Studi di Perugia (Italy)

13435-35 • 2:00 PM - 2:20 PM
Embedded sensing system for shipboard damage control scenarios
Author(s): **Eric Stach**, **Aaron Appelle**, **Jerome Lynch, Liming Salvino,** Duke Univ. (United States)

13435-36 • 2:20 PM - 2:40 PM
Improving the self-sensing inverse problem displacement field recovery via sensor data fusion
Author(s): **Andrew Nguyen, Tyler Tallman,** Purdue Univ. (United States)

13435-38 • 2:40 PM - 3:00 PM
Investigation of 3D printed concrete for real-time monitoring of additive manufacturing process
Author(s): **Safal K.C.**, **Han Liu,** Iowa State Univ. of Science and Technology (United States); **Israel Nilton Lopes Sousa,** Univ. degli Studi di Perugia (Italy); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Antonella D'Alessandro, Filippo Ubertini,** Univ. degli Studi di Perugia (Italy)

13435-40 • 3:00 PM - 3:20 PM
Self-contained electrical conductivity sensing spikes for monitoring of levee wetting and drying cycles
Author(s): **Sydney Morris**, **Ayman Mokhtar**, **Puja Chowdhury**, **Malichi Flemming**, **Austin R. J. Downey**, **Jasim Imran,** Univ. of South Carolina (United States); **Sadik Khan,** Jackson State Univ. (United States)

Coffee Break 3:20 PM - 3:50 PM

SESSION 9: INNOVATIVE MATERIALS AND SENSORS II

19 March 2025 • 3:50 PM - 5:40 PM | Junior Ballroom A (Third Floor)
Session Chair(s): **Monssef Drissi Habti**, Univ. Gustave Eiffel (France)

13435-39 • 3:50 PM - 4:20 PM
Piezoresistive performance of 3D printed cementitious composites doped with carbon microfibers *(Invited Paper)*
Author(s): **Israel Sousa,** Univ. degli Studi di Perugia (Italy); **Han Liu,** Iowa State Univ. of Science and Technology (United States); **Antonella D'Alessandro,** Univ. degli Studi di Perugia (Italy); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Filippo Ubertini,** Univ. degli Studi di Perugia (Italy)

13435-41 • 4:20 PM - 4:40 PM
Ultrasonic measurement of structural boundary conditions to enable on-orbit satellite structural dynamic assessment
Author(s): **Hollis Dinwiddie, Andrei Zagrai,** New Mexico Institute of Mining and Technology (United States)

13435-42 • 4:40 PM - 5:00 PM
Transfer leaning using DAS for blasting event identification
Author(s): **Chao-Sheng Wu**, **Dante Fratta, Jesse C. Hampton,** Univ. of Wisconsin-Madison (United States)

13435-43 • 5:00 PM - 5:20 PM
Detection of defects at elbows in bend pipes based on ultrasonic guided wave
Author(s): **Xiaodie Hu,** Xiamen Univ. (China); **Xibin Fu,** Xiamen Special Equipment Inspection Institute (China); **Zhirong Lin**, **Xinlin Qing, Yishou Wang,** Xiamen Univ. (China)

13435-45 • 5:20 PM - 5:40 PM
Optimized annular array P(VDF-co-TrFE) transducers for selective excitation of Lamb wave modes
Author(s): **Hao Dong**, **Pierre Margerit**, **Marc Rebillat,** PIMM Laboratory UMR CNRS-ENSAM-CNAM (France); **Mickaël Pruvost,** Arkema Piezotech (France); **Nazih Mechbal,** Ecole Nationale Supérieure d'Arts et Métiers (France)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

CONFERENCE 13436

Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIX

17 - 20 March 2025 | Pavilion Ballroom B (Third Floor)

Conference Chair(s): **Tzuyang Yu,** Univ. of Massachusetts Lowell (United States)

Conference Co-Chair(s): **Andrew L. Gyekenyesi,** Ohio Aerospace Institute (United States); **Peter J. Shull,** The Pennsylvania State Univ. (United States); **H. Felix Wu,** U.S. Dept. of Energy (United States)

Program Committee: **Holger Böse,** Fraunhofer Institute for Silicate Research (ISC) (Germany); **Christopher C. Bowland,** Oak Ridge National Lab. (United States); **Burak Boyaci,** Bentley Systems, Inc. (United States); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Chih-Hung Chiang,** Chaoyang Univ. of Technology (Taiwan); **Pei Dong,** George Mason Univ. (United States); **Benjamin L. Ervin,** MIT Lincoln Lab. (United States); **Elvis Higgins,** CSX Transportation, Inc. (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); **Mark Jen,** Kiewit Corp. (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Manigandan Kannan,** The Univ. of Akron (United States); **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Eric N. Landis,** The Univ. of Maine (United States); **Denvid Lau,** City Univ. of Hong Kong (Hong Kong, China); **Kenneth J. Loh,** Univ. of California, San Diego (United States); **Oliver J. Myers,** Clemson Univ. (United States); **Didem Ozevin,** Univ. of Illinois Chicago (United States); **Akira Sasamoto,** National Institute of Advanced Industrial Science and Technology (Japan); **Yu-Min Su,** National Kaohsiung Univ. of Science and Technology (Taiwan); **Jiong Tang,** Univ. of Connecticut (United States); **Hao Yin,** Massachusetts Dept. of Transportation (United States); **Edward Zhou,** AECOM (United States)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:

- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: NDT FOR SUSTAINABLE ENERGY AND SOCIETY

17 March 2025 • 10:30 AM - 11:50 AM | Pavilion Ballroom B (Third Floor)

13436-1 • 10:30 AM - 11:10 AM
Innovative energy harvesting through vertical greenery system in green building (Keynote Presentation)
Author(s): **Denvid Lau,** City Univ. of Hong Kong (Hong Kong, China)

13436-2 • 11:10 AM - 11:30 AM
A study of ultrasonic metamaterial for damage detection in the wind turbine blade
Author(s): **Hongqiao Chen**, **Feilong Huang**, **Weiyu Miao,** Harbin Institute of Technology (China); **Yang Liu,** Xi'an Polytechnic Univ. (China); **Wentao Wang,** Harbin Institute of Technology Shenzhen Graduate School (China)

13436-3 • 11:30 AM - 11:50 AM
Portable non-destructive tree defect detection based on acoustic excitation and motion magnification
Author(s): **Yishuang Zhang**, **Cheuk Lun Chow, Denvid Lau,** City Univ. of Hong Kong (Hong Kong, China)

Lunch Break 11:50 AM - 1:20 PM

SESSION 2: NDT FOR MULTIFUNCTIONAL MATERIALS

17 March 2025 • 1:20 PM - 2:20 PM | Pavilion Ballroom B (Third Floor)

13436-6 • 1:20 PM - 1:40 PM
Recent extraction of second-order material constants for $Ca_3TaGa_3Si_2O_{14}$ (CTGS) crystal
Author(s): **Shuai Ju**, **Haifeng Zhang,** Univ. of North Texas (United States); **John A. Kosinski,** Huntington Ingalls Industries, Inc. (United States)

13436-27 • 1:40 PM - 2:00 PM
Ultrasonication accelerated curing of epoxy resin: monitoring through impedance measurement
Author(s): **Daniel Csehngeri**, **Edmond Cretu, Anoush Poursartip,** The Univ. of British Columbia (Canada)

13436-8 • 2:00 PM - 2:20 PM
Overview of nondestructive evaluation methods on particle functionalized glass fiber-reinforced composites
Author(s): **Josef Ganslmaier,** Institut für Leichtbau, Univ. der Bundeswehr München (Germany); **Marcel Littig,** Wehrwissenschaftliches Institut für Werk- und Betriebsstoffe (Germany); **Dominik Santl,** Airbus Defence and Space (Germany); **Matthias Bleckmann,** Wehrwissenschaftliches Institut für Werk- und Betriebsstoffe (Germany); **Philipp Höfer,** Institut für Leichtbau, Univ. der Bundeswehr München (Germany)

Coffee Break 2:20 PM - 3:10 PM

SESSION 3: ACOUSTIC AND ULTRASONIC NDT TECHNIQUES

17 March 2025 • 3:10 PM - 4:30 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **Manigandan Kannan**, The Univ. of Akron (United States)

13436-9 • 3:10 PM - 3:30 PM
Watching material recrystallization in real-time using spatially resolved acoustic spectroscopy (SRAS)
Author(s): **Wenqi Li**, **Carolina Guerra**, **Arthur Ford**, **Rafael Fuentes-Dominguez**, **Matthew Clark, Richard J. Smith,** The Univ. of Nottingham (United Kingdom)

13436-11 • 3:30 PM - 3:50 PM
Spatially resolved acoustic spectroscopy (SRAS) ++ for elasticity imaging of advanced materials
Author(s): **Wenqi Li,** The Univ. of Nottingham (United Kingdom); **Paul Dryburgh,** King's College London (United Kingdom); **Carolina Guerra**, **Rikesh Patel**, **Richard J. Smith, Matthew Clark,** The Univ. of Nottingham (United Kingdom)

13436-12 • 3:50 PM - 4:10 PM
Non-destructive evaluation on recent and aged pine wood by ultrasonic velocity measurements
Author(s): **Mayra Carrillo, Hector G. Carreón,** Univ. Michoacana de San Nicolás de Hidalgo (Mexico)

13436-13 • 4:10 PM - 4:30 PM
Ethanol detection and monitoring using surface acoustic wave sensor
Author(s): **Rishikesh Srinivasaraghavan Govindarajan,** Embry-Riddle Aeronautical Univ. (United States); **Mackenzie Tobin,** Virginia Commonwealth University (United States); **Zefu Ren**, **Michael Ricciardella**, **Foram Madiyar, Daewon Kim,** Embry-Riddle Aeronautical Univ. (United States)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: VR AND OTHER SIMULATION TECHNIQUES

