mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium BI01: Democratizing AI in Materials Science—A Pathway to Broaden the Impact of Materials Research

This symposium aims to democratize and streamline materials science by lowering the barriers to adopting data-driven artificial intelligence techniques. Materials research is essential for technological advancements, but can be slow and resource-intensive. The utilization of AI methodologies provides a promising avenue for expediting materials research. Nevertheless, obstacles to embracing these approaches exist. Through collaborative discussions and innovative exploration, our symposium seeks to diminish these obstacles and foster a more accessible and efficient landscape for adopting data-driven artificial intelligence techniques in materials science. By democratizing materials science with AI, we mean to increase the visibility, availability, readiness, and user-friendliness of data, tools, platforms, and innovative concepts that are made available through various means such as web applications, Python packages, GitHub, or other sharing platforms. Our aim is to foster a collaborative and open discussion between data science experts and non-experts. This includes materials scientists and engineers, chemists, physicists, and computer scientists from academia and industry. Through these efforts, we hope to catalyze materials research and facilitate breakthroughs in areas ranging from sustainability to healthcare.

The discussion will revolve around data, tools, platforms, frameworks, and pioneering ideas that can accelerate materials research. It also includes the use of data-driven approaches for educational, explorative, accelerative, disseminative, and knowledge-preservative purposes. We expect our symposium to provide a forum to identify adoption barriers encountered by non-data experts.

Topics will include:

- Data extraction, organization, curation, and storage, and materials ontologies
- Experimental and computational databases and sharing platforms
- High-throughput materials space exploration techniques with computations and experiments
- Numerical materials representations (fingerprints or descriptors)
- AI-guided experimentation
- Knowledge discovery, conservation, and dissemination
- Rule mining
- Synthesis, prediction, and design strategies
- Synergetic materials research strategies that combine experimentation and theory
- Accelerating materials discovery with human-assisted AI methods
- Machine learning techniques such as active learning, transfer learning, and large language models
- Boosting materials research through open-source datasets and software
- Broadening impact through outreach, societal interaction, and education

Invited speakers include:

Milad Abolhasani	North Carolina State University, USA
Maria Chan	Argonne National Laboratory, USA
Steve Cranford	Cell Press, USA
Claudia Draxl	Humboldt-Universität zu Berlin, Germany
Matthew Evans	Université catholique de Louvain, Belgium
Alysia Garmulewicz	Universidad de Santiago de Chile, Chile
Neil Gershenfeld	Massachusetts Institute of Technology, USA
Gabe Gomes	Carnegie Mellon University, USA
Ivor Lončarić	Institut Ruder Boškovic, Croatia
Arun Mannodi-Kanakkithodi	Purdue University, USA
Nicola Marzari	École Polytechnique Fédérale de Lausanne, Switzerland
Adnan Mehonic	University College London, United Kingdom
Kristin Persson	University of California, Berkeley, USA
Lilo Pozzo	University of Washington, USA
Krishna Rajan	University at Buffalo, The State University of New York, USA
Kristin Schmidt	IBM T.J. Watson Research Center, USA
Rama Vasudevan	Oak Ridge National Laboratory, USA
James Warren	National Institute of Standards and Technology, USA

Symposium Organizers

Christopher Kuenneth
University of Bayreuth
Computational Materials Science
Germany
Tel 0049-921-55-7330, christopher.kuenneth@uni-bayreuth.de

Deepak Kamal
Solvay
USA
Tel (404) 967-7268, deepak.kamal@solvay.com

Antonia Statt
University of Illinois at Urbana-Champaign
USA
Tel (609) 356-2425, statt@illinois.edu

Milica Todorovic
University of Turku
Finland
Tel 00358-50-331-0029, milica.todorovic@utu.fi

Symposium BI02: Early Career Development—Insights from Academia and Industry

There are several unknowns when it comes to finding a job in academia or industry that fits one's skills and passions. Even after landing the desired position, a significant amount of learning is required to become a successful professional.

This symposium is geared toward the next generation of professionals in academia and industry by providing technical instruction on different aspects of career development. This symposium will delve into the intricacies of the job application process, pinpointing potential opportunities, and sharing anecdotal experiences. Guidance on how to write successful proposals and grants needed for research in Early career will be discussed. Journal editors will share their vision on writing impactful papers, followed by a panel discussion. We aim to gather professionals from various stages of their life and career to offer diverse perspectives. Additionally, this symposium will feature talks on novel and successful teaching and mentoring strategies.

Direct interaction with the attendees of the symposium will be promoted in panel discussions around 1) work-life balance - strategies for maintaining good mental health, coping with pressure, combining family and career; 2) mobility in early careers - discussions will be on: should I move? When is it a good time? What issues will I face? How to get funding for my work?; and 3) What's next after my PhD? Is postdoc a correct decision? How to shift from industry to academia? Is my profile more suited for industry or academia? What other options are there besides industry and academia? An informal networking session will be organized at the end of the symposium.

Topics will include:

- Early career perspectives
- Faculty application
- Mentoring strategies
- Teaching methods
- Writing impactful research articles
- Grant proposal writing
- Job application
- Work-life balance
- Mobility in science

Invited speakers include:

Jain Abnubhav	Lawrence Berkeley National Laboratory, USA
David Bahr	Purdue University, USA
Jeffrey Cain	General Motors, USA
Pieremanuele Canepa	University of Houston, USA
Mallory Clites	U.S. Department of Energy, USA
Daniel Cole	U.S. Army Research Office—Materials Science Division, USA
Vincent Dusastre	Nature Materials, United Kingdom
Jessica Freyer	Rhapsody Venture Partners, USA
Chris Heckle	Argonne National Laboratory, USA
Germano Iannacchione	National Science Foundation, USA
Caroline Koustis	Shimadzu Scientific Instruments, USA
Christine Luscombe	Okinawa Institute of Science and Technology, Japan
Suveen Mathaudhu	Colorado School of Mines, USA
Lincoln Miara	Pure Lithium, USA
Jagjit Nanda	Stanford University, USA
Mihrimah Ozkan	University of California, Riverside, USA
Gopal Rao	Materials Research Society, USA
Briana Simms	University of Cincinnati, USA
Mona Zebarjadi	University of Virginia, USA

Symposium Organizers

Babak Anasori
Purdue University
USA
Tel (267) 441-1233, banasori@purdue.edu

Sepideh Akhbarifar
The Catholic University of America
USA
Tel (202) 319-6156, sepideha@vsl.cua.edu

Zachary Hood
Argonne National Laboratory
USA
Tel (412) 576-2605, zhood@anl.gov

Katherine Mazzio
Humboldt-Universität zu Berlin
Germany
Tel 4917622588474, katherine.mazzio@hu-berlin.de

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium CH01: *In Situ* Characterization During Thin-Film Processing

Thin films are extremely relevant both scientifically and technologically for several reasons. They provide a model system for studying the fundamental properties of materials, they enable the study of the properties of materials under controlled conditions (including extreme conditions), and they can be used to study the growth and properties of crystals. As a result, thin films find many different applications, including transistors, solar cells, microprocessors, displays, coatings for optical lenses, anti-corrosion coatings, and catalytic converters.

Having the possibility to control their composition and properties during deposition/etch or post deposition treatments offers both fundamental knowledge of the process and accelerates the optimization of the process protocols and the final properties of the materials. For these reasons, *in situ* characterization techniques are widely used and developed by the thin film community. In addition, data obtained *in situ* during deposition or post-processing of thin films can be used to accelerate the optimization of deposition/post-treatment conditions and properties thanks to machine learning (ML) and artificial intelligence (AI).

This symposium will bring together researchers using or interested *in situ* techniques during film processing, who are often dispersed amongst different symposia at application focused conferences, to highlight and discuss recent advancements in the field and to promote cross-fertilization between different *in situ* approaches.

Topics will include:

- *In Situ* diagnostic of atomic layer processing (ALD, ASD, ALE)
- *In Situ* plasma characterization and its correlation to thin films processing (deposition and etching)
- Optimization of thin film processing through AI/ML and *in situ* combined approaches
- *In Situ* reactor monitoring for control of process uniformity and reproducibility/maintenance
- *In Situ* studies in large research facilities (synchrotron, neutrons, etc)
- *In Situ* characterization of the evolution of thin films properties during post-deposition treatments
- Nucleation and thin film growth from solutions, melts, and vapors.
- Novel in situ characterization approaches for thin film deposition and processing

Invited speakers include:

Marceline Bonvalot	Commissariat à l'énergie atomique et aux énergies alternatives, France
Christophe Defranoux	Semilab, France
Remy Gassilloud	Commissariat à l'énergie atomique et aux énergies alternatives, France
Agnès Granier	Institut des Materiaux Jean Rouxel, France
Peter Muller-Buschbaum	Technische Universität München, Germany
Kevin Musselman	University of Waterloo, Canada
Shota Nunomura	National Institute of Advanced Industrial Science and Technology, Japan
Robin Ras	Aalto University, Finland
Joachim Schnadt	Lund University, Sweden
Eduardo Solano	ALBA Synchrotron, Spain
Takayoshi Tsutsumi	Nagoya University, Japan
Sergey Voronin	TEL, USA

Symposium Organizers

David Muñoz-Rojas

Université Grenoble Alpes
France
Tel 0033687960790, david.munoz-rojas@grenoble-inp.fr

Jolien Dendooven

Ghent University
Belgium
Tel 003292644365, Jolien.Dendooven@UGent.be

Masaru Hori

Nagoya University
Japan
Tel 0081-52-789-4420, hori@nuee.nagoya-u.ac.jp

Christophe Vallée

University at Albany, State University of New York
USA
Tel (518) 334-7197, cvallee@albany.edu

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium CH02: Recent Advancements in Characterization and Modeling of Electrochemical Interfaces

This symposium covers recent progress in in-situ/operando characterizations of electrochemical interfaces and advancements in multiscale modeling and simulations that move beyond idealized systems to understand the atomic origins of macroscopic behaviors in real electrochemical devices. A strong emphasis is placed on the integration between modeling and characterization to understand the fundamental processes, key chemistry and structural features that dictate the performance of electrochemical interfaces. The first part of the symposium focuses on experimental characterization techniques as well as novel cell designs to enable characterization and elucidation of buried electrochemical interfaces, with special emphasis on the development of in-situ/operando characterization techniques and multimodal approaches to probe solid-gas, solid-liquid and solid-solid interfaces that are relevant in rechargeable batteries, fuel cells, electrolysis, and electro deposition processes. The second part of the symposium focuses on modeling of electrochemical interface using techniques such as density functional theory, molecular dynamics, microkinetic modeling, phase field, continuum modeling, and emerging machine learning-based methodologies. A key emphasis is placed on multiscale modeling approaches that can overcome the specific time- and length-scale limitations of individual simulation methods and integrations between modeling and characterization to resolve the structure-properties relationship at the electrochemical interfaces. The contributions address basic scientific challenges, demonstrate new multimodal characterization and multiscale modeling techniques, identify limiting factors, and advise mitigation strategies for interface engineering. Examples of how these approaches have contributed to the fundamental understanding of various interfacial physico-chemical processes and their effects on overall device performance, as well as how this understanding can be directly applied to design more efficient and durable electrochemical interfaces, are particularly welcome.

Topics will include:

- Advancements in *in situ/operando* characterization techniques
- Integrated characterization and modeling approaches
- Addressing electro-chemo-mechanical coupling at electrochemical interfaces from multiscale modeling
- Electrochemical deposition and corrosion
- Electrocatalysis, including CO_2 reduction and water electrolysis
- High-energy-density Li batteries and solid-state batteries
- Understanding interfacial evolution during electrochemical cycling

Joint sessions are being considered with **CH04 - Advanced Characterization Techniques and Methodologies for Battery Materials**.

Invited speakers include:

Anja Bieberle	Dutch Institute for Fundamental Energy Research, Netherlands
Long-Qing Chen	The Pennsylvania State University, USA
Jun Cheng	Xiamen University, China
Kyung Yoon Chung	Korea Institute of Science and Technology, Republic of Korea
Beatriz Roldán Cuenya	Fritz Haber Institute of the Max Planck Society, Germany
Nikita Dutta	National Renewable Energy Laboratory, USA
Alejandro Franco	Université de Picardie Jules Verne, France
Edwin Garcia	Purdue University, USA
Robert Kostecki	Lawrence Berkeley National Laboratory, USA
Ulrike Krewer	Karlsruhe Institute of Technology, Germany
Kevin Leung	Sandia National Laboratories, USA
Ju Li	Massachusetts Institute of Technology, USA
Y. Shirley Meng	The University of Chicago, USA
Yue Qi	Brown University, USA
Kenneth Takeuchi	Stony Brook University, The State University of New York, USA
Michael Toney	University of Colorado Boulder, USA
Anton Van Der Ven	University of California, Santa Barbara, USA
Chongmin Wang	Pacific Northwest National Laboratory, USA
Johanna Nelson Weker	SLAC National Accelerator Laboratory, USA

Symposium Organizers

Liwen Wan

Lawrence Livermore National Laboratory
USA
Tel (925) 422-3490, wan6@llnl.gov

Ye Cao

The University of Texas at Arlington
USA
Tel (817) 272-1858, ye.cao@uta.edu

Jinghua Guo

Lawrence Berkeley National Laboratory
USA
Tel (510) 495-2230, jguo@lbl.gov

Amy Marschilok

Stony Brook University, The State University of New York
Department of Chemistry
USA
Tel (631) 216-7419, amy.marschilok@stonybrook.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium CH03: Towards Quantitative Characterization of Soft Materials by Scanning Probe Microscopy—Beyond Imaging

Scanning Probe Microscopy (SPM) stands as a formidable technology capable of visualizing, characterizing, and even manipulating nanostructures through the use of a sharp probe. The versatility of SPM makes it a valuable tool for addressing diverse challenges across a wide array of domains considering soft materials, such as energy harvesting, organic electronics, biosensors, self-assembly, biotechnology, life sciences, mechanobiology, cosmetics, and medical applications, particularly in the field of nanomedicine. This cutting-edge field has seen remarkable advancements in recent years, continually introducing new techniques and applications, especially in the realm of soft materials and biological specimens, including disease-related samples with diagnostic potential. Nevertheless, SPM is not without its own set of challenges. Precisely measuring the mechanical properties of materials and effectively handling the substantial amount of data generated by SPM techniques remain major hurdles.

The primary aim of this symposium is to provide an international platform for the exchange of research findings among globally recognized experts actively engaged in the domain of scanning probe microscopy applied to soft polymeric (bio)materials and living organisms. Industrial partners will also be part of the dialogue, facilitating discussions on the potential of novel SPM approaches. This symposium serves as a unique opportunity to both showcase and deliberate on the current state of SPM methods when dealing with challenges and to chart the course for future applications in the context of soft polymeric (bio)materials and living organisms. Furthermore, this symposium is part of the broader Materials Research Society series focused on SPM techniques. The track record of this series in uniting leading figures from academia and industry, as well as attracting budding researchers and students, has been remarkable. Importantly, this event is expected to span a range of disciplines, encompassing material sciences, engineering, biophysics, condensed matter physics, and the development of cutting-edge instrumentation.

Topics will include:

- Mapping at the nanoscale of the mechanical (and viscoelastic) properties of soft materials (polymer blends, nanocomposites, hydrogels, biopolymers, bioglues …) cells and viruses
- Nano-mechanical properties of soft materials (acquisition and analysis)
- Towards industrial, biological, and medical applications (food, personal care, cosmetics, dermatology)
- Characterization of the next-generation cosmetic bio-sourced materials
- Mechanical manipulation of single molecules
- SPM-based mechanobiology
- Cells nanomechanics as a medical diagnostic tool
- Combined multimodal SPM and correlative imaging modes (Raman, IR, SEM, …)
- High speed and high-resolution SPM (instrumentation and data analysis)
- Novel methodologies/processes for the data analysis including advanced statistics and Machine Learning

Invited speakers include:

Mathieu Cognard	Digital Surf, France
Sidney Cohen	Weizmann Institute of Science, Israel
Sonia Contera	University of Oxford, United Kingdom
Alexandre Dazzi	Université Paris-Saclay, France
Rosa Espinoza-Marzal	University of Illinois at Urbana-Champaign, USA
Georg Fanter	Ecole Polytechnique Fédérale de Lausanne, Switzerland
Takeshi Fukuma	Kanazawa University, Japan
Nuria Gavara	Universitat de Barcelona, Spain
Greg Haugstad	University of Minnesota, USA
Peter Hinterdorfer	Johannes Kepler Universität Linz, Austria
Florian Kumpfe	Bruker JPK, Germany
Ken Nakajima	Tokyo Institue of Technology, Japan
Bede Pittenger	Bruker Nano Inc., USA
Roger Proksch	Oxford Instruments, USA
Lorena Redondo-Morata	Institut Pasteur de Lille, France
Felix Rico	Aix-Marseille Université, France
Simone Ruggeri	Wageningen University & Research, Netherlands
Lanti Yang	Sabic, Netherlands
Francesca Zuttion	L'OREAL, France

Symposium Organizers

Philippe Leclere

Université de Mons
Laboratory for Physics of Nanomaterials and Energy (LPNE)
Belgium
Tel 32-65-373868, philippe.leclere@umons.ac.be

Malgorzata Lekka

Polish Academy of Sciences
Institute of Nuclear Physics Henryka Niewodzinski
Poland
Tel 48-12-6628-271, malgorzata.lekka@ifj.edu.pl

Gustavo S. Luengo

L'OREAL Research and Innovation
France
Tel 33148689012, gluengo@rd.loreal.com

Igor Sokolov

Tufts University
School of Engineering, Mechanical Engineering
USA
Tel (617) 627-2548, igor.sokolov@tufts.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium CH04: Advanced Characterization Techniques and Methodologies for Battery Materials

As the demand for sustainable and affordable energy storage solutions increases, there is a critical need to explore alternative materials beyond those employed in traditional lithium-ion batteries (LIBs). Developing cheaper and safer energy storage materials with higher performance is imperative, but new materials often have compromised electrochemical performance, including lower capacities and poor cycling performance. These issues can be attributed to various factors, including local structural changes, surface degradation, and the formation of unstable solid-electrolyte interphases. To address these challenges, this symposium aims to gather researchers and experts to discuss advanced characterization techniques for energy storage materials for battery applications. The symposium will focus on exploring the latest analytical methods, such as *in situ* transmission electron microscopy (TEM), in-situ atomic force microscopy (AFM), neutron diffraction and pair distribution function (PDF) analysis, 3D tomography, X-ray absorption near edge structure (XANES) with extended X-ray absorption fine structure (EXAFS), and solid-state nuclear magnetic resonance (NMR) spectroscopy. We invite original research submissions on advanced characterizations that improve our understanding of the local structure, composition, and chemical states of energy storage materials under *operando* conditions. The symposium will cover topics such as local structural changes and surface degradation of electrodes, formation and stability of solid-electrolyte interphases, morphology and phase characterization using advanced microscopy techniques, and electrochemical and transport properties under operando conditions. This symposium aims to foster interdisciplinary discussions among researchers in materials science, chemistry, physics, and engineering to advance the development of energy storage materials.