18 March 2025 • 10:30 AM - 12:10 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **Andrew L. Gyekenyesi**, Ohio Aerospace Institute (United States)

13436-16 • 10:30 AM - 10:50 AM
Numerical simulation of artificial cracks in concrete structures for damage detection
Author(s): **TzuYang Yu**, **Albert Paradis, Maryam Abazarsa,** Univ. of Massachusetts Lowell (United States)

13436-17 • 10:50 AM - 11:10 AM
Analyzing failure propagation dynamics in pipeline networks: a spatial and scenario-based approach
Author(s): **Yasir Mahmood**, **Nof Yasir**, **Nita Yodo, Ying Huang,** North Dakota State Univ. (United States)

13436-18 • 11:10 AM - 11:30 AM **(CANCELLED)**
Interfacial mechanics and smart bonding: innovations in sensor-structural system stability using electro-mechanical impedance (EMI) monitoring
Author(s): **Ajay Patel**, **Sumedha Moharana, Deepak V. N. S. S. Vootkur,** Shiv Nadar Institution of Eminence (India)

13436-19 • 11:30 AM - 11:50 AM
Damage detection of surface cracks on reinforced concrete bridge piers using virtual reality
Author(s): **Maryam Abazarsa, TzuYang Yu,** Univ. of Massachusetts Lowell (United States)

13436-20 • 11:50 AM - 12:10 PM
Coupling of local and non-local constitutive model for wave propagation in structures
Author(s): **Ajeet K. Yadav, S. Gopalakrishnan,** Indian Institute of Science, Bengaluru (India)

Lunch Break 12:10 PM - 2:00 PM

SESSION 5: LDV AND LASER ULTRASOUND TECHNIQUES

18 March 2025 • 2:00 PM - 2:20 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **TzuYang Yu**, Univ. of Massachusetts Lowell (United States)

13436-21 • 2:00 PM - 2:20 PM
Remote inspection of a steel railway bridge using laser Doppler vibrometry and a bound approach
Author(s): **TzuYang Yu,** Univ. of Massachusetts Lowell (United States); **Qixiang Tang,** Echem Consultants LLC (United States); **Maryam Abazarsa,** Univ. of Massachusetts Lowell (United States)

SESSION 6: SPECIAL SESSION: MULTIFUNCTIONAL COMPOSITE MATERIAL AND STRUCTURES

18 March 2025 • 2:20 PM - 3:20 PM | Pavilion Ballroom B (Third Floor)

13436-7 • 2:20 PM - 2:40 PM
Tensile and fatigue characterization of multifunctional composites
Author(s): **Tymon Nieduzak**, **Alice Kadner,** Columbia Univ. (United States); **Chistopher C. Bowland**, **Sumit Gupta,** Oak Ridge National Lab. (United States); **Maria Feng,** Columbia Univ. (United States)

13436-30 • 2:40 PM - 3:00 PM
3D printed embedded sensor for EV's structure health monitoring
Author(s): **Wonbong Choi,** Univ. of North Texas (United States); **Yijie Jiang,** The Univ. of Oklahoma (United States); **Rigoberto Advincula,** Oak Ridge National Lab. (United States); **Rifat Rupom**, **Liman Rahman, Eunho Cha,** Univ. of North Texas (United States)

13436-28 • 3:00 PM - 3:20 PM
Machine learning-driven design and self-sensing capabilities of automotive bumper lattices for adaptive impact response
Author(s): **Komal Chawla**, **Vlastimil Kunc**, **Ahmed A Hassen,** Oak Ridge National Lab. (United States); **Zhenpeng Xu**, **Rayne Zheng,** Univ. of California, Berkeley (United States); **Seokpum Kim,** Oak Ridge National Lab. (United States)

DISCUSSION: CHALLENGES IN VR/SIMULATION, LDV/LASER ULTRASOUND, & MULTIFUNCTIONAL COMPOSITE MATERIALS

18 March 2025 • 3:20 PM - 4:20 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **TzuYang Yu**, Univ. of Massachusetts Lowell (United States)
Join us for an informal discussion on challenging problems in VR and other simulation techniques, LDV and laser ultrasound techniques, and multifunctional composite materials and structures.

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13436-50 • 6:00 PM - 8:00 PM
Time-varying damping switching condition of semiactive control by optimal control using the predominant frequency calculated from earthquake acceleration data
Author(s): **Daichi Hatano, Nanako Miura,** Kyoto Institute of Technology (Japan)

13436-51 • 6:00 PM - 8:00 PM
Front-end amplified polyCMUTs for acoustic emission detection
Author(s): **Jinhao Lu**, **Martin Angerer**, **Jonas Welsch**, **Edmond Cretu, Robert Rohling,** The Univ. of British Columbia (Canada)

13436-52 • 6:00 PM - 8:00 PM
A multimodal approach to road condition monitoring for enhanced infrastructure management
Author(s): **Mahdi Zulfikar**, **A. Q. M. Zohuruzzaman, Sadik Khan,** Jackson State Univ. (United States)

13436-53 • 6:00 PM - 8:00 PM
Quality monitoring in laser welding of rectangular copper wires for traction drives using a laser Doppler vibrometer
Author(s): **Marcel Baader**, **Tim Raffin**, **Fabian Giesbert, Jörg Franke,** Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany)

13436-54 • 6:00 PM - 8:00 PM
The use of shearography for non-destructive evaluation of damage in green composite laminates
Author(s): **Vito Pagliarulo,** Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello", Consiglio Nazionale delle Ricerche (Italy); **Chiara Saltarelli,** Istituto di Scienze Applicate e Sistemi Intelligenti (Italy); **Melania Paturzo,** Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello", Consiglio Nazionale delle Ricerche (Italy); **Pietro Russo,** Istituto per i Polimeri, Compositi e Biomateriali, Consiglio Nazionale delle Ricerche (Italy)

13436-56 • 6:00 PM - 8:00 PM
Enhancing driver safety on unpaved roads with smartphone-based road roughness index and wavelet denoising
Author(s): **Xinyi Yang,** North Dakota State Univ. (United States); **Yihao Ren,** The Univ. of North Carolina at Pembroke (United States); **Ying Huang, Pan Lu,** North Dakota State Univ. (United States)

13436-57 • 6:00 PM - 8:00 PM
Enhancing CFRP functionalities with reduced graphene oxide films: advancements in smart materials for digital twins and AI-based NDE
Author(s): **Michele Meo**, **Gennaro Scarselli**, **Nicolas P. Avdelidis, Mario Rapisarda,** Univ. of Southampton (United Kingdom)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: NDT FOR ADDITIVE MANUFACTURING

19 March 2025 • 10:30 AM - 12:00 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **Denvid Lau**, City Univ. of Hong Kong (Hong Kong, China)

13436-31 • 10:30 AM - 11:00 AM
Nondestructive evaluation of additively manufactured recycled composites for in-space manufacturing *(Invited Paper)*
Author(s): **Didem Ozevin**, **Yayue Pan**, **Jida Huang, Lin Li,** Univ. of Illinois Chicago (United States)

13436-32 • 11:00 AM - 11:20 AM
X-Ray computed tomography integration with surface imaging to improve additive manufacturing porosity quantification
Author(s): **Erik L. Frankforter, Peter Spaeth,** NASA Langley Research Ctr. (United States)

13436-33 • 11:20 AM - 11:40 AM
Flaw detection in additively manufactured materials
Author(s): **Manigandan Kannan**, **Safia Alam Sumaiya**, **Karthikeyan Ramachandran**, **Eric J. Hartman, Riley R. Myers,** The Univ. of Akron (United States)

13436-34 • 11:40 AM - 12:00 PM
In-situ embedded strain sensing for additively manufactured multimaterial ceramics via piezospectroscopy
Author(s): **Nicholas Reed**, **Rishikesh Srinivasaraghavan Govindarajan**, **Zachary Stein**, **Seetha Raghavan, Daewon Kim,** Embry-Riddle Aeronautical Univ. (United States)

Lunch Break 12:00 PM - 1:30 PM

SESSION 8: RADAR AND THERMAL NDT TECHNIQUES

19 March 2025 • 1:30 PM - 3:00 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **TzuYang Yu**, Univ. of Massachusetts Lowell (United States)

13436-36 • 1:30 PM - 2:00 PM
Assessing the effect of inspection angle on corrosion and crack detection in reinforced concrete structures by using 1.6 GHz GPR *(Invited Paper)*
Author(s): **Maryam Abazarsa, TzuYang Yu,** Univ. of Massachusetts Lowell (United States)

13436-37 • 2:00 PM - 2:20 PM
Detecting underground water leak from the pipelines by radar and thermal infrared techniques
Author(s): **Benhui Fan**, **Ao Wang,** Cerema (France); **Jean-Marie Fleureau,** Lab. de Mécanique Paris-Saclay, Ecole Normale Supérieure Paris-Saclay (France), CentraleSupélec (France), Univ. Paris-Saclay (France); **Vincent Guilbert**, **Bruno Beaucamp**, **Cyril Ledun,** Cerema (France); **Camille Herlent,** Univ. Grenoble Alpes (France); **Raphaël Antoine**, **Cyrille Fauchard,** Cerema (France); **Alain Sylvestre,** Univ. Grenoble Alpes, CNRS (France), Lab. de Génie Électrique de Grenoble, Grenoble INP (France)

13436-38 • 2:20 PM - 2:40 PM
Non-destructive evaluation of corrosion in an artificial aging process at a clad pipe by thermoelectric means
Author(s): **Valdemar Conejo**, **Hector G. Carreón,** Univ. Michoacana de San Nicolás de Hidalgo (Mexico); **Maria Lourdes Carreon,** Univ. of Arkansas (United States); **Maria Guadalupe Carreon,** Univ. Michoacana de San Nicolás de Hidalgo (Mexico)

13436-39 • 2:40 PM - 3:00 PM
Utilizing PS-InSAR for precise displacement monitoring of bridge components: a case study in structural health monitoring
Author(s): **Ehsan Sadeghian**, **Elena Dragomirescu,** Univ. of Ottawa (Canada); **Daniel Cusson,** National Research Council Canada (Canada)

Coffee Break 3:00 PM - 3:30 PM

SESSION 9: MACHINE LEARNING, DEEP LEARNING, AND AI TECHNIQUES

19 March 2025 • 3:30 PM - 5:10 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **TzuYang Yu**, Univ. of Massachusetts Lowell (United States)

13436-40 • 3:30 PM - 3:50 PM
Dual-spectrum imaging and deep learning for enhanced damage detection in railway crossties
Author(s): **Moein Ramezanpour Kami**, **Yuning Wu**, **Xuan Zhu,** The Univ. of Utah (United States); **Thompson Nguyen,** ZS Associates, Inc. (United States)

13436-42 • 3:50 PM - 4:10 PM
Identifying scatterers in 3D solids using machine learning and elastic wave measurements
Author(s): **Boyoung Kim**, **Sina Tajmiri**, **Jinho Hahn, Chanseok Jeong,** Central Michigan Univ. (United States)

13436-43 • 4:10 PM - 4:30 PM
Probabilistic machine learning aided acoustic emission source localization in mode-I fracture test of laminated veneer lumber
Author(s): **Xiangdong He**, **Landon Amerongen**, **Peng Zhang,** The Univ. of Utah (United States); **Thompson Nguyen,** ZS Associates, Inc. (United States); **Xuan Zhu,** The Univ. of Utah (United States)

13436-44 • 4:30 PM - 4:50 PM
Corrosion cracks identification in reinforced concrete with deep learning SCNet model
Author(s): **Ying Xu,** Harbin Institute of Technology Shenzhen Graduate School (China)

13436-45 • 4:50 PM - 5:10 PM
Leveraging AI and remote sensor technology in transportation infrastructure management
Author(s): **Scott Becher,** Bentley Systems, Inc. (United States); **Barritt Lovelace,** Collins Engineers (United States)

DISCUSSION: CHALLENGES IN NDT FOR ADDITIVE MANUFACTURING, RADAR/ THERMAL NDT, & ML/DEEP LEARNING/ AI

19 March 2025 • 5:10 PM - 6:10 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **TzuYang Yu**, Univ. of Massachusetts Lowell (United States)
Join us for an informal discussion on challenging problems in NDT for additive manufacturing, radar and thermal NDT techniques, and machine learning, deep learning, and AI techniques

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 10: DIGITAL IMAGE CORRELATION AND VISION-BASED TECHNIQUES

20 March 2025 • 10:30 AM - 11:50 AM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **Alessandro Sabato**, Univ. of Massachusetts Lowell (United States)

13436-46 • 10:30 AM - 10:50 AM
In-situ fatigue life analysis by direct current potential drop and digital image correlation for additive manufactured metals
Author(s): **Manigandan Kannan**, **Saman Faraji Gargari**, **Muralikrishanan Ramachandran**, **Jordan Craft, Lukas Seggi,** The Univ. of Akron (United States)

13436-47 • 10:50 AM - 11:10 AM
Development of a camera pose estimation algorithm for vibration analysis of an eye-in-hand flexible structure
Author(s): **Wu-Hsin Lin,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan); **Yu-Hsiang Hsu, Chih-Kung Lee,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan)

13436-48 • 11:10 AM - 11:30 AM
Real-time modal analysis of large structures using AI-DIC
Author(s): **Sneha Prasad,** Indian Institute of Technology Madras (India); **Chih H. Chiang,** Chaoyang Univ. of Technology (Taiwan); **David Kumar,** Indian Institute of Technology Madras (India)

13436-41 • 11:30 AM - 11:50 AM
Robotic identification and localization of visual defects in concrete structures using a visual-language processing artificial intelligence model with prompt optimization
Author(s): **Farzad Azizi Zade, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

DISCUSSION: CHALLENGES IN DIGITAL IMAGE CORRELATION AND VISION-BASED TECHNIQUES

20 March 2025 • 11:50 AM - 12:50 PM | Pavilion Ballroom B (Third Floor)
Session Chair(s): **TzuYang Yu**, Univ. of Massachusetts Lowell (United States)
Join us for an informal discussion on challenging problems in digital image correlation and vision-based techniques.

CONFERENCE 13437

Health Monitoring of Structural and Biological Systems XIX

17 - 20 March 2025 | Pavilion Ballroom A, Sessions 4-7 Junior Ballroom B (Third Floor)

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

Conference Co-Chair(s): **Kara J. Peters,** North Carolina State Univ. (United States); **Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

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); **Arvin Ebrahimkhanlou,** Drexel Univ. (United States); **Erik L. Frankforter,** NASA Langley Research Ctr. (United States); **Paul Fromme,** Univ. College London (United Kingdom); **Victor Giurgiutiu,** Univ. of South Carolina (United States); **Srinivasan Gopalakrishnan,** Indian Institute of Science, Bengaluru (India); **Guoliang Huang,** Peking Univ. (China); **Robin James,** General Motors Co. (United States); **Xiaoning Jiang,** North Carolina State Univ. (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); **Paweł H. Malinowski,** The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland); **Zhu Mao,** Worcester Polytechnic Institute (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, Polish Academy of Sciences (Poland); **Xinlin Qing,** Xiamen Univ. (China); **Henrique L. Reis,** Univ. of Illinois at Urbana-Champaign (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,** Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute (China); **Hoon Sohn,** KAIST (Korea, Republic of), Korea Railway Innovation Institute (Korea, Republic of); **Wei-Chih Wang,** Univ. of Washington (United States); **Jinkyu Yang,** Seoul Univ. (Korea, Republic of); **Lingyu Yu,** Univ. of South Carolina (United States); **Fuh-Gwo Yuan,** North Carolina State Univ. (United States); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States)

Monday 17 March 2025

MONDAY PLENARY

17 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2025 SSM Lifetime Achievement Award presentation
- 2025 NDE Lifetime Achievement Award presentation

13431-500 • 8:30 AM - 9:15 AM
Elastocalorics: cool into the future?! (Plenary Presentation)
Author(s): **Stefan S. Seelecke,** Univ. des Saarlandes (Germany)

13436-500 • 9:15 AM - 10:00 AM
Modeling embodied carbon emissions in U.S. building stock (Plenary Presentation)
Author(s): **Ming Hu,** Univ. of Notre Dame (United States)

Coffee Break 10:00 AM - 10:30 AM

MONDAY KEYNOTE

17 March 2025 • 10:30 AM - 11:10 AM | Pavilion Ballroom A (Third Floor)

Session Chair(s): **Zhongqing Su**, The Hong Kong Polytechnic Univ. (Hong Kong, China)

13437-95 • 10:30 AM - 11:10 AM
A 15-year journey of a new NDE method based on solitary waves (Keynote Presentation)
Author(s): **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

SESSION 1: SPECIAL SESSION: GUIDED WAVES FOR SHM AND NDE I

17 March 2025 • 11:10 AM - 12:50 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Paul Fromme**, Univ. College London (United Kingdom); **Yanfeng Shen**, Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute (China)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 1-3: Pavilion Ballroom A (Third Floor)

13437-2 • 11:10 AM - 11:30 AM
Frequency and time domain analysis of guided waves in plate-like structures
Author(s): **Fabrizio Ricci**, **Ernesto Monaco**, **Vittorio Memmolo, Lorenzo Esposito,** Univ. degli Studi di Napoli Federico II (Italy)

13437-91 • 11:30 AM - 11:50 AM
Monitoring of offshore wind turbine monopiles for life extension
Author(s): **Jinsheng Wang**, **Paul Fromme, Philippe Duffour,** Univ. College London (United Kingdom)

13437-5 • 11:50 AM - 12:10 PM
Topological acoustic sensing for defect localization in heterogeneous plate structures using Lamb waves
Author(s): **Guangdong Zhang**, **Tribikram Kundu**, **Pierre A. Deymier, Keith Runge,** The Univ. of Arizona (United States)

13437-3 • 12:10 PM - 12:30 PM
Focusing of Lamb waves through flexural resonance mode acoustic metamaterials
Author(s): **Waliur Rahman,** North Carolina State Univ. (United States); **Md Raf E Ul Shougat,** Texas State Univ. (United States); **Kara J. Peters,** North Carolina State Univ. (United States)

13437-4 • 12:30 PM - 12:50 PM
Guided wave propagation and scattering in a CFRP corner section
Author(s): **Flora Hervin**, **Vincent Maes,** Univ. of Bristol (United Kingdom); **Paul Fromme,** Univ. College London (United Kingdom); **Robert Hughes, Paul Wilcox,** Univ. of Bristol (United Kingdom)

Lunch Break 12:50 PM - 2:10 PM

SESSION 2: SPECIAL SESSION: GUIDED WAVES FOR SHM AND NDE II

17 March 2025 • 2:10 PM - 3:30 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Paul Fromme**, Univ. College London (United Kingdom); **Yanfeng Shen**, Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute (China)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 1-3: Pavilion Ballroom A (Third Floor)

13437-6 • 2:10 PM - 2:30 PM
A damage identification method using multimodal Lamb waves
Author(s): **Zhengchen Dai**, **Jinxia Liu**, **Zhiwen Cui,** Jilin Univ. (China); **Tribikram Kundu,** The Univ. of Arizona (United States)