Topics will include:

- Synchrotron X-ray characterization of electrode materials
- Neutron diffraction and PDF of high energy cathodes
- Spectroscopic studies of solid-electrolyte interphases (SEI)
- *In situ/operando* NMR spectroscopy of battery materials
- X-ray tomography and microscopy for the 3D visualization of energy materials
- Acoustic signals for determining electrochemical system
- Cryo-EM for battery materials and interfaces
- *In situ/operando* optical microscopy for probing interfaces, degradation, deposition and more during the electrochemical process
- Battery performance engineering assisted by advanced atomic force microscopy
- Advanced Raman and infrared spectroscopy for studying battery materials and interfaces

Joint sessions are being considered with **CH02 - Recent Advancements in Characterization and Modeling of Electrochemical Interfaces**.

Invited speakers include:

Mahalingam Balasubramanian	Oak Ridge National Laboratory, USA	**Michal Leskes**	Weizmann Institute of Science, Israel
Frederic Blanc	University of Liverpool, United Kingdom	**Xiaolin Li**	Pacific Northwest National Laboratory, USA
Jordi Cabana	University of Illinois at Chicago, USA	**Jue Liu**	Oak Ridge National Laboratory, USA
Neil Dasgupta	University of Michigan, USA	**Lauren Marbella**	Columbia University, USA
Nuria Garcia-Araez	University of Southampton, United Kingdom	**David Muller**	Cornell University, USA
Clare Grey	University of Cambridge, United Kingdom	**Akshay Rao**	University of Cambridge, United Kingdom
Kelsey Hatzell	Princeton University, USA	**Jennifer Rupp**	Technische Universität München, Germany
Enyuan Hu	Brookhaven National Laboratory, USA	**Dan Steingart**	Columbia University, USA
Yan-Yan Hu	Florida State University, USA	**Xin Xu**	Arizona State University, USA
Karin Kleiner	Universität Münster, Germany	**Wolfgang Zeier**	University of Münster, Germany
James LeBeau	Massachusetts Institute of Technology, USA		

Symposium Organizers

Duhan Zhang

Massachusetts Institute of Technology
USA
Tel (917) 744-2780, duhan@mit.edu

Rachel Carter

U.S. Naval Research Laboratory
Chemistry Division
USA
Tel (615) 306-3568, rachel.carter@nrl.navy.mil

David Halat

Lawrence Berkeley National Laboratory
USA
Tel (406) 580-0724, dmhalat@lbl.gov

Mengya Li

Oak Ridge National Laboratory
USA
Tel (615) 823-9234, lim1@ornl.gov

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium CH05: Frontiers of Imaging and Spectroscopy in Transmission Electron Microscopy

Instrumentation and methodological advances in electron microscopy over the last few decades have dramatically broadened the range of applications of this cornerstone technique of modern science. While the successful implementation of lens aberration correctors in the late 1990s was the catalyst in ushering this new golden age of electron microscopy, the pace of change has all but accelerated in the last few years. Faster, more sensitive direct electron detectors for both imaging and spectroscopic applications, monochromated electron sources for electron spectroscopy, magnetic-field-free lenses, and the promise of stable sample observation at deep cryogenic temperatures are changing the way (scanning) transmission electron microscopy ((S)TEM) is used to characterize materials at unprecedented levels of resolution and sensitivity, including on beam-sensitive or liquids/gaseous systems. Strategies for handling the large amount of multi-dimensional data generated by modern instruments, alongside novel data analytics are also being facilitated by a concurrent revolution in machine learning and artificial-intelligence based processing methodologies.

This symposium will cover a wide range of topics at the frontiers of electron microscopy, including 4D-STEM, monochromated electron spectroscopies, data-analytics and multi-dimensional imaging, as well as in-situ and ultra-fast microscopy. The integration of image acquisition with machine learning and materials modeling will also be highlighted. The goal of this symposium is to bring together researchers from all corners of this vibrant field, and to reach out to interdisciplinary scientific communities so as to foster new collaborative research and to accelerate the design and developments of novel functional materials and devices.

Topics will include:

- Transmission electron microscopy
- Electron energy loss spectroscopy
- (S)TEM-based spectroscopies
- 4D-STEM
- *In situ* electron microscopy
- Modelling of scattering in electron microscopy
- Ultra-fast and dynamic imaging
- Machine learning and data analytics in (S)TEM

Invited speakers include:

Sara Bals	University of Antwerp, Belgium
Judy Cha	Cornell University, USA
Maria Chan	Argonne National Laboratory, USA
Peter Ercius	Lawrence Berkeley National Laboratory, USA
Joanne Etheridge	Monash University, Australia
Paulo Ferreira	International Iberian Nanotechnology Laboratory, Portugal
Berit Goodge	Max Planck Institute for Chemical Physics of Solids, Germany
Demie Kepaptsoglou	University of York, United Kingdom
Judy Kim	University of Oxford, United Kingdom
Andrea Konecna	Brno University of Technology, Czech Republic
Y. Shirley Meng	The University of Chicago, USA

Sophie Meuret	Centre d'Élaboration des Matériaux et d'Etudes Structurales, France
Thomas Pichler	Universität Wien, Austria
Bryan Reed	Integrated Dynamic Electron Solutions Inc., USA
Marta Rossell	Empa–Swiss Federal Laboratories for Materials Science and Technology, Switzerland
Naoya Shibata	The University of Tokyo, Japan
Kazu Suenaga	Osaka University, Japan
Eren Suyolcu	Max Planck Institute for Solid State Physics, Germany
Luiz Tizei	Université Paris-Saclay, France
Jo Verbeeck	University of Antwerp, Belgium
Michael Zachman	Oak Ridge National Laboratory, USA
Han Zhang	National Institute for Materials Science, Japan

Symposium Organizers

Quentin Ramasse

SuperSTEM
School of Chemical and Process Engineering
United Kingdom
Tel 441925864907, qmramasse@superstem.org

Miaofang Chi

Oak Ridge National Laboratory
USA
Tel (865) 438-8855, chim@ornl.gov

Ryo Ishikawa

The University of Tokyo
Institute of Engineering Innovation
Japan
Tel 81-3-5841-7723, ishikawa@sigma.t.u-tokyo.ac.jp

Robert Klie

University of Illinois at Chicago
Physics
USA
Tel (312) 996-6064, rfklie@uic.edu

Symposium CH06: Exploring Fast and Ultrafast Dynamics of Matter with Electrons and Photons

The development of methods for visualizing the atomic-scale nature of matter has proven to be instrumental for understanding the structural origin of functionality in biological, chemical and materials systems. Due to the dynamic nature of function, the need to understand fast, complex physical phenomena through direct in situ observation has stimulated the development of fast and ultrafast probing techniques based on electrons and photons. The ultrafast probing techniques combined with *in situ* and multimodal acquisition capabilities have been utilized to gain a fundamental understanding of dynamic processes occurring in materials and biological structures. This symposium will focus on the current progress made in the field of advanced fast and ultrafast in situ characterization techniques, including ultrafast electron diffraction and microscopy, X-ray based techniques, and complementary multimodal implementations. Worldwide specialists will present new science, techniques, and data analysis and discuss future directions and exciting emerging research areas.

Topics will include:

- Structural, electronic, and magnetic dynamics unveiled by ultrafast microscopy, diffraction, and spectroscopy.
- Novel molecular and material processes that have been enable by ultrafast microscopy, diffraction, spectroscopy.
- Photon-electron interactions by femtosecond optical and/or electron pulses, coherent control of quantum system, electron state manipulation
- Multimodality approaches in ultrafast techniques
- *In situ* electron and X-ray-based ultrafast microscopy, diffraction and spectroscopy techniques and their application in materials science.
- Materials under extreme conditions
- Understanding and mitigating high intensity beam effects on materials
- Atomic scale single-particle dynamics and molecular processes
- Fundamental challenges in designing ultrafast coherent and high-brightness probes (source, optical system, and detection)
- Discoveries, new physical insights, and paradigm tests that have occurred because of developments and advancements in ultrafast characterization techniques

Invited speakers include:

Ilke Arslan	Argonne National Laboratory, USA	**Aaron Lindenberg**	Stanford University, USA
Florian Banhart	Université de Strasbourg, France	**Ulrich Lorenz**	École Polytechnique Fédérale de Lausanne, Switzerland
Naomi Ginsberg	University of California, Berkeley, USA	**Renske M. van der Veen**	Helmholtz-Zentrum Berlin, Germany
Kyoko Ishizaka	The University of Tokyo, Japan	**Anton Malko**	The University of Texas at Dallas, USA
Ido Kaminer	Technion–Israel Institute of Technology, Israel	**Keith Nelson**	Massachusetts Institute of Technology, USA
Ye-Jin Kim	California Institute of Technology, USA	**Archana Raja**	Lawrence Berkeley National Laboratory, USA
Martin Kozak	Univerzita Karlova, Czech Republic	**Chong-Yu Ruan**	Michigan State University, USA
Oh-Hoon Kwon	Ulsan National Institute of Science and Technology, Republic of Korea	**Sascha Schäfer**	University of Regensburg, Germany
Bolin Liao	University of California, Santa Barbara, USA	**Murat Sivis**	University of Göttingen, Germany

Symposium Organizers

Volkan Ortalan

University of Connecticut
Materials Science and Engineering
USA
Tel (860) 486-2570, vortalan@uconn.edu

Libai Huang

Purdue University
Department of Chemistry
USA
Tel (765) 494-7851, libai-huang@purdue.edu

Omar F Mohammed

King Abdullah University of Science and Technology
Materials Science and Engineering
Saudi Arabia
Tel 966-2-808-4491, omar.abdelsaboor@kaust.edu.sa

Ding-Shyue (Jerry) Yang

University of Houston
Chemistry
USA
Tel (713) 743-6022, yang@uh.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium CH07: Cryogenic Electron Microscopy and Correlative Characterization Techniques for Quantum and Energy Materials Research

Cryogenic electron microscopy (EM) has revolutionized our understanding of biological materials at the atomic scale. Despite the research breakthroughs in biology, utilizing cryogenic conditions for EM research of heterogeneous materials is still in its infancy. This symposium is intended to facilitate the exchange of information on the latest developments, challenges, and outlooks in cryogenic EM to probe phenomena in quantum and energy materials. Utilizing cryogenic conditions has allowed researchers to start exploring beam sensitive and liquid phase interfaces found in energy materials and devices such as batteries at the atomic-scale. More recently temperature controlled cryogenic EM hardware is enabling researchers to explore *in situ* low temperature quantum phases. Additionally, recent developments in cryogenic sample preparation, including focused ion and laser beam microscopy, have provided a new platform to probe phenomena in quantum and energy materials that have not been accessible before.

This symposium will also be an opportunity to discuss and identify synergies between complementary cryogenic characterization methods such as *in situ/operando* EM, atom probe tomography and synchrotron beam line techniques. A major challenge in both quantum and energy materials research is linking macro- and micro-scale properties with atomic-scale characterization techniques. Too often, different cryogenic characterization approaches are carried out in isolation, with no straightforward way to combine data from different experimental techniques. We welcome contributions in theoretical and data analysis techniques including AI/ML approaches that are essential to overcome the low signal/noise and instrumentation stability constraints common to cryogenic characterization techniques.

Topics will include:

- Cryogenic sample preparation techniques including vitrification and cryogenic focused ion beam
- Advancements in cryogenic EM an *in situ* holders, such as temperature control, extreme low liquid helium temperatures, applied bias, magnetic field etc.
- Correlative *in situ* EM and other *in situ* microscopy techniques e.g. liquid cell and gas
- Correlative cryogenic and *in situ* x-ray and neutron beam line techniques
- Correlative cryogenic advanced characterisation techniques e.g. atom probe tomography
- Combination with advanced TEM techniques (phase related, spectroscopy, 4D-STEM)
- Advanced TEM techniques to explore interplay of quantum phenomena such as charge, spin, orbital, lattice correlations
- Applications of cryogenic electron spectroscopy for energy and quantum materials
- Synergies with theoretical methods and data science
- Advanced data acquisition and analysis methods (including AI/ML for EM) for cryogenic microscopy and correlative characterization techniques

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Patricia Abellan	Institut des Matériaux Jean Rouxel, France, France
Eva Bladt	DensSolutions Inc., Netherlands
Karen Bustillo	Lawrence Berkeley National Laboratory, USA
Julie Cairney	The University of Sydney, Australia
Miaofang Chi	Oak Ridge National Laboratory, USA
Arun Devaraj	Pacific Northwest National Laboratory, USA
Rafal Dunin-Borkowski	Forschungszentrum Jülich GmbH, Germany
Berit Goodge	Max Planck Institute for Chemical Physics of Solids, Germany
Juan Carlos Idrobo	University of Washington, USA
Katherine Jungjohann	National Renewable Energy Laboratory, USA
Judy Kim	University of Oxford, United Kingdom
James LeBeau	Massachusetts Institute of Technology, USA
Yuzhang Li	University of California, Los Angeles, USA

Marc Maier	Ferrovac, Switzerland
Y. Shirley Meng	The University of Chicago, USA
Ana Pakzad	Ametek, USA
Lee Penn	University of Minnesota, USA
Amanda Petford-Long	Argonne National Laboratory, USA
Noah Schnitzer	Cornell University, USA
Naoya Shibata	The University of Tokyo, Japan
Denys Sutter	CondenZero GmbH, Switzerland
Luizi Tizei	Université Paris-Saclay, France
Min Wu	Thermo Fisher Scientific, Netherlands
Michael Zachman	Oak Ridge National Laboratory, USA
Yimei Zhu	Brookhaven National Laboratory, USA

Symposium Organizers

Michele Conroy

Imperial College London
Materials
United Kingdom
Tel 353871249581, mconroy@imperial.ac.uk

Ismail El Baggari
Harvard University
Rowland Institute
USA
Tel (617) 497-4600, ielbaggari@rowland.harvard.edu

Leopoldo Molina Luna

Technische Universität Darmstadt
Germany
Tel 49-6151-16-20180, leopoldo.molina-luna@aem.tu-darmstadt.de

Mary Scott

University of California, Berkeley
Materials Science
USA
Tel (510) 495-2901, mary.scott@berkeley.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL01: Low-Dimensional Luminescent Materials and Devices

Low-dimensional luminescent materials including halide perovskites and colloidal quantum dots are crucial for various upcoming applications such as hyper-realistic displays, augmented reality glasses, autonomous vehicles, optical quantum communications, electrically pumped lasing, hyperspectral imaging, and other emerging optoelectronic applications. Recent research in this area is currently focusing on developing high-efficiency, stable materials, and devices, as well as developing environmentally friendly alternatives and understanding the fundamental photophysics behind them.

This symposium aims to discuss cutting-edge research ideas and achievements that would contribute to material innovation in metal halide perovskites, colloidal quantum dots, nanoplatelets, and other low-dimensional nanostructures. The proposed symposium will cover a complete range of topics regarding emerging luminescent low-dimensional materials from fundamental chemistry and physics to related practical applications. The discussion in the proposed symposium will comprehensively encompass precise material synthesis, defect passivation strategies, photophysical analysis, thin-film processing and patterning, and optoelectronic devices including light-emitting diodes, photodetectors, and lasers. Since many of these topics are interrelated, the symposium provides a valuable opportunity for participants to exchange views on state-of-the-art accomplishments and generate insights for future innovative research.

Topics will include:

- Quasi-2D perovskites and other low-dimensional perovskite structures
- Colloidal perovskite nanocrystals
- Colloidal inorganic quantum dots, nanoplatelets, and other low-dimensional nanostructures
- Lead-free perovskite and perovskite-derivative emitters
- Novel synthetic routes and growth mechanisms of emitters
- Fundamental photophysics of emitters
- Defect passivation strategies
- Interfacial engineering for light-emitting diodes and other optoelectronic devices
- Degradation mechanism of emitters and their devices
- Novel patterning methods
- Down/Up-conversion emitters, films, and display/lighting devices
- Optically or electrically pumped lasing from low-dimensional emitters
- Chiral luminescent materials
- Infrared-emitting materials and devices

Invited speakers include:

Igor Coropceanu	Nanosys, USA
Yitong Dong	The University of Oklahoma, USA
Hongyou Fan	Sandia National Laboratories, USA
Daniel Gamelin	University of Washington, USA
Feng Gao	Linköping University, Sweden
Xiwen Gong	University of Michigan, USA
Tzung-Fang Guo	National Cheng Kung University, Taiwan
Zeger Hens	Ghent University, Belgium
Laura Herz	University of Oxford, United Kingdom
Bin Hu	The University of Tennessee, Knoxville, USA
Sohee Jeong	Sungkyunkwan University, Republic of Korea

Hemamela Karunadasa	Stanford University, USA
Taekhoon Kim	Samsung Advanced Institute of Technology, Republic of Korea
Maksym Kovalenko	ETH Zürich, Switzerland
Tae-Woo Lee	Seoul National University, Republic of Korea
Xuedan Ma	Argonne National Laboratory, USA
Liberato Manna	Istituto Italiano di Tecnologia, Italy
Qibing Pei	University of California, Los Angeles, USA
Sam Stranks	University of Cambridge, United Kingdom
Tze-Chien Sum	Nanyang Technological University, Singapore
William Tisdale	Massachusetts Institute of Technology, USA
Hendrik Utzat	University of California, Berkeley, USA

Symposium Organizers

Himchan Cho

Korea Advanced Institute of Science and Technology
Department of Materials Science and Engineering
Republic of Korea
Tel 82-42-350-3344, himchan@kaist.ac.kr

Tae-Hee Han

Hanyang University
Division of Materials Science and Engineering
Republic of Korea
Tel 82-2-2220-0411, taeheehan@hanyang.ac.kr

Lina Quan

Virginia Tech
Department of Chemistry
USA
Tel (510) 599-0552, linaquan@vt.edu

Richard D. Schaller

Argonne National Laboratory
Department of Chemistry
USA
Tel (847) 467-2399, schaller@anl.gov

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL02: Phase-Change Materials for Brain-like Computing, Embedded Memory and Photonic Applications

The rapidly growing demand for data storage and processing, driven by artificial intelligence (AI) and other data-intensive applications, is posing a serious challenge for current computing devices based on the von Neumann architecture. For every calculation, data sets need to be shuffled sequentially between the processor, and multiple memory and storage units through bandwidth-limited and energy-inefficient interconnects, typically causing 40% power wastage. Phase-change materials (PCMs) based on chalcogenides or antinomies show great promise to break this bottleneck by enabling non-volatile memory devices that can optimize the complex memory hierarchy, and neuro-inspired computing devices that can unify computing with storage in memory cells. The basic working principle is that PCMs can be switched between the amorphous and crystalline phase rapidly and reversibly by either electrical or optical pulses. The large contrast in electrical resistance and optical reflectivity between the two solid-state phases defines the logic state “0” and “1” for memory applications, while the continuous and non-linear change in resistance and reflectivity upon partial amorphization or gradual crystallization can be used to emulate neuronal dynamics for brain-like computing. In addition to traditional Ge-Sb-Te based alloys, metal oxides and two-dimensional materials, such as VO_2 and $MoTe_2$, have also been utilized for phase-change memory applications, where the switching between different logical states is achieved by transitions between different crystalline phases.