13437-8 • 2:30 PM - 2:50 PM
A holographic array for enhancement of ultrasonic focusing
Author(s): **Yanfeng Lang,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Zhibo Yang**, **Xuefeng Chen,** Xi'an Jiaotong Univ. (China); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

13437-9 • 2:50 PM - 3:10 PM
Assessment of nonlinear effects in guided wave propagation using fiber Bragg grating sensors
Author(s): **Rohan N. Soman**, **Piotr Fiborek,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Mohammad A. Fakih,** Univ. of Bristol (United Kingdom); **Samir Mustapha,** American Univ. of Beirut (Lebanon); **Pawel H. Malinowski,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

13437-10 • 3:10 PM - 3:30 PM
Evaluation of contact defects in bio-inspired dry adhesives using guided waves
Author(s): **Joseph Enriquez-Barton**, **Christoph Schaal, Jamie Booth,** California State Univ., Northridge (United States)

Coffee Break 3:30 PM - 3:50 PM

SESSION 3: SPECIAL SESSION: RECENT ADVANCES IN NONLINEAR ULTRASONICS-BASED NDE AND SHM

17 March 2025 • 3:50 PM - 6:10 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Tribikram Kundu**, The Univ. of Arizona (United States)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 1-3: Pavilion Ballroom A (Third Floor)

13437-11 • 3:50 PM - 4:10 PM
Material nonlinearity detected by spatial evolution of laser-generated broadband Rayleigh waves with focus on residual strain
Author(s): **Seyed Hamidreza Afzalimir**, **Maryam Ghodousi, Cliff J. Lissenden,** The Pennsylvania State Univ. (United States)

13437-12 • 4:10 PM - 4:30 PM
Imaging delaminations using nonlinear steady-state wavefields
Author(s): **Wei Xu,** Hohai Univ. (China); **Maciej Radzienski,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Maosen Cao,** Hohai Univ. (China); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (China); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

13437-13 • 4:30 PM - 4:50 PM
Lamb-like wave mixing in aluminum plate to assess material degradation
Author(s): **Maryam Ghodousi, Cliff J. Lissenden,** The Pennsylvania State Univ. (United States)

13437-14 • 4:50 PM - 5:10 PM
A metamaterial-driven approach for improved performance of fatigue crack detection by amplifying nonlinear ultrasonic features
Author(s): **Yiran Tian**, **Haoyu Fu, Yanfeng Shen,** Shanghai Jiao Tong Univ. (China)

13437-15 • 5:10 PM - 5:30 PM
Zero group velocity nonlinear ultrasonics for fatigue crack detection
Author(s): **Runye Lu, Yanfeng Shen,** Shanghai Jiao Tong Univ. (China)

13437-16 • 5:30 PM - 5:50 PM
Nonlinear guided wave path interactions for damage detection and imaging of composite structures
Author(s): **Houfu Jiang**, **Yanfeng Shen, Yegao Qu,** Shanghai Jiao Tong Univ. (China)

13437-90 • 5:50 PM - 6:10 PM
Lamb waves nonlinear imaging of impact damages in laminate composite plates
Author(s): **Pierre Goislot**, **Guillemette Ribay,** Université Paris-Saclay, CEA, LIST, F-91120, Palaiseau (France); **Emmanuel Moulin, Lynda Chehami,** Université Polytechnique Hauts de France, CNRS, Univ. Lille, UMR 8520-IEMN-Institut d'Electronique de Micro-electronique et de Nanotechnologie, F-59313 Valenciennes (France)

SESSION 4: BIOMEDICAL SMART STRUCTURES AND DEVICES

17 March 2025 • 11:10 AM - 12:10 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Cliff J. Lissenden**, The Pennsylvania State Univ. (United States)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 4-7: Junior Ballroom B (Third Floor)

13437-17 • 11:10 AM - 11:30 AM
Nonlinear vibration-enhanced imaging in a hybrid fiber optic MEMS scanning system
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States)

13437-18 • 11:30 AM - 11:50 AM
An automatic optical system for blood pressure measurement based on the pulse transit time and heart rate variability
Author(s): **Liang-Wei Yen**, **Zheng-Yu Luo**, **Jiun-Woei Huang,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan); **Shu-Sheng Lee,** National Taiwan Ocean Univ. (Taiwan); **Hsiang-Chieh Lee,** Graduate Institute of Photonics and Optoelectronics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan); **Chih-Kung Lee,** Institute of Applied Mechanics, National Taiwan Univ. (Taiwan), National Taiwan Univ. (Taiwan)

13437-20 • 11:50 AM - 12:10 PM
Using highly nonlinear solitary waves to evaluate lamb corneas
Author(s): **Madison Hodgson**, **Piervincenzo Rizzo, Samuel J. Dickerson,** Univ. of Pittsburgh (United States)

Lunch Break 12:10 PM - 1:40 PM

SESSION 5: SPECIAL SESSION: ROBOTIC AND AUTONOMOUS NONDESTRUCTIVE EVALUATION

17 March 2025 • 1:40 PM - 2:20 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Christoph Schaal**, California State Univ., Northridge (United States)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 4-7: Junior Ballroom B (Third Floor)

13437-23 • 1:40 PM - 2:00 PM
Supporting in-space manufacturing via non-contact, nondestructive evaluation
Author(s): **Sharveny Parthibhan**, **Joshua Santiago**, **Omar Palacios, Christoph Schaal,** California State Univ., Northridge (United States)

13437-24 • 2:00 PM - 2:20 PM
Noncontact nondestructive evaluation via air-coupled focused ultrasound and laser vibrometry
Author(s): **Haoyu Fu, Yanfeng Shen,** Shanghai Jiao Tong Univ. (China)

SESSION 6: LASER-ULTRASONICS-DRIVEN SHM AND NDT

17 March 2025 • 2:20 PM - 3:00 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Christoph Schaal**, California State Univ., Northridge (United States)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 4-7: Junior Ballroom B (Third Floor)

13437-21 • 2:20 PM - 2:40 PM
An annular photoacoustic tweezer for manipulation of a single bioparticle
Author(s): **Guojie Luo**, **Yi He**, **Yi Liu**, **Wanglinhan Zhang**, **Mo Yang,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **David J. Collins,** The Univ. of Melbourne (Australia); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

13437-22 • 2:40 PM - 3:00 PM
Using compact fiber optic Sagnac interferometer for biological-based soft tissue elasticity characterization
Author(s): **Jinjun Xia,** Lawrence Technological Univ. (United States); **Suxuan Xu,** Wayne State Univ. (United States)

Coffee Break 3:00 PM - 3:50 PM

SESSION 7: ARTIFICIAL INTELLIGENCE-DRIVEN SHM

17 March 2025 • 3:50 PM - 5:30 PM | Junior Ballroom B (Third Floor)
Session Chair(s): **Fabrizio Ricci**, Univ. degli Studi di Napoli Federico II (Italy)

Sessions 1-3 and 4-7 run concurrently in 2 rooms.
Sessions 4-7: Junior Ballroom B (Third Floor)

13437-25 • 3:50 PM - 4:10 PM
Data-driven MLA to support vibration-based inspection method for continuous welded rails
Author(s): **Piervincenzo Rizzo**, **Matthew Belding, Shayan Baktash,** Univ. of Pittsburgh (United States)

13437-26 • 4:10 PM - 4:30 PM
PIDynNet: an ODE-constrained neural network for nonlinear structural system identification
Author(s): **Hadi Meidani, Tong Liu,** Univ. of Illinois (United States)

13437-28 • 4:30 PM - 4:50 PM
Generative model applications in guided wave: acoustic emission localization and enhanced wavefield scanning resolution
Author(s): **Guan-Wei Lee, Salvatore Salamone,** The Univ. of Texas at Austin (United States)

13437-29 • 4:50 PM - 5:10 PM
Evaluation of blood glucose level monitoring using NIR spectroscopy method at various wavelengths
Author(s): **Alireza Habibi, Fariborz Taghipour,** The Univ. of British Columbia (Canada)

13437-31 • 5:10 PM - 5:30 PM
Data-driven structural health monitoring system for sheet metal assembly
Author(s): **Pradeep Paljibhi Vaghela, Javid Bayandor,** Univ. at Buffalo (United States)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

TUESDAY KEYNOTE

18 March 2025 • 10:30 AM - 11:10 AM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Kara J. Peters**, North Carolina State Univ. (United States)

13437-32 • 10:30 AM - 11:10 AM
Flexible ultrasound transducers for wearable biomedical sensing and imaging (Keynote Presentation)
Author(s): **Xiaoning Jiang,** North Carolina State Univ. (United States)

SESSION 8: SPECIAL SESSION: GUIDED WAVES FOR SHM AND NDE III

18 March 2025 • 11:10 AM - 12:50 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Piervincenzo Rizzo**, Univ. of Pittsburgh (United States)

13437-33 • 11:10 AM - 11:30 AM
Guided ultrasonic wave monitoring of bone implant osseointegration
Author(s): **Enze Chen, Paul Fromme,** Univ. College London (United Kingdom)

13437-34 • 11:30 AM - 11:50 AM
Multi-level structural health monitoring of real scale aerostructures using guided waves
Author(s): **Vittorio Memmolo**, **Ernesto Monaco, Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy)

13437-35 • 11:50 AM - 12:10 PM
Directional guided wave control on composite structures leveraging apodized frequency steerable acoustic transducers
Author(s): **Shulong Zhou, Yanfeng Shen,** Shanghai Jiao Tong Univ. (China)