Topics will include:

- Materials design and characterization
- Crystallization kinetics of PCMs
- Resistance drift phenomenon and multi-level storage
- Brain-like computing devices and modeling
- Threshold switching effect and selector devices
- Cycling endurance and device degradation mechanism
- High-Temperature PCMs and embedded memory
- Optical and thermal properties of PCMs
- Non-volatile photonics and metamaterials
- Atomic imaging and modelling of PCMs

Joint sessions are being considered with **EN04 - Phase Change Materials for Energy Conversion and Storage**.
Also, a **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Jaakko Akola	Norwegian University of Science and Technology, Norway
Sabrina Calvi	INFN Roma Tor Vergata, Italy
Stefano Cecchi	Università degli Studi di Milano-Bicocca, Italy
Hai-Yu Michelle Cheng	Macronix International, USA
Guy Cohen	IBM T.J. Watson Research Center, USA
Behrad Gholipour	University of Alberta, Canada
Shogo Hatayama	National Institute of Advanced Industrial Science and Technology, Japan
Asir Intisar Khan	Stanford University, USA
Hyun Jung Kim	NASA Langley Research Center, USA
Massimo Longo	Università degli Studi di Roma Tor Vergata, Italy
Riccardo Mazzarello	Sapienza Università di Roma, Italy
Antonio Mio	Consiglio Nazionale delle Ricerche, Italy
Timothy Philip	IBM T.J. Watson Research Center, USA
Stefania Privitera	Consiglio Nazionale delle Ricerche, Italy
Andrea Redaelli	ST Microelectronics, Italy
Martin Salinga	University of Münster, Germany
Aida Todri Sanial	Technische Universiteit Eindhoven, Netherlands
Ranjan Singh	Nanyang Technological University, Singapore
Olivier Thomas	Aix Marseille University, France
Sharon Weiss	Vanderbilt University, USA
Nathan Youngblood	University of Pittsburgh, USA
Wei Zhang	Xi’an Jiaotong University, China

Symposium Organizers

Valeria Bragaglia

IBM Research Europe-Zurich
Switzerland
Tel 41-44-724-8507, vbr@zurich.ibm.com

Fabrizio Arciprete

University or Rome Tor Vergata
Italy
Tel 39-06-72594435, fabrizio.arciprete@roma2.infn.it

Juejun Hu

Massachusetts Institute of Technology
USA
Tel (302) 766-3083, hujuejun@mit.edu

Andriy Lotnyk

Leibniz Institute of Surface Engineering (IOM)
Germany
Tel 49-341-235-2840, andriy.lotnyk@iom-leipzig.de

Symposium EL03: 2D Materials—Nanofabrication and Applications

Internet-of-Things is distinctly new and rapidly expanding field of applied science which collides with 2D materials and devices with boundless future. 2D materials' progression from pure fundamental science to an application-oriented technology has occurred over unprecedented time frames, with many applications nearing market readiness. This symposium covers the state-of-the-art research and development on 2D materials and their innovative momentum in many applications such as flexible or wearable transistors, photodetectors, memristors and other devices through novel nanofabrication, nanolithography, and nanomanufacturing technologies. The scope of this symposium also broadly involves the new device applications, circuits design and system integration by the frontier progress of 2D materials and devices emerging with CMOS technology. The symposium content will include, but not limited to, the application of 2D materials as active and passive materials for electronics (including flexible, bio, and printable), photonics (including sensors, photodetectors, and photovoltaics), twistronics (including topological matter and van der Waals heterostructures), and healthcare (including biosensing and neuroscience). This symposium will provide a uniquely comprehensive experimental overview of 2D materials used for diverse applications. The symposium will provide a portal to attendees on the present state-of-the-art in the research on 2D material-based devices, including the nanofabrication, operation, and integration of 2D material-based devices. The symposium will consider and endorse contributions of works that utilize novel materials beyond graphene, including the emerging family of transition metal dichalcogenides (TMDs), Xenes, MXenes, metal organic frameworks (MOFs), etc. and their heterostructures for various applications. This timely symposium will disseminate the findings in this vogue research field to the broadest audience.

Topics will include:

- 2D materials synthesis and characterization
- Nanofabrication of advanced 2D materials and devices
- 2D materials for wearable, flexible, and printable nanotechnology
- 2D materials for neuromorphic and AIs technologies
- 2D materials for healthcare bioelectronics
- 2D materials for twisted and topological matter
- Optics and photonics enabled by 2D materials
- Emerging 2D materials and heterostructures for nanotechnology
- Nanolithography and nanomanufacturing of 2D materials

Joint sessions are being considered with **EL06 - 2D Atomic and Molecular Sheets Beyond Graphene—Optical Properties, Optoelectronics and Quantum Optics**.

Invited speakers include:

Jong-Hyun Ahn	Yonsei University, Republic of Korea
Camilla Coletti	Istituto Italiano di Tecnologia, Italy
Saptarshi Das	The Pennsylvania State University, USA
Xiangfeng Duan	University of California, Los Angeles, USA
Aaron Franklin	Duke University, USA
Jose Antonio Garrido	Catalan Institute of Nanoscience and Nanotechnology, Spain
Mark Hersam	Northwestern University, USA
Francesca Iacopi	University of Technology Sydney, Australia
Dmitry Kireev	University of Massachusetts Amherst, USA
Agnieszka Kuc	Helmholtz-Zentrum Dresden-Rossendorf, Germany
Max Lemme	RWTH Aachen University, Germany
Cecilia Mattevi	Imperial College London, United Kingdom
Arben Merkoçi	Catalan Institute of Nanoscience and Nanotechnology, Spain
Amalia Patanè	The University of Nottingham, United Kingdom
Aleksandra Radenovic	École Polytechnique Fédérale de Lausanne, Switzerland
Iuliana Radu	Taiwan Semiconductor Manufacturing Company Limited, Taiwan
Tania Roy	Duke University, USA
Rodney Ruoff	Center for Multidimensional Carbon Materials, Institute for Basic Science, Republic of Korea
Paolo Samorì	University of Strasbourg, France
Deblina Sarkar	Massachusetts Institute of Technology, USA
Hyeon-Jin Shin	Gwangju Institute of Science and Technology, Republic of Korea
Emanuel Tutuc	The University of Texas at Austin, USA
Oleg Yazyev	École Polytechnique Fédérale de Lausanne, Switzerland
Peide Ye	Purdue University, USA
Cunjiang Yu	The Pennsylvania State University, USA

Symposium Organizers

Carlo Grazianetti

Consiglio Nazionale delle Ricerche
Institute for Microelectronics and Microsystems (IMM)
Italy
Tel 00390396037452, carlo.grazianetti@cnr.it

Deji Akinwande

The University of Texas at Austin
Department of Electrical and Computer Engineering Microelectronics Research Center
USA
Tel (512) 471-4345, deji@ece.utexas.edu

Cinzia Casiraghi

University of Manchester
Department of Chemistry
United Kingdom
Tel 00440161275132 7, cinzia.casiraghi@manchester.ac.uk

Li Tao

Southeast University
School of Materials Science and Engineering
China
Tel 008652091046, tao@seu.edu.cn

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024

Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL04: Recent Advances in Hybrid Perovskites

Halide perovskites are now a well-established class of functional materials with promising device applications ranging from photovoltaics to LEDs and thermoelectrics. Specifically, in the last 15 years the scientific community has witnessed several breakthroughs in optoelectronics (e.g. near unity internal quantum yield, promising self-healing properties, long-lived charge carriers, etc.) as a direct consequence of a better understanding of the correlation between materials' properties, processing, and device performance. This symposium will focus on both the materials' science and engineering aspects related to the modeling, fabrication, characterization, processing, and stability of halide perovskites. The further advancement of devices relies on developing a detailed understanding of the fundamental physical and chemical processes that occur within these materials. Thus, the symposium welcomes presentations related to the implementation of automated experiments and the use of machine learning toward consistent fabrication of devices and to accelerate the understanding of materials properties/stability, respectively. Further, the realization of advanced characterization methods, including microscopy tools and time-dependent techniques are welcome to this discussion forum as they will enable us quantifying carrier-phonon coupling, ion motion, surface-limited chemical reactions, electrical transient responses, the effects of grain boundaries on device performance, among other phenomena.

Topics will include:

- Synthesis and processing
- Compositional engineering including Sn-Pb alternatives
- Data science, high-throughput, automated, and autonomous experiments
- Characterization methods
- Degradation processes and stability
- Charge carrier dynamics
- Material passivation strategies
- Excitons, phonons, polarons, and carrier-phonon coupling
- Spectroscopy and non-linear optical behavior
- Interfacial engineering in device applications
- Applications: photovoltaics, LEDs, photodetectors, transistors and thermoelectric devices
- PV module testing and reliability

Joint sessions are being considered with **QT01 - Chirality and Spin in Halide Perovskites**.

Invited speakers include:

Antonio Abate	Helmholtz-Zentrum Berlin, Germany
Annalisa Bruno	Nanyang Technological University, Singapore
Tonio Buonassisi	Massachusetts Institute of Technology, USA
David Ginger	University of Washington, USA
Laura Herz	University of Oxford, United Kingdom
Libai Huang	Purdue University, USA
Sergei Kalinin	The University of Tennessee, Knoxville, USA
Hemamala Karunadasa	Stanford University, USA

Yen-Hung Lin	The Hong Kong University of Science and Technology, Hong Kong
Monica Lira-Cantu	Catalan Institute of Nanoscience and Nanotechnology, Spain
Monica Morales-Masis	University of Twente, Netherlands
Annamaria Petrozza	Istituto Italiano di Tecnologia, Italy
Li Na Quan	Virginia Tech, USA
Ted Sargent	Northwestern University, USA
Chenyi Yi	Tsinghua University, China
Ni Zhao	The Chinese University of Hong Kong, Hong Kong

Symposium Organizers

Marina Leite

University of California, Davis
Materials Science and Engineering
USA
Tel (626) 345-4043, mleite@ucdavis.edu

Anita Ho-Baillie

The University of Sydney
Australia
Tel 61-2-8627-8916, anita.ho-baillie@sydney.edu.au

Nakita Noel

University of Oxford
Department of Physics
United Kingdom
Tel +44 (0)1865-272401, nakita.noel@physics.ox.ac.uk

Laura Schelhas

National Renewable Energy Laboratory
USA
Tel (303) 275-3722, Laura.Schelhas@nrel.gov

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL05: Materials and Devices for Neuromorphics, Biohybrid Systems and Smart Sensing

The symposium aims to cover the latest advancements in inorganic and organic materials for bio-inspired information processing, bio-computation, and biosensing, showcasing emerging applications in neuromorphic computing, sensing, actuation, and nanoscale bio-interfacing, along with recent advancements in algorithmic development. To highlight the importance of elements with simultaneous memory and processing capabilities towards in-memory computing, local adaptive bio-interfaces, emphasizing fundamental materials properties, novel devices harnessing physical emergent phenomena, new computing paradigms enabled by unconventional materials, and theory and simulation on materials, devices, and architectures.

Topics will include:

- Bioinspired information processing
- Neuromorphic computing
- Computational primitives for neuromorphic engineering
- Inorganic and organic materials for neuromorphic devices
- Neuromorphic sensing and actuation
- Adaptive bio-interfacing
- Neural interface devices
- Memristive materials/devices at the interface with biology
- Bioelectronics, smart sensors and actuators
- Neuromorphic and memristive sensors and actuators
- Systems neuroscience
- Algorithmic advances for neuro-inspired computing and smart sensing
- Algorithm-hardware co-design for neuro-inspired computing

Invited speakers include:

Fabio Biscarini	Università degli Studi di Modena e Reggio Emilia, Italy
Sandro Carrara	École Polytechnique Fédérale de Lausanne, Switzerland
Erika Covi	University of Groningen, Netherlands
Regina Dittmann	Forschungszentrum Jülich GmbH, Germany
Simone Fabiano	Linköping University, Sweden
Dimitra Georgiadou	University of Southampton, United Kingdom
Aristide Gumyusenge	Massachusetts Institute of Technology, USA
Feng Guo	Indiana University, USA
Hadi Heidari	University of Glasgow, United Kingdom
Sahika Inal	King Abdullah University of Science and Technology, Saudi Arabia
Zeinab Jahed	University of California, San Diego, USA
Dmitry Kireev	University of Massachusetts Amherst, USA
Geert Langereis	imec, Netherlands
Tae-Woo Lee	Seoul National University, Republic of Korea

George Malliaras	University of Cambridge, United Kingdom
Dante Gabriel Muratore	Delft University of Technology, Netherlands
Robert Nawrocki	Purdue University, USA
Andreas Offenhaeusser	Forschungszentrum Jülich GmbH, Germany
Themis Prodromakis	University of Edinburgh, United Kingdom
Shahab Rezaei-Mazinani	École des Mines de Saint-Étienne, France
Jacob Robinson	Rice University, USA
Alberto Salleo	Stanford University, USA
John Paul Strachan	Forschungszentrum Jülich GmbH, Germany
Alec Talin	Sandia National Laboratories, USA
Ilia Valov	Forschungszentrum Jülich GmbH, Germany
Stefano Vassanelli	University of Padova, Italy
Sihong Wang	The University of Chicago, USA
Joshua Yang	University of Southern California, USA

Symposium Organizers

Ioulia Tzouvadaki

Ghent University
Department of Electronics and Information Systems
Belgium
Tel 32-9-264-53-59, ioulia.tzouvadaki@ugent.be

Paschalis Gkoupidenis

Max Planck Institute for Polymer Research
Department of Molecular Electronics
Germany
Tel 49(0)-6131379-605, gkoupidenis@mpip-mainz.mpg.de

Francesca Santoro

Forschungszentrum Jülich GmbH
Germany
Tel 49-2461/61-8786, f.santoro@fz-juelich.de

Yoeri van de Burgt

Technische Universiteit Eindhoven
Institute for Complex Molecular Systems
Netherlands
Tel 31402474419, y.b.v.d.burgt@tue.nl

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL06: 2D Atomic and Molecular Sheets Beyond Graphene—Optical Properties, Optoelectronics and Quantum Optics

The study of two-dimensional (2D) materials is a rapidly evolving and interdisciplinary field, with significant potential to revolutionize various existing and emerging technological areas in the future. This symposium will primarily focus on investigating current and future trends in 2D materials research related to photonics, optoelectronics, and quantum optics research, with a particular emphasis on their potential applications in optoelectronics, advanced light-field control, quantum sensing and information processing, and energy. The symposium will cover various topics, such as novel optical properties in 2D materials, 2D heterostructures and twisted 2-D materials, the scalable fabrication of photonic devices using 2D materials, heterogeneous integration of 2D materials with conventional photonic platforms, 2D energy devices, reconfigurable and intelligent 2D optoelectronic devices, nonlinear optics based on 2D materials, 2D polaritons, and 2D materials based quantum optics for quantum sensing, quantum transduction, and quantum information processing. Experts from multiple fields such as materials science, physics, chemistry, and device engineering will be invited to present their research, facilitating discussions on understanding new optical properties and improving the development of these materials for practical applications.

Topics will include:

- Heterogeneous integration of 2D materials with conventional photonic platforms
- 2D materials devices for optoelectronics, sensors and energy applications
- Scalable 2-D photonic device fabrication and applications
- Novel optical and optoelectronic properties in 2D materials
- Reconfigurable 2D materials devices for advanced light field control
- 2D material quantum optics and devices
- Quantum light-matter interaction in 2D materials
- 2D optical materials: from far-IR to visible
- Polaritons in 2D materials
- Optoelectronics of twisted 2D material systems
- Nonlinear optics in 2D materials

Invited speakers include:

Ritesh Agarwal	University of Pennsylvania, USA	**Frank Koppens**	ICFO–The Institute of Photonic Sciences, Spain
Igor Aharonovich	University of Technology Sydney, Australia	**Mo Li**	University of Washington, USA
Andrea Alu	The City College of New York, USA	**Tony Low**	University of Minnesota, USA
Moshe Ben Shalom	Tel Aviv University, Israel	**Thomas Mueller**	Technischen Universität Wien, Austria
Joshua Caldwell	Vanderbilt University, USA	**Prineha Narang**	University of California, Los Angeles, USA
Alessandra Di Gaspare	Consiglio Nazionale delle Ricerche, Italy	**Jiwoong Park**	The University of Chicago, USA
Kin Chung Fong	Harvard University, USA	**Farhan Rana**	Cornell University, USA
Javier Garcia de Abajo	ICFO–The Institute of Photonic Sciences, Spain	**James Schuck**	Columbia University, USA
Gabriele Grosso	The City College of New York, USA	**Zhipei Sun**	Aalto University, Finland
Tony Heinz	Stanford University, USA	**Haoning Tang**	Harvard University, USA
Alexander High	The University of Chicago, USA	**Chiara Trovatello**	Columbia University, USA
Shengxi Huang	Rice University, USA	**Ziliang Ye**	University of British Columbia, Canada
Ali Javey	University of California, Berkeley, USA	**You Zhou**	University of Maryland, USA
Ido Kaminer	Technion–Israel Institute of Technology, Israel		

Symposium Organizers

Qiushi Guo
CUNY Advanced Science Research Center
Photonics Initiative
USA
Tel (203) 988-7177, qguo@gc.cuny.edu

Doron Naveh
Bar-Ilan University
Israel
Tel 972-35314657, doron.naveh@biu.ac.il

Miriam Vitiello
Istituto Nanoscienze, Consiglio Nazionale delle Ricerche
Italy
Tel 39-050-509791, miriam.vitiello@nano.cnr.it

Wenjuan Zhu
University of Illinois at Urbana-Champaign
USA
Tel (217) 244-9456, wjzhu@illinois.edu

mrs.org/fall2024

2024 MRS FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL07: Emerging Material Platforms and Fundamental Approaches for Plasmonics, Nanophotonics, and Metasurfaces

The symposium will explore emerging topics in plasmonics, nanophotonics, metamaterials, and metasurfaces to overcome limitations in practical photonic device development. It aims to provide an overview of recent advancements in design concepts, material platforms, fabrication techniques, and their promising applications. Novel approaches in plasmonics and metasurfaces offer great potential for generating, processing, sensing, and detecting signals at the nanometer scale in diverse fields such as photovoltaics, optical communications, quantum information processing, bioimaging, lighting, sensing, chemistry, and medicine. The recent discovery of new plasmonic materials, layered materials, and two-dimensional materials with desirable properties like low loss, tunable optics, and CMOS compatibility can pave the way for breakthroughs in nanophotonics, optical metamaterials, and their applications. The symposium also focuses on exploring novel nonlinear and quantum phenomena, as well as advanced designs utilizing machine learning strategies and new simulation methods for metasurfaces, metamaterials, and plasmonic materials/devices.