13437-37 • 12:10 PM - 12:30 PM
The impact of viscoelastic behavior in timber structures with elevated moisture content on the characteristics of ultrasonic guided waves
Author(s): **Reem Yassine, Samir Mustapha,** American Univ. of Beirut (Lebanon)

13437-59 • 12:30 PM - 12:50 PM
Reinforcement Learning for Lamb Wave-based Nondestructive Evaluation of Plates
Author(s): **Kathryn Davis**, **Christoph Schaal,** California State Univ., Northridge (United States); **Chanseok Jeong,** Central Michigan Univ. (United States)

Lunch Break 12:50 PM - 2:20 PM

SESSION 9: STRUCTURAL HEALTH MONITORING (SHM) I

18 March 2025 • 2:20 PM - 3:40 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Wiesław M. Ostachowicz**, The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland)

13437-38 • 2:20 PM - 2:40 PM
A novel nondestructive method for monitoring internal pressure in underwater storage tanks
Author(s): **Shuai Ju**, **Rushad Jubair, Mitali H. Desai,** Univ. of North Texas (United States); **Mitali H. Desai, Haifeng Zhang,** Univ. of North Texas (United States)

13437-40 • 2:40 PM - 3:00 PM
Acoustic source localization based on signal energy using correlation coefficient index scanning
Author(s): **Chenning Ma**, **Zhiwen Cui,** Jilin Univ. (China); **Tribikram Kundu,** The Univ. of Arizona (United States)

13437-39 • 3:00 PM - 3:20 PM
Sea state uncertainty-aware monitoring of underwater mooring systems using domain-adapted deep learning techniques
Author(s): **Yixuan Liu,** The Hong Kong Polytechnic Univ. (China); **Shangyan Zou,** Michigan Technological Univ. (United States); **Xin Ye,** Wenzhou Univ. (China); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

13437-42 • 3:20 PM - 3:40 PM
Porous triboelectric nanogenerator to enhance self-powered load monitoring of total knee replacement
Author(s): **Elham Mahmoudi,** Binghamton Univ. (United States); **Adam Garry Redgrift,** Western Univ. (Canada); **Emre Salman**, **Milutin Stanacevic,** Stony Brook Univ. (United States); **Ryan Willing,** Western Univ. (Canada); **Shahrzad Towfighian,** Binghamton Univ. (United States)

Coffee Break 3:40 PM - 4:10 PM

HEALTH MONITORING OF STRUCTURAL AND BIOLOGICAL SYSTEMS BEST STUDENT PAPER SESSION

18 March 2025 • 4:10 PM - 5:55 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Alessandro Sabato**, Univ. of Massachusetts Lowell (United States)
The Health Monitoring of Structural and Biological Systems Best Student Paper Award finalists will present their papers and answer questions.

Opening remarks
18 March 2025 • 4:10 PM – 4:15 PM PDT | Pavilion Ballroom A (Third Floor)

13437-15
Zero group velocity nonlinear ultrasonics for fatigue crack detection
Presenter: Runye Lu, Shanghai Jiao Tong Univ. (China)
18 March 2025 • 4:15 PM – 4:35 PM PDT | Pavilion Ballroom A (Third Floor)

13437-16
Nonlinear guided wave-path interactions for damage detection and imaging of composite storage tanks
Presenter: Houfu Jiang, Shanghai Jiao Tong Univ. (China)
18 March 2025 • 4:35 PM – 4:55 PM PDT | Pavilion Ballroom A (Third Floor)

13437-24
Non-contact non-destructive evaluation via air-coupled focused ultrasound and laser vibrometry
Presenter: Haoyu Fu, Shanghai Jiao Tong Univ. (China)
18 March 2025 • 4:55 PM – 5:15 PM PDT | Pavilion Ballroom A (Third Floor)

13437-35
Directional guided wave control on composite structures leveraging apodized frequency steerable acoustic transducer
Presenter: Shulong Zhou, Shanghai Jiao Tong Univ. (China)
18 March 2025 • 5:15 PM –5:35 PM PDT | Pavilion Ballroom A (Third Floor)

13437-62
Ultrasonic testing for online state estimation of prismatic Li-ion battery cells
Presenter: Shengyuan Zhang, Nanyang Technological Univ. (Singapore)
18 March 2025 • 5:35 PM – 5:55 PM PDT | Pavilion Ballroom A (Third Floor)

POSTER SESSION

18 March 2025 • 6:00 PM - 8:00 PM | Grand Ballroom C/D (Ballroom Level)

Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. 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.

Poster Setup and Pre-Session Viewing: Monday 10:00 AM – 5:00 PM
Pre-Session Viewing: Tuesday 8:00 AM - 6:00 PM

Poster authors, view poster presentation guidelines and set-up instructions at https://spie.org/SS/Poster-Presentation-Guidelines

13437-77 • 6:00 PM - 8:00 PM
Method for estimating the vibration shape of a 200 m elevator rope with a single sensor
Author(s): **Ryoji Nakanishi**, **Nanako Miura,** Kyoto Institute of Technology (Japan); **Tetsu Ogawa,** Toshiba Elevator and Building Systems Corp. (Japan)

13437-78 • 6:00 PM - 8:00 PM
Effective thickness mapping in composite materials based on local changes of the dispersion curves
Author(s): **Kai Zhu,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Maosen Cao,** Hohai Univ. (China); **Wieslaw M. Ostachowicz, Maciej Radzienski,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

13437-80 • 6:00 PM - 8:00 PM
Guided ultrasonic wave phase and group velocity measurement
Author(s): **Paul Fromme,** Univ. College London (United Kingdom); **Philip Loveday,** Univ. of the Witwatersrand, Johannesburg (South Africa)

13437-81 • 6:00 PM - 8:00 PM
A fractal patterned and MXene@NPC incorporated graphene-electrodes-based patch sensor for long-term and continuous electrocardiogram remote monitoring
Author(s): **Seung Jae Lim**, **Pradhan Gagan Bahadur**, **Moon Seong Jo, Jae Yeong Park,** Kwangwoon Univ. (Korea, Republic of)

13437-82 • 6:00 PM - 8:00 PM
MOFs-derived nanoporous carbon incorporated 3D porous graphenes-based patch sensor for wearable sweat Na+ and pH continuous monitoring
Author(s): **Dong Yun Kim**, **Md Asaduzzaman**, **Ahmad Abdus Samad, Jae Yeong Park,** Kwangwoon Univ. (Korea, Republic of)

13437-84 • 6:00 PM - 8:00 PM
Tensile damage progression in the full grouted sleeves with defects by acoustic emission
Author(s): **Lu Zhang**, **Xinyi Gao**, **Guifu Jia, Hongyu Li,** Guilin Univ. of Technology (China)

13437-85 • 6:00 PM - 8:00 PM
Quantitative assessment of structural damage progress in defective fully grouted sleeve connection
Author(s): **Lu Zhang**, **Xiaolong Tang**, **Chenjun Wang, Hongyu Li,** Guilin Univ. of Technology (China)

13437-86 • 6:00 PM - 8:00 PM
The enhanced UT detection for cracking in the steel structures by deployment of the periodic bolts
Author(s): **Lu Zhang**, **Zhenxing Zhou**, **Jiajun Zeng, Hongyu Li,** Guilin Univ. of Technology (China)

13437-87 • 6:00 PM - 8:00 PM
A hybrid AE source localization method for wire rupture in prestressed anchor cables bundle
Author(s): **Lu Zhang**, **Yongqi Su**, **Jiajun Zeng, Hongyu Li,** Guilin Univ. of Technology (China)

13437-88 • 6:00 PM - 8:00 PM
The development of the simplified model for constitutive relationship of bi-stable elements
Author(s): **Hongyu Li**, **Xiaohui Guo**, **Ying Zhang, Lu Zhang,** Guilin Univ. of Technology (China)

13437-89 • 6:00 PM - 8:00 PM
The study of the size effect on the mechanical properties of bistable structure
Author(s): **Hongyu Li**, **Bin Ke**, **Ying Zhang, Lu Zhang,** Guilin Univ. of Technology (China)

13437-93 • 6:00 PM - 8:00 PM
Dynamic and static monitoring of the piping networks using FBG sensors
Author(s): **Richard J. Black**, **Keo Sourichanh**, **Behzad Moslehi,** Intelligent Fiber Optic Systems Corp. (United States); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States); **William Price,** Intelligent Fiber Optic Systems Corp. (United States)

13437-94 • 6:00 PM - 8:00 PM
Robust multiplexed pultruded sensor arrays for accelerator cryomodules
Author(s): **Richard J. Black,** Intelligent Fiber Optic Systems Corp. (United States); **Fumio Furuta,** Fermi National Accelerator Lab. (United States); **Behzad Moslehi**, **Keo Sourichanh,** Intelligent Fiber Optic Systems Corp. (United States); **Peter Holdsworth,** Pultron Composites Ltd (New Zealand); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

WEDNESDAY KEYNOTE

19 March 2025 • 10:30 AM - 11:10 AM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Piervincenzo Rizzo**, Univ. of Pittsburgh (United States)

13437-43 • 10:30 AM - 11:10 AM
Metamaterial-controlled nonlinear ultrasonic guided waves for structural health monitoring (Keynote Presentation)
Author(s): **Yanfeng Shen**, **Yiran Tian**, **Hexuan Xu, Haoyu Fu,** Shanghai Jiao Tong Univ. (China)

SESSION 10: STRUCTURAL HEALTH MONITORING (SHM) II

19 March 2025 • 11:10 AM - 12:30 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Yanfeng Shen**, Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute (China)

13437-44 • 11:10 AM - 11:30 AM
A novel frequency domain transmitometry for damage detection in aircraft data transmission lines
Author(s): **Saidanvar Valiev**, **Anthony C. Okafor, Jie Huang,** Missouri Univ. of Science and Technology (United States)

13437-45 • 11:30 AM - 11:50 AM
Effect of vibration on signal reflection in aircraft data transmission lines
Author(s): **Saidanvar Valiev**, **Anthony C. Okafor**, **Jie Huang**, **Jeremiah J. Rittenhouse, Daniel Stutts,** Missouri Univ. of Science and Technology (United States)

13437-69 • 11:50 AM - 12:10 PM
Evaluation of static and dynamic performances of nano-filled polymer sensors for aerospace structural health monitoring
Author(s): **Massimo Viscardi**, **Ernesto Monaco,** Univ. degli Studi di Napoli Federico II (Italy); **Pietro Russo,** Istituto per i Polimeri, Compositi e Biomateriali, Consiglio Nazionale delle Ricerche (Italy); **Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy)

13437-47 • 12:10 PM - 12:30 PM
Temperature-driven changes in electromechanical impedance technique applied for damage detection in 3D printed plates
Author(s): **Paresh Mirgal,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Daniel del-Río-Velilla,** Univ. Politécnica de Madrid (Spain); **Tomasz Wandowski**, **Katarzyna Majewska, Pawel H. Malinowski,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

Lunch Break 12:30 PM - 2:00 PM

SESSION 11: STRUCTURAL HEALTH MONITORING (SHM) III

19 March 2025 • 2:00 PM - 3:20 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Haifeng Zhang**, Univ. of North Texas (United States)

13437-51 • 2:00 PM - 2:20 PM
A survey on noise reduction techniques on structural health monitoring
Author(s): **Fatemeh A. Mehrabadi,** Islamic Azad Univ. (Iran, Islamic Republic of)

13437-48 • 2:20 PM - 2:40 PM
GFRP bar and concrete interface bond deterioration monitoring using an embedded piezo sensor based on electromechanical impedance measurement
Author(s): **Lukesh Parida, Sauvik Banerjee,** Indian Institute of Technology Bombay (India)

13437-49 • 2:40 PM - 3:00 PM
Integration of CNT-embedded smart composites with machine learning model for real-time SHM for aircraft structures
Author(s): **Rahul Singh**, **Sneha Prasad**, **Sumaiya Begam**, **Chris Ebison Abraham, David Kumar,** Indian Institute of Technology Madras (India)

13437-50 • 3:00 PM - 3:20 PM
Application of particle swarm optimization algorithm for damage localization of weld cracks in portal steel frame using electromechanical impedance technique
Author(s): **Mayank Kamal**, **Lukesh Parida, Sauvik Banerjee,** Indian Institute of Technology Bombay (India)

Coffee Break 3:20 PM - 3:50 PM

SESSION 12: SPECIAL SESSION: OPTICAL SENSING AND MACHINE LEARNING FOR SHM AND NDE I

19 March 2025 • 3:50 PM - 5:50 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Alessandro Sabato**, Univ. of Massachusetts Lowell (United States); **Arvin Ebrahimkhanlou**, Drexel Univ. (United States)

13437-56 • 3:50 PM - 4:10 PM
Physics-informed variational autoencoders for full-field expansion of sparse measurements
Author(s): **Nitin N. Kulkarni, Alessandro Sabato,** Univ. of Massachusetts Lowell (United States)

13437-92 • 4:10 PM - 4:30 PM
Optical sensing of the propylene glycol solution for lunar habitat thermal management
Author(s): **Richard J. Black**, **Behzad Moslehi**, **William Price**, **Keo Sourichanh,** Intelligent Fiber Optic Systems Corp. (United States); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States); **Scott W. Hansen,** NASA Johnson Space Ctr. (United States)

13437-57 • 4:30 PM - 4:50 PM
Synthetic ground-penetrating radar image generation using denoising diffusion probabilistic models
Author(s): **Pedram Bazrafshan,** Drexel Univ. (United States); **Isabel Morris,** New Mexico Institute of Mining and Technology (United States); **Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

13437-53 • 4:50 PM - 5:10 PM
Strain fields evaluation on aerospace structures using digital image correlation aimed at structural health monitoring
Author(s): **Ernesto Monaco**, **Massimo Viscardi**, **Fabrizio Ricci**, **Vittorio Memmolo, Lorenzo Esposito,** Univ. degli Studi di Napoli Federico II (Italy)

13437-52 • 5:10 PM - 5:30 PM
Innovative application of satellite remote sensing to identify damaged areas in bridge structures using SAR-extracted displacement responses
Author(s): **Alireza Entezami**, **Bahareh Behkamal, Carlo De Michele,** Politecnico di Milano (Italy)

13437-58 • 5:30 PM - 5:50 PM
On the effect of operational and environmental variables on wind turbine blades damage detection using vibration responses
Author(s): **Mohadeseh Ashkarkalaei**, **Ramin Ghiasi**, **Vikram Pakrashi, Abdollah Malekjafarian,** Univ. College Dublin (Ireland)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 13: SPECIAL SESSION: NDE AND SHM OF BATTERY MATERIALS, STRUCTURES, AND SYSTEMS

20 March 2025 • 10:30 AM - 11:30 AM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Robin James**, General Motors Co. (United States)

13437-63 • 10:30 AM - 10:50 AM
Exploration of lithium metal battery nondestructive evaluation at NASA Langley Research Center
Author(s): **Erik L. Frankforter**, **Daniel Perey**, **Matthew Webster**, **Peter Spaeth**, **William Schneck,** NASA Langley Research Ctr. (United States); **William Nelson,** Univ. of Virginia (United States); **Peter Juarez,** NASA Langley Research Ctr. (United States); **Andrew Campbell,** Univ. of South Carolina (United States)

13437-75 • 10:50 AM - 11:10 AM
Impact monitoring of embedded batteries in sandwich composites with integrated soft elastomeric capacitors
Author(s): **Emmanuel Ogunniyi**, **Austin R. J. Downey,** Univ. of South Carolina (United States); **Han Liu**, **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Subramani Sockalingam,** Univ. of South Carolina (United States)

13437-62 • 11:10 AM - 11:30 AM
Ultrasonic testing for online state estimation of prismatic Li-ion battery cells
Author(s): **Shengyuan Zhang,** Nanyang Technological Univ. (Singapore); **Peng Zuo,** A*STAR Agency for Science, Technology and Research (Singapore); **Zheng Fan,** Nanyang Technological Univ. (Singapore)

SESSION 14: SPECIAL SESSION: OPTICAL SENSING AND MACHINE LEARNING FOR SHM AND NDE II

20 March 2025 • 11:30 AM - 11:50 AM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Robin James**, General Motors Co. (United States)

13437-60 • 11:30 AM - 11:50 AM
A virtual calibration technique for large FOV multicamera-DIC system
Author(s): **Babu Jangam**, **Sneha Prasad, David Kumar,** Indian Institute of Technology Madras (India)

Lunch Break 11:50 AM - 1:40 PM

SESSION 15: SENSORS AND SENSOR NETWORKS

20 March 2025 • 1:40 PM - 3:00 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Wei-Chih Wang**, National Tsing Hua Univ. (United States)

13437-64 • 1:40 PM - 2:00 PM
Dynamic and high-precision displacement measurement using intensity modulation in polymer optical fibers
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Pratheeksha Srinivasu**, **Aditya Sharma, Vinayak Ghorapade,** National Tsing Hua Univ. (Taiwan)

13437-66 • 2:00 PM - 2:20 PM
Towards monitoring cellular health: cell birefringence simulations in photonic crystal fibers
Author(s): **Jiahaw Fu, Rosalind Wynne,** Villanova Univ. (United States)

13437-67 • 2:20 PM - 2:40 PM
Noninvasive lactate monitoring in human sweat using fluorescent carbon quantum dots and molecularly imprinted polymer sensing

Author(s): **Andrea Rodriguez Garza**, **Alireza Habibi**, **Ali Khodaei Tehrani, Fariborz Taghipour,** The Univ. of British Columbia (Canada)

13437-68 • 2:40 PM - 3:00 PM
Physics-based artificial neural network model for sensor placement optimization towards structural health monitoring
Author(s): **Zainab Ismail**, **Samir Mustapha**, **Reem Yassine, Hussein Tarhini,** American Univ. of Beirut (Lebanon)

SESSION 16: SPECIAL SESSION: 3D-PRINTED SENSORS AND ADVANCED COMPOSITES

20 March 2025 • 3:00 PM - 3:40 PM | Pavilion Ballroom A (Third Floor)
Session Chair(s): **Zhongqing Su**, The Hong Kong Polytechnic Univ. (Hong Kong, China)

13437-72 • 3:00 PM - 3:20 PM
Ultrasonic and electromagnetic NDE of complex composite structures
Author(s): **Flora Hervin,** Univ. of Bristol (United Kingdom); **Qiuji Yi,** Northumbria Univ. (United Kingdom); **Robert Hughes, Paul Wilcox,** Univ. of Bristol (United Kingdom)

13437-73 • 3:20 PM - 3:40 PM
Nondestructive identification of elastic constants of composites via inversion of ultrasonic guided wave dispersion under noncontact testing
Author(s): **Chengyang Huang, Francesco Lanza di Scalea,** Univ. of California, San Diego (United States)

CONFERENCE 13438

Digital Twins, AI, and NDE for Industry Applications and Energy Systems 2025

18 - 19 March 2025 | Port Hardy (Fourth Floor)

Conference Chair(s): **Christopher Niezrecki,** Univ. of Massachusetts Lowell (United States)

Conference Co-Chair(s): **Saman Farhangdoust,** Embry-Riddle Aeronautical Univ. (United States)