Topics will include:

- Plasmonics: Fundamental and applications
- Advanced nanophotonics and metamaterials
- Alternative plasmonic materials, epsilon-near-zero materials
- Photonics with 2D Materials; All-dielectric metasurfaces
- Active tunable plasmonics and metasurfaces
- Biological and chemical sensing with plasmonics and nanophotonics
- Topological/Bound state in continuum based on metasurfaces
- Quantum/Nonlinear/Thermal plasmonics and metasurfaces
- Photovoltaic applications and radiation engineering using plasmonics
- Waveguides, devices and systems from plasmonics and nanophotonics
- Plasmonic hot-carriers for photodetection and solar energy harvesting devices
- Ultrafast dynamics of plasmonic nanosystems
- On-demand pulse-shaping with plasmonics and metasurfaces
- Nonreciprocal and non-Hermitian photonic metamaterials and metasurfaces

Invited speakers include:

Andrea Alù	The City College of New York, USA
Harry Atwater	California Institute of Technology, USA
Alexandra Boltasseva	Purdue University, USA
Svetlana Boriskina	Massachusetts Institute of Technology, USA
Mark Brongersma	Stanford University, USA
Federico Capasso	Harvard University, USA
Kuo-Ping Chen	National Tsing Hua University, Taiwan
Mu Ku Chen	City University of Hong Kong, Hong Kong
Dmitri Chigrin	RWTH Aachen University, Germany
Javier García de Abajo	ICFO–The Institute of Photonic Sciences, Spain
Jennifer Dionne	Stanford University, USA
Patrice Genevet	Colorado School of Mines, USA
Seunghoon Han	Samsung Advanced Institute of Technology, Republic of Korea
Ortwin Hess	Trinity College Dublin, The University of Dublin, Ireland
Po-Chun Hsu	The University of Chicago, USA
Min Seok Jang	Korea Advanced Institute of Science and Technology, Republic of Korea
Boubacar Kanté	University of California, Berkeley, USA
Laura Kim	University of California, Los Angeles, USA
Yuri Kivshar	The Australian National University, Australia
Marina Leite	University of California, Davis, USA
Stefan A. Maier	Monash University, Australia
Xingjie Ni	The Pennsylvania State University, USA
Junsuk Rho	Pohang University of Science and Technology, Republic of Korea
Vladimir M. Shalaev	Purdue University, USA
Maxim Shcherbakov	University of California, Irvine, USA
Junichi Takahara	Osaka University, Japan
Jason Valentine	Vanderbilt University, USA
Pin Chieh Wu	National Cheng Kung University, Taiwan
Anatoly Zayat	King's College London, United Kingdom
Yang Zhao	University of Illinois at Urbana-Champaign, USA

Symposium Organizers

Yu-Jung Lu

Academia Sinica
RCAS
Taiwan
Tel 886918342819, yujunglu@gate.sinica.edu.tw

Viktoriia Babicheva

The University of New Mexico
Department of Electrical and Computer Engineering
USA
Tel (765) 714-3768, vbb@unm.edu

Howard Ho Wai Lee

University of California, Irvine
Department of Physics and Astronomy
USA
Tel (949) 824-6911, Howardhw.lee@uci.edu

Melissa Li

California Institute of Technology
USA
Tel (770) 316-9498, mli3@caltech.edu

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EL08: Diamond Functional Devices—From Material to Applications

Diamond represents a unique carbon material owing to its superb material properties. It is often considered as a material with great potential in many areas, with power and RF electronics, heat spreaders, sensors, MEMs, room temperature quantum applications, tissue engineering and catalysis in extreme environments among the most promising. Importantly, these properties can be controlled by judicious selection of the conditions under which the materials are formed. Single crystal diamond, thin diamond, nanodiamond films, and nanoscale diamond powders are attractive for a wide range of applications including high frequency, high power electronic devices, quantum computing, nanoelectronics, platforms for chemical and biological sensing, bio labeling/drug delivery, bioelectronics, electrochemistry, and protective and biocompatible coatings, etc. Fluorescent nanodiamond particles are now being extensively studied within the biotechnology and biomedical communities for use as biocompatible fluorescent markers for biological molecules or specific cells and for targeted drug delivery. In this respect, contributions dealing with the conjugation of biomolecules/drugs of nanodiamond particles are solicited this year. The symposium will bring together scientists and engineers working at the forefront of microscale and nanoscale diamond material research. Papers are solicited in all areas of high-performance sp3 carbon material research and applications, taking into account the unique combination of their superlative properties including radiation hardness, thermal conductivity, mechanical, electrical, optical, and biological properties.

Topics will include:

- Synthesis of diamond with intentional incorporation of defects and dopants
- Fabrication of single crystal diamond membranes with low surface roughness for photonic chip and quantum systems
- Recent advancements in large area homo- and hetero-epitaxial growth of single-crystalline diamond (>2 in)
- Diamond-based hetero-structures in thermionic, photo-induced, and field-emission devices
- Magnetometry and quantitative bio-sensing with color centers in diamond surfaces and particles
- Diamond detectors, field-effect transistors and high-current diodes for semiconductor applications
- Superconductivity in diamond and graphite-diamond hybrids
- Elastic strain band gap engineering in semiconductor diamond
- Biocompatible surface functionalization architectures for diamond in bio-imaging, drug delivery, and quantum sensing
- Nanoscopic diamond powders and films for photocatalytic and electrocatalytic applications
- Boron-doped diamond electrochemical sensors for biomedical and environmental applications
- Fiber-integrated diamond photonic sensors and devices, and luminescent diamond composites

Joint sessions are being considered with **QT04 - Molecular Quantum Systems**.
Also, a **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Daniel Araujo	Universidad de Cádiz, Spain	**Christian Osterkamp**	Universität Ulm, Germany
Alessandro Bellucci	Consiglio Nazionale delle Ricerche, Italy	**Philipp Reineck**	Royal Melbourne Institute of Technology, Australia
Dominik Bucher	Technische Universität München, Germany	**Romana Schirhagl**	Groningen University, Netherlands
Takeshi Kondo	Tokyo University of Science, Japan	**Shimaoka Takehiro**	National Institute of Advanced Industrial Science and Technology, Japan
Anke Krueger	Universität Stuttgart, Germany	**Teraji Tokuyuki**	National Institute for Materials Science, Japan
Karin Larsson	Uppsala University, Sweden	**Moshe Tordjman**	Massachusetts Institute of Technology, USA
Elison Matioli	École Polytechnique Fédérale de Lausanne, USA	**Zuzana Vlcková**	Czech Academy of Science, Czech Republic
Aldona Mzyk	Technical University of Denmark, Denmark	**Jelena Vuckovic**	Stanford University, USA
Naka Nobuko	Kyoto University, Japan		

Symposium Organizers

Chia-Liang Cheng

National Dong Hwa University
Department of Physics
Taiwan
Tel 88638903696, clcheng@gms.ndhu.edu.tw

Robert Bogdanowicz

Gdansk University of Technology
Faculty of Electronics, Telecommunication and Informatics
Poland
Tel 48608079012, robbogda@pg.edu.pl

David Eon

University of Grenoble Alpes
Institut Neel Polytech Grenoble
France
Tel 334-76-88-10-79, david.eon@neel.cnrs.fr

Shannon Nicley

Michigan State University
Fraunhofer USA Center Midwest for Coatings & Diamond Technologies Division
USA
Tel (517) 355-3903, nicleysh@msu.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN01: Light-Harvesting Materials for Efficient and Stable Solar Fuels Production

Artificial photosynthesis represents a promising pathway toward sustainable fuel production, which includes reactions such as water splitting, CO_2 reduction, and organic oxidations to value-added products. A fundamental understanding of the material properties is needed to provide insights into the factors affecting light absorption, catalysis, or degradation mechanisms, which are key for translating this technology from the laboratory scale to practical systems. Accordingly, this symposium will focus on advances in our understanding of the material properties, interfaces, and surfaces of emerging, established, and prospective semiconductors during photochemical and photoelectrochemical reactions or in comparable environments. As such, submissions are particularly welcome on topics including operando material characterization, material and interface modeling, spectroscopic insights into charge recombination, charge transfer and reaction kinetics, and new approaches to material design and discovery. These considerations are applicable to most light absorber families, therefore focused sessions will be dedicated to traditional (oxide, carbon nitride) photo- and photoelectrocatalysts, as well as to chalcogenides, metal halide perovskites, and polymer materials with good prospects. We also welcome submissions from the wider photovoltaics and optoelectronics fields with an emphasis on materials studied under operation in relatively harsh environments of elevated humidity or under reducing/oxidizing atmospheres. The symposium aims to attract a broad audience of researchers working in solar energy conversion on thin film, quantum dot, and other nanostructured light harvesting materials studied in solution and gas-phase environments, making it a fertile ground for cross-disciplinary exchanges that might inspire new material design and characterization directions in solar fuel synthesis.

Topics will include:

- Advances in photocatalysis and photoelectrocatalysis
- Understanding and trajectory of oxide materials in solar fuel production
- Carbon nitride and carbonaceous photocatalysts
- Chalcogenides and halide perovskites in photo(electro)catalysis or other aqueous/high humidity/reducing/oxidizing environments
- Other earth-abundant, emerging materials for photocatalysis and photoelectrocatalysis
- *Operando* material characterization
- Spectroscopic insights into charge recombination, charge transfer and reaction kinetics
- Degradation mechanisms and passivation strategies, insights into the semiconductor-electrolyte interface
- Approaches to material design and discovery

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Demetra Achilleos	University College Dublin, Ireland
Joel Ager	University of California, Berkeley, USA
Fiona Beck	The Australian National University, Australia
Katharina Brinkert	University of Warwick, United Kingdom
Sonya Calnan	Helmholtz-Zentrum Berlin, Germany
James Durrant	Swansea University, United Kingdom
Sixto Giménez	Universitat Jaume I, Spain
Ronen Gottesman	Hebrew University of Jerusalem, Israel
Anna Hankin	Imperial College London, United Kingdom
Robert Hoye	University of Oxford, United Kingdom
Ji-Wook Jang	Ulsan National Institute of Science and Technology, Republic of Korea
Prashant Kamat	University of Notre Dame, USA
Tianquan Lian	Emory University, USA
Jingshan Luo	Nankai University, China
Jonathan Major	University of Liverpool, United Kingdom
Aditya Mohite	Rice University, USA
Annamaria Pettrozza	Istituto Italiano di Tecnologia, Italy
David Tilley	University of Zurich, Switzerland
Aron Walsh	Imperial College London, United Kingdom
Yanfa Yan	The University of Toledo, USA

Symposium Organizers

Ludmilla Steier
University of Oxford
United Kingdom
Tel 447447104432, ludmilla.steier@chem.ox.ac.uk

Virgil Andrei
University of Cambridge
United Kingdom
Tel 447724296697, va291@cam.ac.uk

Rafael Jaramillo
Massachusetts Institute of Technology
USA
Tel (617) 324-6871, rjaramil@mit.edu

Rajiv Ramanujam Prabhakar
Lawrence Berkeley National Laboratory
USA
Tel (510) 646-7980, rprabhakar@lbl.gov

Symposium EN02: Thin Film Chalcogenides for Energy Applications

This symposium will focus on the theory, materials characterization, and electronic performance for thin film chalcogenide-based photovoltaic (PV) and photoelectrochemical (PEC) devices. Chalcogenide-based thin film solar cells have emerged as a genuine alternative to traditional silicon-based cells and have a wider range of applications such as for tandem, indoor-photovoltaics or building integrated PV. The symposium will comprise well-established industrial technologies CIGS and CdTe, along with emerging or high-potential materials such as, but not limited to, CZTS, $Sb_2(S,Se)_3$, SnS, Bi_2S_3, $MoSe_2$, $AgBiS_2$, Cu_2ZnSnS_4, Cu_2BaSnS_4, ketserite inspired compounds and chalcohlaide materials. We will also explore the overlaps where similar thin film chalcogenides are used as the basis for PEC devices for water splitting or CO_2 reduction, a promising approach to mitigate greenhouse gas emissions and produce valuable chemical feedstocks. By considering both applications in the same symposium this will allow valuable discussions about what the two technologies can learn from each other, by identifying common approaches and limitations. The symposium will cover techniques for optimizing material properties and device structures, improving light absorption and charge transport, as well as approaches to mitigate degradation and to identify limiting defect mechanisms.

Topics will include:

- Chalcogenides
- Solar Cells
- Photocatalysis
- Thin Films
- Semiconductors

Joint sessions are being considered with **NM03 - Engineering Ultra-Thin Chalcogenide Films**.

Invited speakers include:

Julian Bachman	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany	**Sascha Sadewasser**	International Iberian Nanotechnology Laboratory, Portugal
Robert Hoye	University of Oxford, United Kingdom	**David Scanlon**	University of Birmingham, United Kingdom
Oliver Hutter	Northumbria University, United Kingdom	**Byungha Shin**	Korea Advanced Institute of Science and Technology, Republic of Korea
Rafael Jaramillo	Massachusetts Institute of Technology, USA	**David Tilley**	University of Zurich, Switzerland
Keith McKenna	University of York, United Kingdom	**Hao Xin**	Nanjing University of Posts and Telecommunications, China
Qingbo Meng	Institute of Physics, Chinese Academy of Sciences, China	**Gang Xiong**	First Solar, USA
David Mitzi	Duke University, USA	**Feng Yan**	Arizona State University, USA
Ilona Oja Acik	TalTech, Estonia	**Yanfa Yan**	The University of Toledo, USA
Alejandro Pérez-Rodríguez	Institut de Recerca en Energia de Catalunya, Spain	**Wooseok Yang**	Sungkyunkwan University, USA
Matt Reese	National Renewable Energy Laboratory, USA	**Shujie Zhou**	University of New South Wales, Australia
Alessandro Romeo	Università degli Studi di Verona, Italy		

Symposium Organizers

Jon Major
University of Liverpool
Physics
United Kingdom
Tel 44-151-7943346, jon.major@liverpool.ac.uk

Natalia Maticiuc
Helmholtz-Zentrum Berlin
Germany
Tel (030)-8062---15698, natalia.maticiuc@helmholtz-berlin.de

Nicolae Spalatu
Tallinn University of Technology
Estonia
Tel 3726203366, nicolae.spalatu@taltech.ee

Lydia Wong
Nanyang Technological University
School of Materials Science and Engineering
Singapore
Tel (65)-6513-8292, lydiawong@ntu.edu.sg

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN03: Emergent Properties in Actinide Materials—Enabling Next-Generation Nuclear Energy Applications

Actinide materials exhibit an unusually large range of unique physical and chemical properties that include electronic, transport, and magnetic properties. The unique characteristics of actinides stem, in part, from the complexities of their *5f* electronic structure, and have opened avenues for the application of actinide materials in many diverse fields ranging from space exploration, neutron detectors, and medical diagnostics. The most prominent application of actinides, however, is in nuclear energy since actinides form the backbone of current and emerging nuclear fission technologies for energy production. With a global concerted effort of achieving net-zero carbon emissions by 2050, advanced nuclear energy technologies are expected to play a vital role in the worldwide energy economy. The success of implementing next-generation nuclear energy technologies relies on key breakthroughs and fundamental discoveries in the physical and chemical behavior of actinide materials. This symposium will focus on the physics, chemistry, and materials science of actinide materials that can enable innovative nuclear energy technologies. Particular emphasis will be laid on novel experimental and modeling approaches that uncover new phenomena at rapid times scales and small length scales, 5f magnetic and electronic behaviors, chemical segregation and radiation damage, and property evolution under extreme temperature, pressure, and radiation extremes.

Topics will include:

- Advanced first-principles modeling and simulation approaches that address many-body effects in actinides
- Novel synthesis methods of actinide materials
- Emergent behaviors of 5f-electron systems at low temperatures and high magnetic fields.
- Large-scale experiments that utilize state-of-the-art photon or X-ray sources for advanced material characterizations
- Defect evolution and chemical segregation in nuclear materials using ultrahigh-resolution microscopy
- Thermal, magnetic, optical, and electronic properties of actinides with potential for advanced nuclear fuel properties

Invited speakers include:

Assel Aitkaliyeva	University of Florida, USA
Lucia Amidani	European Synchrotron Radiation Facility, France
Nicholas Butch	National Institute of Standards and Technology, USA
Lionel Desgranges	Commissariat à l'énergie atomique et aux énergies alternatives, France
Daniel Gregg	Australian Nuclear Science and Technology Organisation, Australia
Jean-Christophe Griveau	European Commission, Germany
Yoshinori Haga	Japan Atomic Energy Agency, Japan
Mingda Li	Massachusetts Institute of Technology, USA
J. Matthew Mann	Air Force Research Laboratory, USA
Binod Rai	Savannah River National Laboratory, USA
James Tobin	University of Wisconsin–Oshkosh, USA
Floriana Tuna	University of Manchester, United Kingdom
Kevin Vallejo	Idaho National Laboratory, USA
Tonya Vitova	Karlsruhe Institute of Technology, Germany
Yanwen Zhang	Idaho National Laboratory, USA

Symposium Organizers

Amey Khanolkar

Idaho National Laboratory
Condensed Matter & Materials Physics Group
USA
Tel (208) 526-3890, Amey.Khanolkar@inl.gov

Miaomiao Jin

The Pennsylvania State University
Ken and Mary Alice Lindquist Department of Nuclear Engineering
USA
Tel (814) 865-4863, mmjin@psu.edu

Xiang Liu

Zhejiang University
School of Physics
China
Tel 86-13774018690, xiang.liu@zju.edu.cn

Eteri Svanidze

Max Planck Institute for Chemical Physics of Solids
Chemical Metals Science
Germany
Tel 49-351-4646-4217, eteri.svanidze@cpfs.mpg.de

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN04: Phase Change Materials for Energy Conversion and Storage

Phase transition in materials can be induced with external stimuli such as heat, light, pressure, and electric and magnetic fields. Phase Change materials (PCMs) therefore have applications in a wide range from sensors to information and energy storage and conversion. This symposium aims to bring different aspects and the multidisciplinary nature of PCM design and applications from theory to experiment together. Both solid-liquid and solid-solid transitions are of interest. PCMs are known for their capability of absorbing and releasing a large amount of thermal energy during phase transitions which have been utilized for thermal storage and heat management in buildings, batteries, and energy conversion technologies such as solar thermal, geothermal, ocean thermal, thermoelectric, and magnetocaloric. They are widely used to minimize energy consumption (e.g., to stabilize the indoor temperature within buildings) or facilitate thermal transport (e.g., micro-encapsulated PCM slurry for enhanced convective cooling). In the context of electrochemical energy storage and conversion devices, a stable temperature range is essential to maximize the capacity and lifespan of the materials in the devices. For example, lithium-ion batteries run at an optimum operating temperature range of 20-50 °C. PCMs with a phase change temperature at this temperature range, such as paraffins, hydrates, and composite materials have been tested and exhibited better heat management compared with forced air convection or conventional coolant. In the context of thermoelectrics, several known phase change materials have shown excellent thermoelectric properties. GeTe is an example of this category where the metavalent nature of the bonds is proposed to be related to both the phase change and the excellent thermoelectric properties. Thermally-induced phase change in FeRh is shown to result in large changes in the Seebeck coefficient and hence an extremely large Thomson coefficient is reported in this material which can be used for the design of Thomson coolers and power generators.