Program Committee: **Ali Abdul-Aziz,** Kent State Univ. (United States); **Nicolas P. Avdelidis,** Univ. of Southampton (United Kingdom); **Robin James,** General Motors Co. (United States); **Daniel Kanzler,** Applied Validation (Germany); **Zheng Liu,** The Univ. of British Columbia Okanagan (Canada); **Theodore E. Matikas,** Univ. of Ioannina (Greece); **Michele Meo,** Univ. of Southampton (United Kingdom); **Norbert G. Meyendorf,** Fraunhofer IKTS (Germany), Univ. of Dayton (United States); **Piotr Omenzetter,** Univ. of Aberdeen (United Kingdom); **Martin Oppermann,** TU Dresden, Center of Microtechnical Manufacturing (Germany); **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Stefano Sfarra,** Univ. of L'Aquila (Italy); **Christian Wunderlich,** Fraunhofer IKTS (Germany); **Yuan Yao,** National Tsing Hua Univ. (Taiwan); **Marcelo J. Dapino,** The Ohio State Univ. (United States); **Florian Raddatz,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Christopher Udell,** Mondaic AG (Switzerland)

Tuesday 18 March 2025

TUESDAY PLENARY

18 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

13436-501 • 8:30 AM - 9:15 AM
Smart lightweighting of vehicle structures (Plenary Presentation)
Author(s): **Marcelo J. Dapino,** The Ohio State Univ. (United States)

13431-501 • 9:15 AM - 10:00 AM
Soft sensors for non-destructive evaluation, robotics, and interfacing with nerves (Plenary Presentation)
Author(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Coffee Break 10:00 AM - 10:30 AM

TUESDAY KEYNOTE

18 March 2025 • 10:30 AM - 11:10 AM | Port Hardy (Fourth Floor)
Session Chair(s): **Christopher Niezrecki**, Univ. of Massachusetts Lowell (United States)

13438-27 • 10:30 AM - 11:10 AM
Physics-based and data-driven digital twinning of offshore wind turbines using sensor measurements (Keynote Presentation)
Author(s): **Babak Moaveni,** Tufts Univ. (United States)

SESSION 1: DIGITAL TWINS, AI, AND MACHINE LEARNING FOR ENERGY SYSTEMS

18 March 2025 • 11:10 AM - 12:30 PM | Port Hardy (Fourth Floor)
Session Chair(s): **Christopher Niezrecki**, Univ. of Massachusetts Lowell (United States)

13438-1 • 11:10 AM - 11:30 AM **(CANCELLED)**
Optimizing maintenance planning for floating offshore wind turbines: digital twins and stochastic modeling for navigating uncertainty
Author(s): **Xukai Zhang**, **Jian Tao, Arash Noshadravan,** Texas A&M Univ. (United States)

13438-2 • 11:30 AM - 11:50 AM
Inspection of concrete structures in the nuclear industry: an AI perspective
Author(s): **Rahmat Ali,** Canadian Nuclear Labs. Ltd. (Canada)

13438-3 • 11:50 AM - 12:10 PM
Predictive maintenance of assets using AI-enabled condition monitoring data analysis
Author(s): **Yashwant Sinha,** Rowan Univ. (United States)

13438-4 • 12:10 PM - 12:30 PM
Harvesting current power for under ice monitoring
Author(s): **Sunny Rong,** Univ. of Michigan (United States), Greenhills School (United States); **Jerry Zuo**, **Jianuo Huang**, **Xiaofan Li, Binh Truong,** Univ. of Michigan (United States)

Lunch Break 12:30 PM - 2:00 PM

SESSION 2: DIGITAL TWINS: NDE 4.0, MODELING, AND PROGNOSTICS I

18 March 2025 • 2:00 PM - 3:20 PM | Port Hardy (Fourth Floor)
Session Chair(s): **Christian Wunderlich**, Fraunhofer-Institut für Keramische Technologien und Systeme IKTS (Germany)

13438-5 • 2:00 PM - 2:20 PM
Assessing semantic similarity in automated civil engineering image descriptions: evaluation of pretrained vision language models
Author(s): **Pedram Bazrafshan**, **Kris Melag, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

13438-6 • 2:20 PM - 2:40 PM
Creating schematic representation of corrosion using CGAN and ultrasonic imaging
Author(s): **Antoine Cuvillier**, **Pierre Bélanger,** Ecole de Technologie Supérieure (Canada); **Guillaume Painchaud-April, Alain Le Duff,** Evident (Canada)

13438-7 • 2:40 PM - 3:00 PM
LeakGPT: detecting water pipe leaks using vision language models
Author(s): **Lixin Tu**, **Hao Liu**, **Yu Hu**, **Ling Bai**, **Rakiba Rayhana**, **Zheng Liu,** The Univ. of British Columbia Okanagan (Canada); **Xiangjie Kong, Hongwei Zhang,** XK Innovate, Inc. (Canada)

13438-8 • 3:00 PM - 3:20 PM
A digital twin platform for robotic non-destructive evaluation of reinforced concrete
Author(s): **Ali Ghadimzadeh Alamdari**, **Arvin Ebrahimkhanlou, Ivan Bartoli,** Drexel Univ. (United States)

Coffee Break 3:20 PM - 3:50 PM

SESSION 3: DIGITAL TWINS: NDE 4.0, MODELING, AND PROGNOSTICS II

18 March 2025 • 3:50 PM - 5:30 PM | Port Hardy (Fourth Floor)
Session Chair(s): **Saman Farhangdoust**, Embry-Riddle Aeronautical Univ. (United States)

13438-9 • 3:50 PM - 4:10 PM
Digital twin framework for a plate bonded with transducer for structural health monitoring using guided waves
Author(s): **Vishnu Harikumar, Bijudas C. R.,** Indian Institute of Space Science and Technology (India)

13438-10 • 4:10 PM - 4:30 PM
Digital twin modelling for 3D-printed composite structures manufactured by fused filament fabrication method: mesoscale geometry simulation
Author(s): **Ayshan Soltansaleki, Garrett Melenka,** York Univ. (Canada)

13438-11 • 4:30 PM - 4:50 PM
Machinery diagnosis leveraging machine learning assisted by physics-guided signal processing
Author(s): **Ismael Morales Soto**, **Qianyu Zhou**, **Farhad Imani, Jiong Tang,** Univ. of Connecticut (United States)

13438-13 • 4:50 PM - 5:10 PM
Prescriptive maintenance with digital triplets
Author(s): **Zheng Liu,** The Univ. of British Columbia Okanagan (Canada); **Erik Blasch,** MOVEJ Analytics (United States); **Kazuhiko Tsukada,** Kyoto Univ. (Japan); **Norbert Meyendorf,** Univ. of Dayton (United States)

13438-14 • 5:10 PM - 5:30 PM
Prognosis and predictive modeling of hand movements in industrial tasks using StretchSense glove and digital twin simulations
Author(s): **Tajbeed A. Chowdhury**, **Eric Wagner**, **Paul Motzki, Martina Lehser,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

Wednesday 19 March 2025

WEDNESDAY PLENARY

19 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

13435-500 • 8:30 AM - 9:15 AM
Structural health monitoring in extreme environments: innovations in sensor technology and digital integration (Plenary Presentation)
Author(s): **Didem Ozevin,** Univ. of Illinois Chicago (United States)

13434-500 • 9:15 AM - 10:00 AM
Auxetic knot-architectured SMA wearable haptic interfaces (Plenary Presentation)
Author(s): **Il-Kwon Oh,** KAIST (Korea, Republic of)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: AI AND MACHINE LEARNING FOR NDE/SHM-IMAGING

19 March 2025 • 10:30 AM - 11:50 AM | Port Hardy (Fourth Floor)
Session Chair(s): **Michele Meo**, Univ. of Southampton (United Kingdom)

13438-16 • 10:30 AM - 10:50 AM
Optical coherence tomography as NDE method for quality control in additive manufacturing
Author(s): **Christian Wunderlich**, **Conner Phillips**, **Luise Schreiber**, **Ralf Schallert, Malgorzata Kopycinska-Müller,** Fraunhofer-Institut für Keramische Technologien und Systeme IKTS (Germany)

13438-15 • 10:50 AM - 11:10 AM
Optical coherence tomography supported by machine learning for fast and reliable quality control in 3D polymer printing
Author(s): **Malgorzata Kopycinska-Müller**, **Ralf Schallert,** Fraunhofer-Institut für Keramische Technologien und Systeme IKTS (Germany); **Mathias Kloss,** ProductionToGo GmbH (Germany); **Gurur GamGam,** Relimetrics GmbH (Germany); **Conner Phillips, Christian Wunderlich,** Fraunhofer-Institut für Keramische Technologien und Systeme IKTS (Germany)

13438-18 • 11:10 AM - 11:30 AM
The analysis of factors influencing defect detection in PVC materials using thermal imaging
Author(s): **Wei-Yang Chung**, **Yuan Yao,** National Tsing Hua Univ. (Taiwan); **Stefano Sfarra,** Univ. degli Studi dell'Aquila (Italy); **Alessandro Sabato,** Univ. of Massachusetts Lowell (United States)

13438-28 • 11:30 AM - 11:50 AM
Importance of contrast-to-noise ratio sensitivity function in nondestructive evaluation
Author(s): **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States)

Lunch Break 11:50 AM - 1:20 PM

SESSION 5: AI AND MACHINE LEARNING FOR INDUSTRY APPLICATIONS OF NDE/SHM

19 March 2025 • 1:20 PM - 3:20 PM | Port Hardy (Fourth Floor)
Session Chair(s): **Saman Farhangdoust**, Embry-Riddle Aeronautical Univ. (United States); **Christopher Niezrecki**, Univ. of Massachusetts Lowell (United States)