In this symposium, attention will be given to fundamental physics, material design, and the applications of PCMs in energy-related fields, which can help to reduce CO_2 emissions in the long term. This symposium further extends the topics to cover the latest research on novel thermophysical properties of PCM and advanced thermal characterization tools.

Topics will include:

- Phase change materials for thermal energy storage
- Phase change materials for solar thermal energy conversion
- Phase change materials in conjunction with thermal to electrical energy conversion, hybrid device design
- Phase change materials as good thermoelectrics both in having a large thermoelectric and thermomagnetic figure of merit and or in exhibiting a large Thomson coefficient.
- Single crystal to single crystal phase transition: properties, applications, and structure change studies
- Single crystal to amorphous phase transition: properties, applications, and structure change studies
- Ferroelectric Phase Transition enabling pyroelectric modules
- Advanced thermal and material characterization tools to study the phase transition

Joint sessions are being considered with **EL02 - Phase-Change Materials for Brain-like Computing, Embedded Memory and Photonic Applications**.

Invited speakers include:

Seunghyun Baik	Sungkyunkwan University, Republic of Korea
Keivan Esfarjani	University of Virginia, USA
Patrick Hopkins	University of Virginia, USA
Seung Hwan Ko	Seoul National University, Republic of Korea
Sang-Kwon Lee	Chung-Ang University, Republic of Korea
Peiwen Li	University of Arizona, USA
Y. Shirley Meng	The University of Chicago, USA
Takao Mori	National Institute for Materials Science, Japan
Rahul Rao	Air Force Research Laboratory, USA
Sheng Shen	Carnegie Mellon University, USA
Robert Simpson	University of Birmingham, United Kingdom
Kenichi Uchida	National Institute for Materials Science, Japan
Haiyan Wang	Perdue University, USA
Robert Wang	Arizona State University, USA
Mary Anne White	Dalhousie University, Canada
Junqiao Wu	University of California, Berkeley, USA
Matthias Wuttig	Rheinisch-Westfälische Technische Hochschule Aachen, Germany
Ronggui Yang	Huazhong University of Science and Technology, China

Symposium Organizers

Mona Zebarjadi
University of Virginia
Electrical and Computer Eng. & Materials Science Eng.
USA
Tel (434) 924-7532, m.zebarjadi@virginia.edu

Shuo Chen
University of Houston
Physics Department
USA
Tel (713) 743-9135, schen34@uh.edu

Qing Hao
The University of Arizona
Aerospace and Mechanical Engineering
USA
Tel (520) 621-6582, qinghao@arizona.edu

Sunmi Shin
National University of Singapore
Department of Mechanical Engineering
Singapore
Tel 006565166350, mpeshin@nus.edu.sg

Symposium EN05: Electrodes for Chemical and Energy Conversion Technologies

This symposium focuses on the design, synthesis, and characterization of electrode materials for chemical and energy conversion technologies and aims to bring together researchers from the field of materials chemistry, electrochemistry, electrochemical synthesis, and electrocatalysis. In this symposium, we will discuss state-of-the-art electrode materials for chemical and energy conversion technologies with a focus on understanding the electron transfer reaction/mechanism at the electrode/electrolyte interface, focusing on how the choice of the electrode material impacts activity, selectivity, and operational stability. We will further discuss state-of-the-art characterization techniques to study the chemical composition of electrode materials during operation (*operando* and *in situ* measurements) as well as cover recent findings from computational studies addressing fundamental and applied questions of chemical and energy conversion technologies. Submissions of abstracts covering the design, synthesis, and characterization of novel electrode materials are encouraged!

Topics will include:

- Materials chemistry for developing efficient electrodes for chemical and energy conversion technologies
- Next-generation electrode materials for chemical and energy conversion technologies
- Computational chemistry for designing efficient electrodes
- Efficient electrode materials for electrochemical synthesis
- *Operando* characterization of redox-active materials
- Investigation of the electron transfer mechanism for chemical and energy conversion technologies

Invited speakers include:

Sneha Akhade	Lawrence Livermore National Laboratory, USA
Teresa Andreu	Universitat de Barcelona, Spain
Michael Busch	Luleå University of Technology, Sweden
Egon Campos dos Santos	Universidade de São Paulo, Brazil
Tej Choksi	Nanyang Technological University, Singapore
William Chueh	Stanford University, USA
Tomas Edvinsson	Uppsala University, Sweden
Sergey Koroidov	Stockholm University, Sweden
Antoni Llobet	Institute of Chemical Research of Catalonia, Spain
Mathilde Luneau	Chalmers University of Technology, Sweden
Daniel Martin Yerga	University of Jyväskylä, Finland
Tyler Mefford	University of California, Santa Barbara, USA
Miguel Modestino	New York University, USA
Joseph Montoya	Toyota Research Institute, USA
Erin Ratcliff	Georgia Institute of Technology, USA
Jan Rossmeisl	Copenhagen University, Denmark
Paula Sebastian Pascual	KTH Royal Institute of Technology, Sweden
Yang Shao-Horn	Massachusetts Institute of Technology, USA
Magda Titirici	Imperial College London, United Kingdom
Francesca Maria Toma	Helmholtz Center Hereon, Germany
Siegfried Waldvogel	Johannes Gutenberg-Universität Mainz, Germany
Anna Wuttig	The University of Chicago, USA

Symposium Organizers

Alexander Giovannitti

Chalmers University of Technology
Department of Chemistry and Chemical Engineering
Sweden
Tel 0733019906, alexander.giovannitti@chalmers.se

Joakim Halldin Stenlid

KBR Inc., NASA Ames Research Center
Intelligent Systems Division
USA
Tel (650) 293-7688, joakim.halldin.stenlid@nasa.gov

Helena Lundberg

KTH Royal Institute of Technology
Department of Chemistry
Sweden
Tel +4687908125, hellundb@kth.se

Germán Salazar Alvarez

Uppsala University
Sweden
Tel 018-471-2244, german.salazar.alvarez@angstrom.uu.se

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN06: Redox Flow-Based Electrochemical Systems

Redox flow batteries are considered a highly promising approach to stationary energy storage that addresses the intermittency challenge of renewable energies. Although significant progress has been achieved, materials development is a common challenge that has hampered the widespread commercial implementation of this technology. In particular, fundamental understanding of the electrochemical processes and mechanisms by which these systems operate is limited, including experimental and computational approaches for elucidating solvation structures, electrolyte/electrode interfaces, new membranes and electrodes, failure/degradation pathways, and transport properties. This knowledge is critically important to achieve technical breakthroughs that will enable the ubiquitous implementation of these technologies. Moreover, high-level developmental needs have been identified for system-level optimizations of the state-of-the-arts, such as stack prototype, flow field, safety diagnostics, cost analysis, and field analytics. Recently, the redox flow concept has been extended to other fields including solar flow, redox targeting, desalination, carbon capture, flow synthesis, etc. These new applications have opened promising new avenues that have the potential to solve the challenges of these fields. This symposium will encourage the discussion of new concepts and challenges at the cutting-edge of fundamental and applied studies of materials and systems for redox flow-based electrochemical devices. It will also bring together a diverse, international mix of leading researchers and emerging talents to promote further synergy across these fields.

Topics will include:

- Advanced electrolytes and solvation chemistry for flow batteries
- Inorganic, organic, polymeric and suspension redox materials
- Ion exchange membranes and porous separators
- Electrodes and electro-catalysts
- Failure/degradation mechanisms
- Transport of heat, mass, and charge
- Computational modeling
- Flow field design and stack prototyping
- Solar flow batteries
- Redox targeting flow batteries
- Redox flow electrolysis
- Redox flow desalination
- Redox flow CO_2 capture
- Flow synthesis

Invited speakers include:

Ertan Agar	University of Massachusetts Lowell, USA
Michael Aziz	Harvard University, USA
Qing Chen	The Hong Kong University of Science and Technology, Hong Kong
Dafei Feng	University of Wisconsin–Madison, USA
Imre Gyuk	U.S. Department of Energy, USA
Yunlong Ji	University of the Chinese Academy of Sciences, China
Song Jin	University of Wisconsin–Madison, USA
David Kwabi	University of Michigan, USA
Xianfeng Li	Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China
Zhenxing Liang	South China University of Technology, China
Tianbiao Liu	Utah State University, USA
Ellen Matson	University of Rochester, USA
Matthew Mench	The University of Tennessee, Knoxville, USA
Shelley Minteer	The University of Utah, USA
Trung Nguyen	The University of Kansas, USA
Pekka Peljo	University of Turku, Finland
Joaquín Rodríguez-López	University of Illinois at Urbana-Champaign, USA
Ulrich Schubert	Friedrich-Schiller-Universität Jena, Germany
Katheryn Toghill	Lancaster University, United Kingdom
David Waite	University of New South Wales, Australia
Qing Wang	National University of Singapore, Singapore
Wei Wang	Pacific Northwest National Laboratory, USA
Tongwen Xu	University of Science and Technology of China, China
Zhengjin Yang	University of Science and Technology of China, China
Guihua Yu	The University of Texas at Austin, USA
Roswitha Zeis	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Symposium Organizers

Xiaoliang Wei
Purdue University
Mechanical Engineering & Materials Engineering
USA
Tel (317) 274-8983, wei304@purdue.edu

Patrick Cappillino
University of Massachusetts Dartmouth
Chemistry and Biochemistry
USA
Tel (508) 910-6639, pcappillino@umassd.edu

Aaron Hollas
Pacific Northwest National Laboratory
USA
Tel (509) 375-4449, Aaron.Hollas@pnnl.gov

Pan Wang
Westlake University
Chemistry
China
Tel N/A, wangpan@westlake.edu.cn

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN07: Multijunction Devices for Solar Energy Conversion -

Photovoltaics (PV) is currently at an exciting point in its trajectory. Having recently passed 1 TW of installed capacity world-wide, PV is delivering on its promise to supply the globe with clean energy. However, to meet the growing electricity demand that is required to decarbonize multiple sectors, the growth rate must continue to increase for several more decades. Tandem or multijunction solar cells offer the clearest path to high efficiency and high areal energy density photovoltaic energy conversion, with a great deal of recent effort focused on metal halide perovskite materials. Theoretically and at the laboratory scale, increasing the number of junctions is a simple way to create a record-setting device. Tandem devices can be made using sub-cells out of the same material system with tunable bandgaps (e.g all III-V or all-perovskite tandems) or by combining different material systems into “hybrid tandem” devices (e.g. perovskite/Si tandems). There are multiple approaches to interconnecting the sub-cells in a tandem stack that have different trade-offs in terms of efficiency, cost, and manufacturability. There are also other energy conversion applications, such as the photoelectrochemical production of chemical fuels through the reduction of water or CO_2, or thermophotovoltaic devices that can convert heat to electricity.

To continue advances in tandem and multijunction devices, sustained material research in key and emerging areas along the value chain is vital, including: (i) high efficiency device concepts and architectures for multi-junction solar cells; (ii) development of transparent, carrier-selective contact layers and interfaces; (iii) modeling the performance and energy yield of tandem devices; (iv) advances in packaging and outdoor performance of multijunction devices, and (v) unique reliability challenges of tandem devices, particularly those containing metal halide perovskites. The proposed *Multijunction devices for solar energy conversion* symposium focuses on these topics but more generally seeks to encompass any materials research with the potential to advance multijunction devices for energy conversion.

Topics will include:

- Demonstrations of multijunction solar cells and modules
- Novel architectures for tandem/multijunction devices
- Development of new absorber materials (including metal halide perovskites)
- Materials and interfaces for multijunction devices (e.g. passivation layers, transparent conductive oxides)
- Manufacturing considerations for tandem devices
- Novel application for tandem devices (e.g. thermophotovoltaics, photoelectrochemistry using tandem photoelectrodes)
- Modeling approaches for tandem performance (e.g. energy yield modeling)
- Advances in packaging and outdoor performance of tandem/multijunction devices

Joint sessions are being considered with **EL04 - Recent Advances in Hybrid Perovskites**, **EN01 - Light-Harvesting Materials for Efficient and Stable Solar Fuels Production**, and **EN02 - Thin Film Chalcogenides for Energy Applications**.

Invited speakers include:

Steve Albrecht	Helmholtz-Zentrum Berlin, Germany
Henk Bolink	Universitat de València, Spain
Gianlucca Coletti	TNO, Netherlands
Adriene Creatore	Technische Universiteit Eindhoven, Netherlands
Stefaan De Wolf	King Abdullah University of Science and Technology, Saudi Arabia
Marika Edoff	Uppsala University, Sweden
Giles Eperon	Swift Solar Inc., USA
Pilar Espinet Gonzales	The Aerospace Corporation, USA
Tyler Grassmann	The Ohio State University, USA
Zachary Holman	Beyond Silicon, USA

Bill McMahon	National Renewable Energy Laboratory, USA
Laura Miranda	OxfordPV, Germany
Nakita Noel	University of Oxford, United Kingdom
Ulrich Paetzold	Karlsruhe Institute of Technology, Germany
Erin Sanehira	CubicPV, USA
Vera Steinman	First Solar, USA
Eva Unger	Helmholtz Zentrum Berlin, Germany
Menglei Xu	JinkoSolar, China
Xiaodan Zhang	Nankai University, China
Kai Zhu	National Renewable Energy Laboratory, USA

Symposium Organizers

Emily Warren

National Renewable Energy Laboratory
USA
Tel (303) 384-7293, emily.warren@nrel.gov

David P. Fenning

University of California, San Diego
Department of Nanoengineering
USA
Tel (858) 246-0864, dfenning@ucsd.edu

Monica Morales-Masis

University of Twente
Faculty of Science and Technology
Netherlands
Tel 6266074862, m.moralesmasis@utwente.nl

Hairen Tan

Nanjing University
College of Engineering and Applied Sciences
China
Tel 8615895864885, hairentan@nju.edu.cn

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024

Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN08: Materials Design and Discovery for Next-Generation Energy Storage Systems

This symposium will cover material design and discovery for next-generation energy storage systems. Two major parts will be included: 1) novel synthesis and advanced characterization of energy materials and 2) artificial intelligence (AI) / machine learning (ML) assisted discovery of new materials and mechanism study.

The first part highlights efforts to develop new solid-state materials for next generation battery chemistries and their advanced characterizations related . New superionic materials are critical to enabling stable cycling and safe operation of future high-energy-density electrode materials. Furthermore, developing beyond lithium-ion chemistries based on Na, Zn, K, or Al and other working ions requires developing new electrolyte and electrode materials. Symposium contributions should address the fundamental science and technology for materials design and applications and discuss X-ray, electron- and neutron characterization techniques and approaches for electrochemical energy storage applications.

The second part covers the discovery of novel materials via AI/ML and simulation of interfaces and mechanisms that can aid the adoption of next generation energy storage systems. The ambitious goal of decarbonizing our economy relies on the improvement of renewable energy technology, which require the design, discovery and synthesis of new and sustainable materials. AI and ML provide new approaches for accelerating the availability of new energy storage materials, which enables predictive models from existing material data and establish a new understanding of material behavior, ultimately leading to the development of more cost-effective and high-performance energy storage systems. This symposium will provide state-of-the-art modeling, simulation methods, and complex algorithms that have been developed for energy storage materials. The discussion on interface mechanisms study by AI/ML, the phase diagram for new materials, prediction of their properties and synthesizability, and potential applications will also be extensively included. Abstracts will be solicited in the following areas: design and synthesis of superionic conductors, advanced characterizations on structure/interfaces, new materials beyond lithium battery chemistries, AI/ML applications on mechanism study, and new materials discovery for next-generation energy storage systems.

Topics will include:

- Novel superionic conductors for Na, K, Zn etc.
- New design of solid electrolytes and their interfaces with electrodes.
- Interfacial characterization to understand the charge transfer.
- Characterizing fast conducting battery materials and interfaces that are challenging for conventional techniques.
- AI/ML-guided energy storage materials design and characterization.
- Advanced simulations of electrochemical interfaces.

Joint sessions are being considered with **CH01 - *In Situ* Characterization During Thin-Film Processing**.