13438-19 • 1:20 PM - 1:40 PM
Federated two-stage machine learning model for ultrasonic guided wave structural health monitoring of composite structures
Author(s): **Lukas Jilke**, **Emy Arts**, **Florian Raddatz,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Norbert Hosters**, **Marek Behr,** RWTH Aachen Univ. (Germany); **Gerko Wende,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

13438-20 • 1:40 PM - 2:00 PM
Characterization and classification of flaws in PAUT using a convolutional neural network
Author(s): **Eloi Lombard, Pierre Bélanger,** Ecole de Technologie Supérieure (Canada)

13438-21 • 2:00 PM - 2:20 PM
A study of online melt pool, plume, and spatter tracking in laser powder bed fusion using DBSCAN
Author(s): **Yanzhou Fu,** Benedict College (United States); **Matthew Whetham**, **Austin R. J. Downey**, **Lang Yuan,** Univ. of South Carolina (United States); **Gurcan Comert,** North Carolina A&T State Univ. (United States)

13438-24 • 2:20 PM - 2:40 PM
Lite transformer for ultrasonic signal processing
Author(s): **Thibault Sendra, Pierre Bélanger,** Ecole de Technologie Supérieure (Canada)

13438-23 • 2:40 PM - 3:00 PM
Analyzing the deflection in bending of Timoshenko beams using physics-informed neural networks
Author(s): **Farzaneh Sarbandifarahani,** Univ. of Hamedan (Iran, Islamic Republic of); **Mohsen Sheibanian,** Arizona State Univ. (United States); **Maziyar Bazmara,** Univ. of Houston (United States); **Mohammad Mianroodi,** Univ. Gustave Eiffel (France)

13438-22 • 3:00 PM - 3:20 PM
Data fusion-based SHM: integrating local and global monitoring techniques
Author(s): **Dattar Singh Aulakh, Suresh Bhalla,** Indian Institute of Technology Delhi (India)

Thursday 20 March 2025

THURSDAY PLENARY

20 March 2025 • 8:15 AM - 10:00 AM | Pavilion Ballroom C/D (Third Floor)

View Full Details: spie.org/ssn/thursday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- Craig F. Bohren Best Student Presentation Award

13437-500 • 8:30 AM - 9:15 AM
The use of detection theory to inform decision making in SHM/NDE (Plenary Presentation)
Author(s): **Michael D. Todd,** Univ. of California, San Diego (United States)

13435-501 • 9:15 AM - 10:00 AM
Active vibration control of large, optical space structures (Plenary Presentation)
Author(s): **Steven F. Griffin,** Boeing LTS Inc. (United States)

SPIE EVENT POLICIES

Acceptance of policies and registration conditions

The following policies and conditions apply to all SPIE events, both The following policies and conditions apply to all SPIE events, both online and in person. As a condition of registration, you will be required to acknowledge and accept the SPIE policies and conditions contained herein.

SPIE has established a confidential reporting system for all SPIE event participants to raise concerns about possible unethical or inappropriate behavior within our community. When at an SPIE event, you may contact any SPIE staff with concerns. If you feel that you are in immediate danger, please dial the local emergency number for police intervention.

Agreement to hold harmless

Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Anti-harassment policy

It is SPIE policy that all employees, volunteers, and participants are entitled to respectful treatment. Any form of bullying, discrimination, harassment, sexual or otherwise, is unacceptable and will not be tolerated. This policy applies to all locations and situations where SPIE business is conducted and to all SPIE-sponsored activities and events.

Attendee registration and admission policies

SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry of or to remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, whose conduct is not in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to anyone who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

Badge Scanning

Exhibitors or co-sponsors may request to scan your registration badge to collect your contact information. When you allow your badge to be scanned, you are agreeing to receive communications from them. You will be subject to those entities' communications and privacy policies and must opt-out with them directly if you no longer wish to receive information from them. SPIE is not responsible for their use of your contact information obtained when you volunteer your badge to be scanned.

Be well agreement

You acknowledge that attending an event involves some risk of exposure to illness. You voluntarily assume this risk and agree not to hold SPIE or its affiliates liable for any illness you may contract. You also agree not to attend the event if you feel ill or have reason to suspect you may have a communicable illness.

SPIE will provide hand sanitizer locations and disposable face masks upon request.

Capture and use of a person's image

By registering for an SPIE event, you grant full permission to SPIE to capture, store, use, and/or reproduce your image or likeness, including incidental capture of any individuals in your household or workplace, by any audio and/or visual recording technique and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE purpose. By registering for an SPIE event, you waive any right to inspect or approve the use of the images or recordings or of any written copy. You also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, you release, defend, indemnify, and hold harmless SPIE from and against any claims, damages, or liability arising from or related to the use of the images, recordings, or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion, or use in composite form that may occur or be produced in taking, processing, reduction, or production of the finished product, its publication or distribution.

Code of conduct

SPIE is committed to providing a harassment- and discrimination-free experience for everyone at our events, an experience that embraces the richness of diversity where participants may exchange ideas, learn, network, and socialize in the company of colleagues in an environment of mutual respect.

Event and course cancellation by SPIE

If for some unforeseen reason, SPIE should have to cancel a course or an entire event, processed registration fees for the canceled activity will be refunded to registrants. Registrants will be responsible for the cancellation of travel arrangements or housing reservations and the applicable fees.

Family-friendly policy

Conference events: all conference technical and networking events require a badge for admission. Registered attendees may bring children with them if they have been issued a badge. Registration badges for children under 18 are free and available at the SPIE registration desk onsite. Children under 14 years of age must be accompanied by an adult at all times, and guardians are asked to help maintain a professional, disturbance-free conference environment.

Exhibition hall: everyone who attends the exhibition must be registered and have a badge. Badges for children are free and available onsite at the registration desk. Children under 14 years of age must be accompanied by an adult at all times. Guardians are asked to help maintain a professional, disturbance-free exhibition environment. Children under 18 are not allowed in the exhibition area during exhibition move-in and move-out.

Identification requirement

To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued photo identification at registration to collect registration materials. Individuals are not allowed to pick up badges for other attendees. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

For online events, SPIE requires individuals to register with their legal identity.

Laser-pointer safety policy

SPIE events are subject to the applicable laser safety rules and regulations of the host location. SPIE supplies industry-standard Class 2 presentation laser pointers for all conference and other meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers. The use of a personal laser pointer represents the user's acceptance of liability for any damage or injuries to the presenter or others.

No smoking policy

Attendees will observe all non-smoking regulations that are publicly posted by the facilities used by the event.

Online commenting policy

SPIE moderates all comments posted in an online event. We encourage robust discussion, the exchange of scientific ideas, and the sharing of multiple, diverse perspectives. We expect the discussion to be consistent with the norms of scholarly research community interactions at events. Online event participants should report any comments or content that falls short of those community norms. We will remove comments, content, or people that are considered inappropriate by SPIE standards or that:

- are defamatory, libelous, obscene, indecent, abusive, or threatening to others
- infringe the copyright, trademark, or other rights of a third party
- upload viruses or are a cybersecurity hazard
- are off-topic or inappropriately commercial in nature
- are in violation of any applicable laws or regulations

Payment policy

Registrations must be fully paid before access to the conference is allowed. SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks, and wire transfers. Onsite registrations can also be paid with cash.

Recording policy

Conferences and poster sessions: audio and video recordings are prohibited without prior written consent of SPIE and the presenter. Consent forms are available at Speaker Check-in, SPIE Registration, or the Chair Services Desk. Individuals not complying with this policy will be asked to surrender their recording media and leave the conference room. Refusal to comply with such requests is grounds for expulsion from the event. Please see the SPIE code of conduct.

Courses: audio and video recordings are prohibited without explicit permission from SPIE and the instructor. Individuals not complying with this policy will be asked to surrender their recording media and leave the classroom. Refusal to comply with such requests is grounds for expulsion from the event.

Exhibition: attendees may not record interviews on the exhibition floor nor record or photograph exhibitor booth displays and/or products without explicit permission from SPIE and on-site company representatives. Consent forms are available at Exhibitor Assistance. Individuals not complying with this policy will be asked to surrender their recording media and leave the exhibition hall. Refusal to comply with such requests is grounds for expulsion from the event.

SPIE Conferences app connect feature

The connect feature in the SPIE Conferences app is a personal networking tool that allows individuals to share their contact information with other attendees via their phones while using the SPIE app. This tool should not be used for systematic scanning of badges for managing sales leads. Inappropriate use is a violation of event policy.

SPIE Conferences app lead retrieval feature

The lead retrieval feature in the SPIE Conferences app is a lead generation tool that allows attendees to share their contact information with SPIE exhibitors. Exhibitor representatives using the lead retrieval app may scan attendee badges in the exhibition or supporting company events after receiving permission from an attendee. It should not be used in the technical conference area. The lead retrieval feature will be disabled for exhibitor representatives who exceed reasonable use or are in violation of other SPIE event policies. Attendees should report inappropriate use by notifying staff or contacting support via the help link in the app.

SPIE Conferences app messaging policy

The SPIE Conferences app supports attendee-to-attendee messaging to facilitate professional networking among meeting participants. This feature should not be used to push high-volume solicitations, and messaging will be disabled for attendees who exceed reasonable use or are in violation of other SPIE event policies. Attendees should report inappropriate use via the app reporting feature. SPIE will also monitor for high-volume patterns suggesting improper use.

Unauthorized solicitation

Unauthorized solicitation in the exhibition hall is prohibited. Any non-exhibiting organization observed to be distributing information or soliciting business in the aisles, or in another company's booth, will be asked to leave immediately.

Unsecured items

Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

Wireless internet service

At most events, SPIE provides wireless access for attendees. Properly secure your computer before accessing the public wireless network. SPIE is not responsible for computer viruses or other kinds of computer damage.