Invited speakers include:

Wurigumula Bao	The University of Chicago, USA
Anja Bielefeld	Justus-Liebig-Universität Giessen, Germany
Mei Cai	General Motors, USA
Rachel Carter	U.S. Naval Research Laboratory, USA
Miaofang Chi	Oak Ridge National Laboratory, USA
Olivier Delaire	Duke University, USA
Betar Gallant	Massachusetts Institute of Technology, USA
Rafael Gomez-Bombarelli	Massachusetts Institute of Technology, USA
Akitoshi Hayashi	Osaka Prefecture University, Japan
Subramanya Herle	Applied Materials, USA
Maria K. Chan	Argonne National Laboratory, USA
Chen Ling	Toyota Research Institute of North America, USA
Lauren Marbella	Columbia University, USA
Christian Masquelier	Université de Picardie Jules Verne, France
Peter Nellist	University of Oxford, United Kingdom
Shyue Ping Ong	University of California, San Diego, USA
Tod Pascal	University of California, San Diego, USA

Symposium Organizers

Y. Shirley Meng

The University of Chicago
USA
Tel (858) 822-4247, shirleymeng@uchicago.edu

Kelsey B. Hatzell

Princeton University
USA
Tel (609) 258-2980, kelsey.hatzell@princeton.edu

Dan Steingart

Columbia University
USA
Tel (212) 854-1712, dan.steingart@columbia.edu

Kang Xu

SES AI
USA
Tel (240) 483-5168, kang.xu@ses.ai

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN09: Innovations in Materials and Processes for Printed, Flexible and Stretchable Energy-autonomous Sensing Systems

Our current society demands an urgent increase in the efficiency and the sustainability of all processes that surround us, from industries to agriculture and even how we track our health. To optimize and improve those processes, we need to collect as much data as possible, developing and adopting new versatile and ubiquitous sensing systems. Often, we also need coupled actuators triggered by the sensed signals. Concepts like the Internet of Things (IoT), and wearable or plant electronics capitalize on these needs and provide new sensing/actuating technologies with unconventional form factors, such as large-area, mechanical flexibility and/or stretchability, and environmentally friendliness. Nevertheless, such sensors/actuators and the associated electronics that drive and read them require energy. However, plugging them into the grid or to conventional bulky power sources is in most cases not feasible either because the systems are highly distributed or because they need to remain soft and flexible to adapt to curved surfaces or to be worn comfortably. This has triggered the need for suitable energy harvesters and storage systems with compatible form factors. The efficient production of such sensing and actuating systems requires sustainable and low-cost materials, both inorganic and organic/polymeric; as well as techniques to process them, for which solution processing and 2D/3D printing are the most appealing avenues. In this symposium, we provide a venue for discussion of both fundamental and applied research progress in this broad field.

Topics will include:

- Ultra-low power or energy-autonomous flexible, stretchable, and printable sensors and actuators for the body, plants, and other curved surfaces with compatible read-out electronics.
- Flexible, stretchable, and printable energy harvesters such as photovoltaics, thermoelectric, triboelectric, piezoelectric, etc. for the body, plants, and other curved surfaces.
- Flexible, stretchable, and printable energy storage solutions including (super)capacitors, batteries, fuel cells, etc.
- 3D-printed functional materials and devices for energy-efficient sensing, actuating or energy harvesting/storage.
- Flexible, stretchable, and printable autonomous sensing/actuating architectures for wearables and the IoT, including flexible low-power electronics, antennas, etc.
- Large-area sensing and actuating systems, energy harvesters and energy storage solutions for autonomous smart textiles, e-skin and robotic skin.
- Advanced manufacturing techniques for large-area, flexible, stretchable, and printed sensors/actuators, such as 3D printing, roll-to-roll fabrication, etc.

Joint sessions are being considered with **SB10 - Soft Materials for Sensors and Actuators in e-textiles and e-skins**.

Invited speakers include:

Levent Beker	Koc University, Turkey
Paul R. Berger	The Ohio State University, USA
Francesca Brunetti	Università degli Studi di Roma Tor Vergata, Italy
Mario Caironi	Istituto Italiano di Tecnologia, Italy
Ravinder Dahiya	Northeastern University, USA
Simone Fabiano	Linköping University, Sweden
Kenjiro Fukuda	RIKEN, Japan
Martin Kaltenbrunner	Johannes Kepler Universität Linz, Austria
Ying-Chih Lai	National Chung Hsing University, Taiwan
Pooi See Lee	Nanyang Technological University, Singapore
Antonietta Loi	University of Groningen, Netherlands

Tse Nga (Tina) Ng	University of California, San Diego, USA
Thuc-Quyen Nguyen	University of California, Santa Barbara, USA
Almudena Rivadeneyra	Universidad de Granada, Spain
John Rogers	Northwestern University, USA
Francesca Santoro	Rheinisch-Westfälische Technische Hochschule Aachen, Germany
Ravi Silva	University of Surrey, England
Jae Sung Son	Pohang University of Science and Technology, Republic of Korea
Eleni Stavrinidou	Linkoping University, Sweden
Benjamin C. K. Tee	National University of Singapore, Singapore
Andres Vasquez Quintero	Azalea Vision, Belgium
Naveen Verma	Princeton University, USA

Symposium Organizers

Francisco Molina-Lopez

KU Leuven
Materials Engineering
Belgium
Tel 32468073292, francisco.molinalopez@kuleuven.be

Ana Claudia Arias

University of California, Berkeley
USA
Tel (510) 642-1728, acarias@eecs.berkeley.edu

Derya Baran

King Abdullah University of Science and Technology
Saudi Arabia
Tel 966128087238, derya.baran@kaust.edu.sa

Luisa Petti

Libera Università di Bolzano
Faculty of Engineering
Italy
Tel 39-0471-017156, luisa.petti@unibz.it

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN10: Critical Materials for Energy—Extraction, Functionality and Recycling

The goal of this symposium is to provide an interactive forum for scientists from various fields who work towards novel and more efficient extraction and utilization of critical materials and minerals to enable sustainable energy technologies. Critical materials and minerals, including rare-earth elements (REE), platinum group elements (PGE), and lithium/cobalt/nickel that possess unique electronic, magnetic, catalytic, transport, and luminescent properties, are key components of many clean energy and high-tech applications that enable wind turbines, solar panels, electric vehicles, and energy-efficient lighting and transportation for accelerating decarbonization economy and realizing Net-Zero-World ecosystem. However, uneven resource distribution and limited as well as vulnerable supply chains of critical materials pose an immense risk to the development and deployment of clean energy technologies both domestically and globally. Therefore, a sustained, multidisciplinary effort by integrating scientific research and engineering innovation to develop diverse solutions across the materials lifecycle, including mineral processing, materials manufacturing, elemental substitution, efficient use, and end-of-life recycling is timely and highly needed. To address the pressing opportunities and challenges, we envision this symposium to highlight most recent trends in fundamental and applied research on enhancing functional behavior and discovery of new properties of REE/PGE-based materials, mining, harnessing, substituting, and recycling critical materials in a wide range of energy and information technology applications. This symposium will bridge expertise on theoretical materials design, materials synthesis, functional measurement/control, advanced characterization, high-throughput computations and machine-learning/artificial intelligence methods. Particular attention will be paid to advancing our understanding of how critical elements impart materials and molecules the unique properties that are valuable for clean energy and climate solution technologies; predictive design of atom-efficient critical materials for energy and electronic applications; identifying new sources or facilitating reuse and recycling of existing critical materials, and reducing and eliminating the need for critical elements.

Topics will include:

- Extraction and separation of critical elements from natural sources
- Recycling of critical elements from man-made materials and components
- Approaches to energy-efficient and atom-efficient circular economy
- Life cycle analysis and assessment strategies on critical materials for environmental sustainability and socio-economic viability
- Enhanced functional behavior of rare-earth element (REE) and platinum-group element (PGE)-enabled materials in energy technologies
- Progress and challenges with substituting REE/PGE with more abundant elements
- Predictive design of functional materials based on the critical materials
- Methodological advances in synthesis, characterization, theory, high-throughput computations, and data-science approaches
- *In situ* visualization and manipulation of critical elements at heterogeneous interfaces

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Rebecca Abergel	University of California, Berkeley, USA
Laura Calvillo	Università degli Studi di Padova, Italy
Joseph Cotruvo	The Pennsylvania State University, USA
Beatriz Roldan Cuenya	Fritz Haber Institute of the Max Planck Society, Germany
Zdenek Dohnalek	Pacific Northwest National Laboratory, USA
Yingge Du	Pacific Northwest National Laboratory, USA
Livia Giordano	Università degli Studi di Milano-Bicocca, Italy
Graeme Henkelman	The University of Texas at Austin, USA
Hideo Hosono	Tokyo Institue of Technology, Japan
Santa Jansone-Popova	Oak Ridge National Laboratory, USA
Sven Jantzen	Umicore, Germany
Emma Kendrick	University of Birmingham, United Kingdom
Masaaki Kitano	Tokyo Institue of Technology, Japan
Laura Lewis	Northeastern University, USA
Jessica Durham Macholz	Argonne National Laboratory, USA
Judson Marte	MP Materials, USA
Jeremy Mehta	Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, USA
George Schatz	Northwestern University, USA
Rachel Segalman	University of California, Santa Barbara, USA
Marlies Van Bael	Hasselt University, Belgium
Anna Vanderbruggen	Helmholtz-Zentrum Dresden-Rossendorf, Germany
Yan Wang	Worcester Polytechnic Institute, USA
Chao Yan	Princeton NuEnergy, USA
David Yancey	Dow Chemical Company, USA

Symposium Organizers

Chong Liu

The University of Chicago
Pritzker School of Molecular Engineering
USA
Tel (773) 834-5574, chongliu@uchicago.edu

Cristiana Di Valentin

Università degli Studi di Milano-Bicocca
Department of Materials Sciences
Italy
Tel 39-02-6448-5235, cristiana.divalentin@unimib.it

Peter V. Sushko

Pacific Northwest National Laboratory
Physical Sciences Division
USA
Tel (509) 375-3962, peter.sushko@pnnl.gov

Hua Zhou

Argonne National Laboratory
Advanced Photon Source
USA
Tel (630) 252-7139, hzhou@anl.gov

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN11: Nitrogen-doped Carbon—From Fundamental Understanding to Applications in Electrochemical Devices

Nitrogen doping in conductive nanostructures like graphene, carbon nanotubes, and mesoporous carbon has spurred a wide array of research topics, primarily due to the improved electrochemical properties imparted by this doping. The advent of single atom catalysts (SACs) has further highlighted N-doped graphene as an ideal substrate, given its remarkable catalytic activity in electrochemical processes. This encompasses a deep dive into the underlying science of diverse electrochemical processes and reaction mechanisms, understanding the roles played by different nitrogen species within the carbon matrix, and the methodologies to enrich these structures with specific nitrogen species. Such foundational knowledge is increasingly being applied in areas addressing global challenges like environmental remediation through advanced oxidation processes, supercapacitors or zinc-air battery cathodes for energy storage solutions, and fuel cell electrodes in alternative energy conversion devices. These applications necessitate a close association with advanced characterization techniques and theoretical modeling to fully understand the physicochemical attributes of N-doped graphitic structures.

This symposium will serve as an interactive platform for scientists from various disciplines to further our collective understanding of N-doped graphitic nanostructures. The focus is on assembling these materials into functional entities with enhanced electrocatalytic properties, positioning them as viable, Earth-abundant alternatives to precious metal electrocatalysts in various electrochemical processes. It will cover a broad spectrum of topics: from the basic understanding of electrochemical processes and mechanisms to the synthesis and post-treatment of N-doped materials, their assembly into macroscopic functional forms, and the exploration of emerging applications at both atomic and device scales. Emphasis will also be on advanced characterization techniques, first-principles calculations, theoretical modeling, and the role of SACs in this exciting field. Contributions that shed light on the latest concepts and applications of these materials are highly encouraged.

Topics will include:

- Novel experimental synthesis methods or post-treatments to achieve N-doping with selectivity of the N species present.
- Advanced characterization methods for evaluating the structure of N-doped materials.
- *In situ* and *operando* methods for elucidating to formation or degradation of active species.
- Advanced electrochemical microscopy and related techniques for in depth evaluation of the electrochemical activity of the N-doped Carbon materials.
- Dynamic modeling of active nitrogen species or understanding the interactions between the single atoms and their support.
- Electrochemical reactions mechanism elucidation and selectivity (*e.g.* ORR, HER, OER, CO_2RR) on N-doped graphtic nanostructures.
- Assembly methods and novel 3D or 2D assembled architectures of N-doped Graphitic nanostructures into macroscopic materials.
- N-doped materials for energy storage (*e.g.* supercapacitors or zinc-air battery cathodes) or conversion (*e.g.* fuel cells) applications.
- N-doped graphitic materials as electrocatalysts for the generation of environmentally friendly fuels.
- Water quality improvement aided by *on-site* H_2O_2 generation through ORR with N-doped graphitic materials.
- Recent concepts and emerging applications with N-doped graphitic materials at the atomic scale and device level.

Invited speakers include:

Paola Ayala	Universität Wien, Austria
Gabriela Borin	Empa–Swiss Federal Laboratories for Materials Science and Technology, Switzerland
Paula Colavita	Trinity College Dublin, The University of Dublin, Ireland
Lior Elbaz	Bar-Ilan University, Israel
Jingsong Huang	Oak Ridge National Laboratory, USA
Frederic Jaouen	Institut Charles Gerhardt, France
Ulrike Kramm	Technische Universität Darmstadt, Germany
Deborah Myers	Argonne National Laboratory, USA
Teresita Oropeza	Instituto Tecnológico de Tijuana Calzada Del, Mexico
Francisco Ruiz-Zepeda	National Institute of Chemistry, Slovenia
Mauricio Terrones	The Pennsylvania State University, USA
Haotian Wang	Rice University, USA

Symposium Organizers

Jose M. Romo-Herrera

Universidad Nacional Autónoma de México (UNAM)
Centro de Nanociencias y Nanotecnologia
Mexico
Tel 52-646-175-0650---Ext-729, jmromo@ens.cnyn.unam.mx

David A. Cullen

Oak Ridge National Laboratory (ORNL)
Center for Nanophase Materials Sciences
USA
Tel (865) 576-0230, cullenda@ornl.gov

Vincent Meunier

The Pennsylvania State University (Penn State)
Engineering Science and Mechanics
USA
Tel (814) 863-7966, vincent.meunier@psu.edu

Joaquin Rodriguez-Lopez

University of Illinois at Urbana-Champaign (UIUC)
Department of Chemistry
USA
Tel (217) 300-7354, joaquinr@illinois.edu

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium EN12: Scientific Basis for Nuclear Waste Management

Nuclear waste management is a complex and multidisciplinary field that requires scientific expertise, technological advancements, regulatory frameworks, and public involvement. Ongoing research and development efforts aim to enhance understanding of waste management practices, improve and advance novel waste treatment technologies, and explore advanced disposal options to address long-term safety concerns and minimize environmental impacts.

This MRS symposium, first held in 1978, is the premier international meeting to address the fundamental and applied science of materials in the context of the safe and effective management of nuclear wastes. The special topics of interest include material development and characterization, processing, and practical aspects of their deployment. Other topics will address: 1) design, formulation, fabrication, and durability testing of waste forms; 2) effect of disposal conditions and radiation on properties of waste forms; 3) melt processing in joule-heated ceramic melters and cold crucibles, hot isostatic pressing, cementation, and steam reforming; 4) disposal concepts, designs, and materials including container corrosion; 5) engineered barrier systems; 6) radionuclide solubility, speciation, sorption, and migration; 7) methods and techniques, including the development of analytical methods for nuclear forensics advancement; and 8) recent developments and novel techniques in solid and liquid characterization, sensing and monitoring of radionuclides, and modeling tools.

Topics will include:

- Waste forms
- Development and scale up of waste processing technologies
- Behavior of spent nuclear fuel materials in different disposal environments
- Geological disposal of radioactive wastes
- Off-gas management for reprocessing, vitrification, and molten salt reactors
- Strategies, processes and materials for the disposition of plutonium and fissile materials from civil and defense stockpiles
- International research and waste management programs
- Development and enhancement of safeguards concepts
- Cross-cutting topics

Invited speakers include:

Nicolas Dacheux	Université de Montpellier, France
Pavel Ferkl	Pacific Northwest National Laboratory, USA
Stephane Gin	Commissariat à l'énergie atomique et aux énergies alternatives, France
Christophe Jegou	Commissariat à l'énergie atomique et aux énergies alternatives, France
Maik Lang	The University of Tennessee, Knoxville, USA
Thierry Mennecart	Belgian Nuclear Research Centre, Belgium
Gabriel Murphy	Forschungszentrum Jülich GmbH, Germany
Ian Pegg	The Catholic University of America, USA
Karin Popa	European Commission, Germany
Nieves Rodriguez-Villagra	Centre for Energy, Environmental and Technological Research, Spain
Clare Thorpe	University of Sheffield, United Kingdom

Symposium Organizers

Josef Matyas
Pacific Northwest National Laboratory
Radiological Materials & Technology Development
USA
Tel (509) 372-6023, josef.matyas@pnnl.gov

Dan Gregg
Australian Nuclear Science and Technology Organisation
Australia
Tel 61-2-9717-7075, dgg@ansto.gov.au

Philip Kegler
Forschungszentrum Jülich GmbH
Germany
Tel 49-2461-616190, p.kegler@fz-juelich.de

Tomofumi Sakuragi
Radioactive Waste Management Funding and Research Center
Japan
Tel 81-92-802-3492, sakuragi@rwmc.or.jp

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium MT01: Dynamics of Defects Under Extreme Environments

There has been a long-standing notion in the materials science community that materials' functional properties are strongly tied to the underlying defect substructure. Metals, for instance, consist of complex hierarchical networks of crystalline defects (i.e. vacancies, interstitials, dislocation loops, and grain boundaries) that have a strong bearing on the associated mechanical response (hardness, plasticity, fracture toughness, creep properties). Nevertheless, the nature of such inherent microstructure-property correlations under extreme conditions remains elusive to this date. In response to high deformation rates, elevated temperatures, and/or high-dose irradiation effects, crystalline flaws often interplay and evolve in highly nonlinear and stochastic ways, making the property prediction based on structural metrics a formidable task. Empirical frameworks conventionally describe these correlations by a fairly small set of "descriptors" largely ignoring inherent scale hierarchies and intricate topology of defect networks at micro/nano-structural levels. Multi-scale simulations have fairly limited applicability/predictability due to modeling gaps in transferring physics-based information across length/time-scales. Experimental investigations can only explore a small portion of the immense combinatorial space spanned by varying environments and different elemental compositions.

The above limitations demand applications of machine learning (ml) that can help establish robust relationships between defects' heterogeneous microstructure and materials' response within a "microstructural informatics" framework. The latest developments include deep-learned data mining for feature extraction, neural net-based interatomic potentials for complex defects, and graph network representations of heterogeneous microstructures. Obvious questions and challenges have yet to be fully addressed: 1) accurate identification and classification of topological defects through robust ml-based metrics that fully account for associated spatio-temporal variations under extreme conditions 2) construction of efficient ml force fields for strongly interacting defects to model their collective behavior with ab-initio accuracy but beyond atomistic scales 3) applications of ml to bridge existing gaps across scales in physics-based simulations to accelerate the design process of heterogeneous materials and microstructural tailoring 4) leverage the notion of "tractability" and "interpretability" given the multi-combinatorial descriptors' phase space via effective reduced-complexity models and feature engineering leading to the extraction of fundamental physics and underlying mechanisms. To address these challenges, the proposed symposium will aim to conduct a thorough survey of the current state-of-the-art in data mining and pattern detection, feature extraction and analysis, and interpretation of ml predictions relevant to defects' characterization and associated physics under harsh environments. We invite relevant contributions from academia and industry employing advanced computational/experimental techniques powered by ml to explore microstructure-property correlations in a broad range of contexts including chemically complex alloys and composites, amorphous particulate systems, metallic glasses, two-dimensional heterostructures and irradiated materials.

Topics will include:

- Applications of deep learning in image processing of defects, pattern detection, and physics extraction
- Hybrid physics-based machine-learned simulations of complex defects and heterogeneous structures across scales
- Development of machine-learned interatomic potentials via ab initio calculations
- Inverse design and microstructural/topological optimization: data-centric machine learning approaches
- Graph neural networks: micromechanics of defects and property predictions
- Machine-learned microstructural predictors of yielding and failure in heterogeneous systems
- Ml-assisted composition search strategies for targeted functional properties under extreme environments

Invited speakers include:

David Aristoff	Colorado State University, USA	**Mathew Nithin**	Los Alamos National Laboratory, USA
Silvia Bonfanti	National Centre for Nuclear Research, Poland	**Stefanos Papanikolaou**	National Centre for Nuclear Research, Poland
Jacqueline Cole	University of Cambridge, United Kingdom	**Stefan Sandfeld**	Forschungszentrum Jülich GmbH, Germany
Elizabeth Holm	University of Michigan, USA	**Subramanian Sankaranarayanan**	Argonne National Laboratory, USA
Noel Jakse	Université Grenoble Alpes, France	**Jun Song**	McGill University, Canada
Surya Kalidindi	Georgia Institute of Technology, USA	**Thomas Swinburne**	Aix-Marseille Universite, France
Javier Llorca	IMDEA Materials Institute, Spain	**Milica Todorovic**	University of Turku, Finland
Cosmin Marinica	Commissariat à l'énergie atomique et aux énergies alternatives, France	**Blas Uberuaga**	Los Alamos National Laboratory, USA
Normand Mousseau	Université de Montréal, Canada	**Jan Wróbel**	Warsaw University of Technology, Poland

Symposium Organizers

Kamran Karimi

National Center for Nuclear Research
Poland
Tel 222732517, kamran.karimi@ncbj.gov.pl

Mikko Alava

Aalto University
Department of Applied Physics
Finland
Tel 358504132152, mikko.alava@aalto.fi

Joern Davidsen

University of Calgary
Department of Physics & Astronomy
Canada
Tel (403) 210-7964, jdavidse@ucalgary.ca

Enrique Martinez

Clemson University
Department of Mechanical Engineering
USA
Tel (864) 656-5640, enrique@clemson.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium MT02: Machine Learning in Action—Automated and Autonomous Experiments

The conventional materials innovation cycle heavily relies on human decision-making and manual operation of scientific tools, leading to slow progress. Pressing challenges like the electrification of everything, large-scale materials synthesis, waste stream upconversion, and energy conversion and storage demand a transformative approach to accelerate material discoveries. In this symposium, we aim to explore innovative methods that combine experimental automation and machine learning to conduct materials research at or beyond the state of the art. This convergence presents a unique opportunity for machine learning-driven autonomous experimentation, promising improved efficiency, accuracy, and reproducibility in materials synthesis and characterization, thus accelerating breakthroughs in materials and physics.

The symposium's primary focus is on showcasing the applications of machine learning in experimental tasks, with an emphasis on materials synthesis and characterization. The topics to be covered include automated and autonomous experiment workflow design, development of task-specific algorithms for experimentation, high-throughput synthesis and characterization, and the creation of digital twins for laboratories. By bringing together researchers from both the material science and machine learning communities, we aim to facilitate knowledge exchange, share recent advancements, and discuss the opportunities and challenges in this rapidly evolving field.

Topics will include:

- Computer-vision based automated experiments
- Modular high-throughput experiments
- AI-driven autonomous experiments
- Multi-fidelity workflow design
- Algorithms for microscopy, spectroscopy, diffraction, and electrochemical experiments
- Data-driven experiment planning, realization, and review
- Automation beyond the benchtop, integration across the lab and countries
- Digital twins and Ontologies in academic research contexts
- Orchestration of autonomous campaigns with multiple tenants
- Autonomous research data management

Invited speakers include:

Milad Abolhasani	North Carolina State University, USA
Mahshid Ahmadi	The University of Tennessee, Knoxville, USA
Alan Aspuru-Guzik	University of Toronto, Canada
Hannah-Noa Barad	Bar-Ilan University, Israel
Keith Brown	Boston University, USA
John Gregoire	California Institute of Technology, USA
Jason Hattrick-Simpers	University of Toronto, Canada
Kedar Hippalgaonkar	National University of Singapore, Singapore
Pinshane Huang	University of Illinois at Urbana-Champaign, USA
Yoosung Jung	Korea Advanced Institute of Science and Technology, Republic of Korea
Eun-Ah Kim	Cornell University, USA
Alfred Ludwig	Ruhr-Universität Bochum, Germany
Benji Maruyama	Air Force Research Laboratory, USA
Nicola Marzari	École Polytechnique Fédérale de Lausanne, Switzerland
Thomas Morris	Brookhaven National Laboratory, USA
Dan Olds	Brookhaven National Laboratory, USA
Kishna Rajan	University at Buffalo, The State University of New York, USA
Sebastian Siol	Empa–Swiss Federal Laboratories for Materials Science and Technology, Switzerland
Steven R. Spurgeon	Pacific Northwest National Laboratory, USA
Esther Tsai	Brookhaven National Laboratory, USA
Daniela Ushizima	Lawrence Berkeley National Laboratory, USA
Rama K. Vasudevan	Oak Ridge National Laboratory, USA
Yan Zeng	Lawrence Berkeley National Laboratory, USA

Symposium Organizers

Yongtao Liu

Oak Ridge National Laboratory
Center for Nanophase Materials Sciences
USA
Tel (865) 232-5819, liuy3@ornl.gov

Andi Barbour

Brookhaven National Laboratory
USA
Tel (531) 344-3895, abarbour@bnl.gov

Lewys Jones

Trinity College Dublin
Ireland
Tel (353)18961398, lewys.jones@tcd.ie

Helge Stein

Karlsruhe Institute of Technology
Germany
Tel 0731-50-34507, helge.soeren.stein@gmail.com

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium MT03: Synthesis of 2D Materials—Theory and Simulation

The synthesis of 2D materials has attracted significant attention in recent years due to their unique properties and potential applications in various fields such as electronics, energy, and catalysis. The stacked van der Waals heterostructures, in particular, are emerging as a prime candidates for quantum material design. However, the lack of controllable and reproducible synthesis methods is a significant hurdle to their industrial application. This is due to the lack of a comprehensive understanding of crucial growth mechanisms and the absence of real-time in-situ access to growth states for feedback process control. Experimental synthesis of these materials is often done by trial-and-error, leading to low reproducibility and controllability. The objective of this symposium is to bring together experts in the field to discuss theoretical, computational, and machine-learning methods for designing and synthesizing 2D materials beyond graphene.

Theoretical, computational, and machine learning methods and tools can assist and guide the design and synthesis of 2D materials beyond graphene. The symposium aims to focus on these methods at multiple length and time scales to provide a comprehensive understanding of growth mechanisms and enable real-time in-situ access to growth states, particularly it focuses on: (1) Nanoscale atomistic simulations, including density functional theory calculations and molecular dynamics simulations; (2) Mesoscale methods such as phase-field method, understanding the microstructure of 2D materials; (3) Macroscale continuum approaches, coupling thermal and chemical transport equations; (4) Machine learning models of growth and synthesis, providing predictive insights into the growth process.

Topics will include:

- Nanoscale atomistic simulations of the growth, including density functional theory calculations and molecular dynamics simulations
- Mesoscale methods such as phase-field method, understanding the microstructure of 2D materials
- Macroscale continuum approaches, coupling thermal and chemical transport equations
- Machine learning models of growth and synthesis, providing predictive insights into the growth process
- Verification and sensitivity analysis of mathematical and computational models

Invited speakers include:

Hamed Attariani	Wright State University, USA
Vincent Crespi	The Pennsylvania State University, USA
Feng Ding	Ulsan National Institute of Science and Technology, Republic of Korea
Süleyman Er	DIFFER, Netherlands
Samir Farhat	LSPM - CNRS, France
Susan Sinnott	The Pennsylvania State University, USA
Priya Vashishta	University of Southern California, USA
Boris I. Yakobson	Rice University, USA

Symposium Organizers

Kasra Momeni

The University of Alabama
Mechanical Engineering
USA
Tel (205) 348-1079, kmomeni@ua.edu

Long-Qing Chen

The Pennsylvania State University
Department of Materials Science and Engineering
USA
Tel (814) 863-8101, lqc3@psu.edu

Nadire Nayir

University of Istanbul
Department of Physics Engineering
Turkey
Tel +902122853930, nnayir@itu.edu.tr

Jian Wang

Wichita State University
Department of Chemistry and Biochemistry
USA
Tel (316) 978-7411, jian.wang@wichita.edu

Symposium MT04: Next-Generation AI-Catalyzed Scientific Workflow for Digital Materials Discovery

Emerging data-driven techniques based on statistics, machine learning, and artificial intelligence (AI) have shown great potential for improving effectiveness of the scientific workflow in material discovery. To widen their application and speed up material innovation, this symposium aims to bring together researchers from interdisciplinary knowledge domains (materials, engineering, computer science, statistics, and robotics) to discuss the fundamental challenges and innovative methodologies of applying emerging AI algorithms to catalyze the scientific workflow in material discovery. The scope of the discussion includes integration of physics/chemistry laws, human intelligence within AI systems, how emerging AI algorithms can be applied to material design and computation, and how big material data can be visualized. The materials are defined in a wide sense, including the building blocks used to create, e.g., molecules, polymers, or metals, and semiconductors. The broad implications resulting from the fruitful discussions will inspire researchers working across research fields to move forward and promote the basic knowledge development and technology deployment.

Topics will include:

- Physics- and chemistry-informed, explainable machine learning for material development
- High throughput material simulation enabled by machine learning algorithms
- Large language models for materials development
- Generative models for materials design
- Fuzzy AI and AI with human reasoning for materials development
- Human-machine interactions, human-machine hybridized intelligence in materials development
- Data generation & curation
- Data tools (visualization, dimension reduction) and software
- AI ethics

Invited speakers include:

Raymundo Arroyave	Texas A&M University, USA
Alan Aspuru-Guzik	University of Toronto, Canada
Samuel Blau	Lawrence Berkeley National Laboratory, USA
Gerbrand Ceder	University of California, Berkeley, USA
Michele Ceriotti	École Polytechnique Fédérale de Lausanne, Switzerland
Stefano Curtarolo	Duke University, USA
Pascal Friederich	Karlsruhe Institute of Technology, Germany
Janine George	Federal Institute for Materials Research and Testing, Germany
Renana Gershoni-Poranne	Technion–Israel Institute of Technology, Israel
Brian Giera	Lawrence Livermore National Laboratory, USA
Richard Gottscho	Lam Research Corporation, USA
Ganna Gryn'ova	Heidelberg Institute for Theoretical Studies, Germany
Boris Kozinsky	Harvard University, USA
Heather Kulik	Massachusetts Institute of Technology, USA
Ying Li	University of Wisconsin–Madison, USA
Kohei Nakajima	The University of Tokyo, Japan
Kristin Persson	Lawrence Berkeley National Laboratory, USA
Rampi Ramprasad	Georgia Institute of Technology, USA
Semion Saikin	Kebotix, USA
Aron Walsh	Imperial College London, United Kingdom
Tian Xie	Microsoft, United Kingdom

Symposium Organizers

Jian Lin

University of Missouri
Mechanical and Aerospace Engineering
USA
Tel (573) 882-8427, linjian@missouri.edu

Kjell Jorner

ETH Zürich
Chemistry
Switzerland
Tel 41-44-633-35-30, kjell.jorner@chem.ethz.ch

Daniel Tabor

Texas A&M University
Chemistry
USA
Tel (979) 862-8045, daniel.tabor@chem.tamu.edu

Dmitry Zubarev

IBM Almaden Research Center
USA
Tel (435) 764-1903, dmitry.zubarev@ibm.com

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM01: Nanotubes, Graphene and Related Nanostructures

Carbon nanotubes, graphene, and other related nanostructures (including those of boron nitride, and boron), have attracted tremendous attention for their intriguing properties. These nanomaterials have been widely investigated, from theory, synthesis, and characterization to applications in electronic devices, mechanical reinforcement, energy conversion and storage, biological and chemical sensors, etc. This symposium will emphasize the physical, chemical, and biological aspects of these carbon and non-carbon nanostructures as well as emerging technologies that aid in the understanding and preparation of such materials, such as artificial intelligence and additive manufacturing. We will bring together researchers from different disciplines to discuss the fundamental and industrial aspects of theory, synthesis, characterization, chemical and biochemical methods for purification and assembly, toxicity and bio-compatibility, and applications in electronics, chemistry, biochemistry, mechanical reinforcement, etc.

Topics will include:

- Synthesis, doping, and characterization
- Theoretical study of growth, doping, and emerging behavior including electronic and magnetic structure, and properties
- Electron transport and scanning tunneling microscopy studies.
- Machine learning and artificial intelligence
- Energy harvesting, conversion, and storage
- Optical spectroscopy
- Applications in transparent and flexible conductors, actuator, sensor, transistors, etc.
- Molecular approaches for purification, modification, and sorting
- CNT, BNNT as well as their 2D counterpart on biomolecule interactions: biochemical applications and toxicity studies
- Synthesis and characterization of B-C-N thin films and other novel structures, Hierarchical organization
- One-dimensional carbon-based heterostructures including functionalized carbon nanotubes
- Graphene nanoribbons, nanoflakes, and other novel carbon-based nanostructures such as carbyne and graphdiyne

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Placidus B. Amama	Kansas State University, USA
Ardemis Boghossian	École Polytechnique Fédérale de Lausanne, Switzerland
Jeffrey Fagan	National Institute of Standards and Technology, USA
Aaron Franklin	Duke University, USA
Il Jeon	Sungkyunkwan University, Republic of Korea
Tanja Kallio	Aalto University, Finland
Katalin Kamaras	Wigner Research Centre for Physics, Hungary
Efthimios Kaxiras	Harvard University, USA
Mijin Kim	Georgia Institute of Technology, USA
Xuedan Ma	Argonne National Laboratory, USA
Naoyuki Matsumoto	National Institute of Advanced Industrial Science and Technology, Japan
Vincent Meunier	The Pennsylvania State University, USA

Yutaka Ohno	Nagoya University, Japan
Alister Page	The University of Newcastle, Australia, Australia
Swapan Pati	Jawaharlal Nehru Center for Advanced Scientific Research, India
Amitava Patra	Institute of Nano Science and Technology, India
Jiang Pu	Tokyo Institute of Technology, Japan
Rahul Rao	Air Force Research Laboratory, USA
Stephanie Reich	Freie Universität Berlin, Germany
Ming Xu	Huazhong University of Science and Technology, China
Boris Yakobson	Rice University, USA
Yoke Khin Yap	Michigan Technological University, USA
Nazmiye Yapici	StabiLux Biosciences, USA
Chongwu Zhou	University of Southern California, USA

Symposium Organizers

Ranjit Pati
Michigan Technological University
Physics
USA
Tel (906) 487-3193, patir@mtu.edu

Sofie Cambre
University of Antwerp
Belgium
Tel 3232652452, sofie.cambre@uantwerpen.be

Shunsuke Sakurai
National Institute of Advanced Industrial Science and Technology
CNT-Application Research Center
Japan
Tel 81-298614654, shunsuke-sakurai@aist.go.jp

Ming Zheng
National Institute of Standards and Technology
Materials Science and Engineering Division
USA
Tel (301) 975-8995, ming.zheng@nist.gov

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM02: Atomic Precision in Nanocluster Engineering

This symposium will bring together leading experts in atom-precise nanocluster science and engineering. Atomic precision represents the ultimate control over the structure and properties of matter. Advances in synthetic chemistry now enable synthesis of a wide variety of nanoclusters with atom-precise structures and exciting emergent properties, from photoluminescence to enhanced catalytic activity. Emerging research is showing that nanoclusters can serve as synthetic seeds for synthesizing larger nanomaterials and can be assembled into hierarchically-ordered nanocluster superlattices. To fully realize the promise of atom-precise materials systems composed of nanocluster "building blocks," and thereby pave the way for applications in energy, photonics, sensing, and biomedicine, it is critical to bring together complementary expertise in nanocluster synthesis and characterization, computational modeling, materials integration, and emerging applications.

This symposium focuses on the latest advances in atom-precise metal, semiconductor, and carbon nanoclusters and on efforts to harness nanoclusters for higher-order materials and applications. Abstracts are welcomed in the following areas: advanced synthesis methods for atomically precise nanoclusters that increase the level of control over materials structure; computational methods to simulate nanocluster electronic structure, self-assembly, and emergent properties of nanocluster arrays; advanced structural characterization of nanocluster materials including X-ray diffraction and electron or scanning probe microscopies; ultrafast spectroscopy for characterization of ground-state and excited-state properties of atom-precise nanomaterials; applications of nanocluster materials, such as clean energy technologies, biomedical imaging, and sensing. By bringing together synergistic expertise, this symposium aims to catalyze new collaborations and research innovations that will advance the state-of-the-art in nanocluster-based materials.

Topics will include:

- Synthetic control of atomically precise nanoclusters
- Advanced structure determination for nanoclusters
- Advanced computational modeling of nanoclusters
- Ultrafast spectroscopic characterization
- Assembly of hierarchical materials from atom-precise building blocks
- Near-field effects in nanocluster arrays
- Catalytic activity and applications in heterogeneous catalysis
- Photonics applications of nanoclusters
- Biomedical applications of nanoclusters

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Christopher Ackerson	Colorado State University, USA	**Richard Robinson**	Cornell University, USA
Sara Bals	University of Antwerp, USA	**Xavier Roy**	Columbia University, USA
Quiang Cui	Boston University, USA	**Kevin Stamplecoskie**	Queen's University, Canada
Nicola Gaston	The University of Auckland, New Zealand	**Dmitri Talapin**	The University of Chicago, USA
Rebecca Gieseking	Brandeis University, USA	**Tom Vosch**	Copenhagen University, Denmark
Robert Green	Alabama State University, USA	**Tao Wei**	University of South Carolina, USA
Kenneth Knappenberger	The Pennsylvania State University, USA	**Bryan Wong**	University of California, Riverside, USA
Jarad Mason	Harvard University, USA	**Jianping Xie**	National University of Singapore, Singapore
Sara Mason	Brookhaven National Laboratory, USA	**Chenjie Zeng**	University of Florida, USA
Maria Matus	University of Jyväskylä, Finland		

Symposium Organizers

Stacy Copp

University of California, Irvine
Materials Science and Engineering
USA
Tel (949) 824-8181, stacy.copp@uci.edu

Andre Clayborne

George Mason University
Chemistry and Biochemistry
USA
Tel (703) 993-1070, aclaybo@gmu.edu

Matthew Jones

Rice University
Chemistry, Materials Science and NanoEngineering
USA
Tel (713) 348-3489, mrj@rice.edu

Nonappa Nonappa

Tampere University
Materials Chemistry
Finland
Tel 358504728897, nonappa@tuni.fi

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM03: Engineering Ultra-Thin Chalcogenide Films

Layered chalcogenide-based materials have been shown to possess highly sought-after properties such as non-trivial topologies in metals and insulators, superconductivity, semiconductors with high carrier mobilities, piezo- and ferro-electricity, as well as a high performance in opto- and photo-electronics. As much as interest in those materials in the form of ultra-thin films has gained momentum for future high-performing applications, so have efforts of their fabrication and characterization. However, their layered van der Waals nature poses an obstacle for the bottom-up synthesis of large-scale thin film growth of precise thickness. Layer-by-layer growth – a prerequisite to achieve even film coverage with a defined number of layers, is suppressed by the ultra-low surface energy of the van der Waals planes. High-angle rotational domain formation is prevalent due to the weak substrate-film and interlayer interactions across the van der Waals gap. Probing film properties thoroughly in the ultra-thin to single layer limit is time-consuming and expensive. Furthermore, in the ultra-thin limit, defects and impurities stemming from the synthesis process may mask the intrinsic properties of the materials. Achievements in synthesis that translate into progress for device applications are tied to studies of thin film growth kinetics and the properties of ultra-thin films to further our understanding of the early stages of growth. This symposium will bring together a diverse set of researchers – from academia to national labs and fundamental physics and materials science to synthesis and devices – who are at the forefront of advancing the understanding of layered chalcogenide-based materials thin film growth and their potential. We aim to cover the wide range of bottom-up synthesis of layered chalcogenide-based materials chemistries such as mono-, di-, tri-, transition metal-, sesqui-, group-III-, and group-IV-chalcogenides in thin film form, their characterization and potential for applications.

Topics will include:

- Engineering of chalcogenide-based layered thin films and heterostructures – doping, alloying or defect control
- Characterization of thin and ultra-thin films
- Structure-property correlation-electronic, optical, and magnetic properties of layered chalcogenides
- Theory and simulation of chalcogenide thin film growth processes and properties for predictive engineering
- Applications of layered chalcogenide thin films
- Solar Cells
- Photocatalysis

Joint sessions are being considered with **EN02 - Thin Film Chalcogenides for Energy Applications**.

Invited speakers include:

Zakaria Al Balushi	University of California, Berkeley, USA
Nicholas Borys	Montana State University, USA
Kenneth Burch	Boston College, USA
Yufeng Hao	Nanjing University, China
Danielle Hickey	The Pennsylvania State University, USA
Rafael Jaramillo	Massachusetts Institute of Technology, USA
Deep Jariwala	University of Pennsylvania, USA
Kibum Kang	Korea Advanced Institute of Science and Technology, Republic of Korea
Yu Lei	Tsinghua University, China
Saurabh Lodha	Indian Institute of Technology Bombay, India
Marcelo Lopes	Paul Drude Institute for Solid State Electronics, Germany
Nadire Nayir	Istanbul Technical University, Turkey
Tianchao Niu	Institute of International Innovation Beihang University, China
Seongshik Oh	Rutgers University, USA
Frank Peiris	Kenyon College, USA
Michael Pettes	Los Alamos National Laboratory, USA
Lin Wang	Shanghai Jiao Tong University, China
Yuanxi Wang	University of North Texas, USA

Symposium Organizers

Maria Hilse

The Pennsylvania State University
USA
Tel (814) 325-1847, mxh752@psu.edu

Tanushree Choudhury

Indian Institute of Technology Bombay
India
Tel 022-2576-7610, tanuhc@iitb.ac.in

Patrick Vora

George Mason University
USA
Tel (703) 993-4214, pvora@gmu.edu

Xiaotian Zhang

Shanghai Jiao Tong University
China
Tel 86-13851775232, xiaotianzhang@sjtu.edu.cn

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM04: Exploring the Properties and Applications of Freestanding Membranes—From 2D to 3D

The goal of the symposium is to allow the community to come together to advance the freestanding nano-membrane-related research from 2D materials to ultra-thin 3D materials with electronic, photonic, and electrochemical applications. The technological innovation in microelectronic devices has been led by silicon owing to its mature processing, but the increasing demand for ultra low-power electronics and miniaturization urges to develop new types of materials and architectures that have superior performances and properties as well as design flexibility for integration. Recently, emerging freestanding nano-membranes including 2D materials and ultrathin 3D materials have been developed, merging epitaxial complex oxides with the successful methodology from low-dimensional (Van der Waals (VdW) heterostructures) systems as a new material building block to create new functional devices and discover new physical phenomena. The freestanding membranes can substantially bring a new paradigm in the electrical, magnetic, optical, and thermal properties, leading to abundant intriguing functionalities. Thus, a great deal of effort has been made to innovate device architectures. To obtain high-quality freestanding nano-membranes, significant progress has been made in *in situ* growth or *ex situ* transfer techniques. These are critical approaches to obtaining extensive and flexible designs of novel structures. In this symposium, we provide the opportunity for speakers and audience to share their latest progress in the research of novel freestanding thin films, including the methods for synthesis, fabrication, layer lift-off, transfer, and stack as well as their scaling-up for device applications. The symposium will cover a complete range of topics related to various freestanding thin films from fundamentals to applications. Interdisciplinary topics related to physics, materials science, and engineering will be connected by invited talks to accelerate the development of various freestanding nano-membranes and their applications. The session will also be dedicated to motivating discussions toward emerging technology to develop new types of integrated structures using 2D materials, and ultra-thin 3D materials.

Topics will include:

- Remote epitaxy and van der Waals epitaxy of semiconductors, complex oxides, and 2D materials
- Synthesis science with remote epitaxy for novel structures and physical phenomena
- Novel sacrificial layer of complex oxides and semiconductors
- Stacking and twisting of complex oxides and semiconductors
- Layer lift-off technology (mechanical, optical, chemical, and so on)
- Synthesis of various 2D materials and 3D thin films as well as their heterostructures
- The role of interfaces in determining the properties
- Heterogeneous integration of freestanding material films and their applications
- Optical, electrical, and magnetic interaction at the hetero-interface
- Strain engineering in freestanding materials

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Jong-Hyun Ahn	Yonsei University, Republic of Korea	**Yu Jung Lu**	Academia Sinica, Taiwan
Andrea Caviglia	Delft University of Technology, Netherlands	**Judith L. MacManus-Driscoll**	University of Cambridge, United Kingdom
Woo Seok Choi	Sungkyunkwan University, Republic of Korea	**Feng Miao**	Nanjing University, China
Chang-Beom Eom	University of Wisconsin–Madison, USA	**Abdallah Ougazzaden**	Georgia Tech Lorraine, France
Stephen Forrest	University of Michigan, USA	**Aaron Ptak**	National Renewable Energy Laboratory, USA
Rachel S. Goldman	University of Michigan, USA	**Paolo G. Radaelli**	University of Oxford, United Kingdom
Felix Gunkel	Forschungszentrum Jülich GmbH, Germany	**Joan Redwing**	The Pennsylvania State University, USA
Yimo Han	Rice University, USA	**Kate Reidy**	Massachusetts Institute of Technology, USA
Mark Hersam	Northwestern University, USA	**Frances Ross**	Massachusetts Institute of Technology, USA
Harold Hwang	Stanford University, USA	**Jutta Schwarzkopf**	Leibniz-Institut für Kristallzüchtung, Germany
Thomas Sand Jespersen	Technical University of Denmark, Denmark	**Jian Shi**	Rensselaer Polytechnic Institute, USA
Hyun S Kum	Yonsei University, Republic of Korea	**Michel Snure**	Air Force Research Laboratory, USA
Chun Ning Lau	The Ohio State University, USA	**Stephanie Tomasulo**	U.S. Naval Research Laboratory, USA
Kyusang Lee	University of Virginia, USA	**Vincent Tung**	The University of Tokyo, Japan
Xiuling Li	The University of Texas at Austin, USA	**Mona Zebarjadi**	University of Virginia, USA

Symposium Organizers

Jeehwan Kim
Massachusetts Institute of Technology
USA
Tel (617) 253-2883, Jeehwan@mit.edu

Sang-Hoon Bae
Washington University in St. Louis
USA
Tel (314) 935-8693, sbae22@wustl.edu

Ho Nyung Lee
Oak Ridge National Laboratory
USA
Tel (865) 574-9782, hnlee@ornl.gov

Nini Pryds
Technical University of Denmark
Denmark
Tel 4545252525, nipr@dtu.dk

mrs.org/fall2024

2024 MRS FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM05: Structural Control and Design of 2D Layered Materials and Heterostructures Towards Novel Functionalities

The structural control of 2D layered materials and heterostructures plays a crucial role in shaping their physical properties, presenting an exciting avenue for uncovering exceptional characteristics, advancing novel functionalities and developing sustainable electronics. Phase engineering methods allow for fine-tuning the material's electronic properties, such as conductivity, charge carrier mobility and band alignment which are crucial for applications. Extensive phase engineering endeavors encompass a wide spectrum of approaches, ranging from planar control to vertical stacking engineering, leading to the development of multifunctional heterostructures with applications in optoelectronics, energy-efficient memory, and moiré physics. This symposium will explore the structure-property relationship and their functionalities in 2D layered materials and heterostructures, focusing on (a) atomistic modeling to study the formation and stability of various structures during synthesis, fabrication, and external stimuli; (b) engineering methods to control structures; (c) experimental characterization of atomic to mesoscopic structures, revealing new optical, electronic, and spintronic functionalities; and (d) design and implementation of innovative devices based on controllable 2D materials and heterostructures for applications such as neuromorphic computing, high-speed transistors and energy harvesters. Presenters and invited speakers from diverse disciplines such as chemistry, physics, engineering, and materials science will foster enriching interdisciplinary discussions.

Topics will include:

- Structural control techniques for 2D layered materials
- Synthesis techniques for various heterostructures, such as vertical, lateral, wrap-around, and mixed dimensional heterostructures.
- Creating structural and functional properties of 2D materials by external stimuli
- Experimental characterization of structure-property relationships in 2D materials.
- Twistronics and Moire physics of heterostructures
- Heterostructures for applications, including optoelectronics, energy-efficient memory, neuromorphic computing, energy harvesting and photoelectrocatalysis.
- Atomistic modeling to understand the formation and stability of various structures.
- Theoretical understanding of structure-property relationship in heterostructures
- Device structure and modeling

Invited speakers include:

Deji Akinwande	The University of Texas at Austin, USA
Anasori Babak	Purdue University, USA
Hyeonsik Cheong	Sogang University, Republic of Korea
Mark Hersam	Northwestern University, USA
Long Ju	Massachusetts Institute of Technology, USA
Jennie Lau	The Ohio State University, USA
Max Lemme	RWTH Aachen University, Germany
Xiaoqin Li	The University of Texas at Austin, USA
Jun Lou	Rice University, USA
Steven Louie	University of California, Berkeley, USA
Feng Miao	Nanjing University, China
Xiaofeng Qian	Texas A&M University, USA
Joan Redwing	The Pennsylvania State University, USA
Hyeon Suk Shin	Ulsan National Institute of Science and Technology, Republic of Korea
Joonki Suh	Ulsan National Institute of Science and Technology, Republic of Korea
Vincent Tung	The University of Tokyo, Japan
Jun Xiao	University of Wisconsin–Madison, USA
Xiao-xiao Zhang	University of Florida, USA
Yang Zhang	University of Tennessee, USA
Shuyun Zhou	Tsinghua University, China
You Zhou	University of Maryland, USA
Xiaoyang Zhu	Columbia University, USA

Symposium Organizers

Ying Wang

University of Wisconsin–Madison
Electrical and Computer Engineering
USA
Tel (510) 612-2305, y.wang@wisc.edu

Andras Kis

École Polytechnique Fédérale de Lausanne
Switzerland
Tel 41-21-693-39-25, andras.kis@epfl.ch

Lain-Jong (Lance) Li

The University of Hong Kong
China
Tel Pok-Fu-Lam,-Hong-Kong, lanceli1@hku.hk

Hanyu Zhu

Rice University
Materials Science and NanoEngineering
USA
Tel (713) 348-2582, hanyu.zhu@rice.edu

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM06: Emerging Trends in Nano- and Micro-structured Bioinspired Materials

Mimicking and adapting the function of naturally occurring materials to new systems presents opportunities for the sustainable development of highly functional nanomaterials for pressing technological needs. This includes a wide range of both organic/protein-based materials to inorganic nanostructures generated and employed at relatively ambient conditions. This symposium on bioinspired materials would bring together researchers from various fields who are interested in the design, synthesis, and application of nanomaterials that recapitulate the properties and structures found in nature. The talks will focus on experimental synthesis, processing characterization, multi-scale computational modeling, and data science approaches to bioinspired nano- and micro-structured materials based on various building blocks such as proteins, polysaccharides, nucleic acids, and nanoparticles (both inorganic and organic). Contributions that feature the integration of both experiments with computational analyses with validation studies are highly encouraged.

Topics will include:

- Combined experimental and theoretical studies of nano- and micro-structured bioinspired materials
- Theoretically assisted design of biomimetic and bio-inspired materials
- Multi-scale modeling methods of biomimetic, bioinspired, and bioderived systems
- Experiment and simulations of the directed and self-assembly of biopolymers, polymers, and colloids
- Integration of biomolecules into protective matrices (e.g., metal-organic frameworks, composites)
- Incorporating biological or biomimetic function into synthetic materials
- Design of bioinspired hierarchical composites, self-healing materials, superhydrophobic surfaces, adhesives, functional nanocomposites, and biomimetic membranes
- Application of machine learning and data science approaches to the study, understanding, and replication of bioinspired systems and processes

Invited speakers include:

Nurit Ashkenasy	Ben-Gurion University of the Negev, Israel	**Sebastien Lecommandoux**	Université de Bordeaux, France
Helena Azevedo	University of Porto, Portugal	**Andrea Merg**	University of California, Merced, USA
Oleg Gang	Brookhaven National Laboratory, USA	**Valeria Milam**	Georgia Institute of Technology, USA
Dominic Glover	University of New South Wales, Australia	**Fiorenzo Omenetto**	Tufts University, USA
David Kaplan	Tufts University, USA	**Siddharth Patwardhan**	The University of Sheffield, United Kingdom
David Kisailus	University of California, Irvine, USA	**Nathaniel Rosi**	University of Pittsburgh, USA
Abigail Knight	University of North Carolina at Chapel Hill, USA	**Vladimir Tsukruk**	Georgia Institute of Technology, USA

Symposium Organizers

Yaroslava Yingling

North Carolina State University
Materials Science and Engineering
USA
Tel (919) 513-2624, yara_yingling@ncsu.edu

Alon Gorodetsky

University of California, Irvine
USA
Tel (919) 357-6220, alon.gorodetsky@uci.edu

Marc Knecht

University of Miami
USA
Tel (305) 284-9351, knecht@miami.edu

Tiff Walsh

Deakin University
Australia
Tel 61-352-273-116, tiffany.walsh@deakin.edu.au

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium NM07: Building Advanced Materials via Aggregation and Self-assembly

This symposium will cover a broad of topics about building advanced materials using aggregation or self-assembly techniques, both experimental and theoretical. Aggregation and self-assembly play crucial roles in the natural formation of minerals and have become increasingly important in the fabrication of advanced materials at both laboratory and industrial scales. Over time, numerous materials synthesized via these methods have found applications in fields such as biomedicine, energy, environment, catalysis, and optics. For instance, interconnected nanoparticle superlattices fabricated through self-assembly of Fe_3O_4 nanoparticles have been utilized as anodes to enhance lithium-ion battery performance, while advanced luminescent materials have been created through aggregation-induced emission (AIE) of intrinsically non-emissive molecules. However, one of the major challenges facing this rapidly expanding field is the development of a fundamental understanding of aggregation and self-assembly mechanisms, which will be a key focus of the symposium. Contributions to the event will encompass a wide array of topics, including but not limited to: 1) Recent advances in the synthesis of advanced materials using aggregation or self-assembly methods; 2) Investigations into the mechanisms underlying aggregation and self-assembly processes; 3) Observation of these processes via in situ techniques; 4) Theoretical developments on particle-based crystallization; and 5) Materials with AIE and their practical applications. This symposium will provide researchers with updated information on aggregation and self-assembly research. The symposium has also been designed to help experienced researchers deepen their knowledge on the development of new techniques, particularly state-of-the-art *in situ* characterization tools that can aid in understanding aggregation and self-assembly mechanisms.

Topics will include:

- Building advanced materials via cluster, biomaterials or particle aggregation and/or self-assembly
- Observation of the aggregation and/or self-assembly pathways via *in situ* techniques
- Mechanism studies of aggregation or self-assembly pathways
- Control of morphology and size during the synthesis of advanced materials via aggregation and/or self-assembly pathways
- Driving forces for particle interactions
- Fluorescent and phosphorescent AIE-based polymers, oligomers, and molecules
- Design principles and operational mechanisms of the AIE-based molecules
- Biocompatible AIE probes for sensing, imaging, and other biomedical applications
- Applications of these advanced materials in areas of energy, environment, biomedicine, etc.

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Lluis Blancafort	Universitat de Girona, Spain
James De Yoreo	Pacific Northwest National Laboratory, USA
Julia Dshemuchadse	Cornell University, USA
Hongyou Fan	Sandia National Laboratories, USA
Kristen Fichthorn	The Pennsylvania State University, USA
Oleg Gang	Brookhaven National Laboratory, USA
Pupa Gilbert	University of Wisconsin–Madison, USA
Yuning Hong	La Trobe University, Australia
Rongrong Hu	South China University of Technology, China
Cherie Kagan	University of Pennsylvania, USA
Nicholas Kotov	University of Michigan, USA
Eugenia Kumacheva	University of Toronto, Canada
Dongsheng Li	Pacific Northwest National Laboratory, USA
Xiaoding Lou	China University of Geoscience, China
Chad Mirkin	Northwestern University, USA
Jungwon Park	Seoul National University, Republic of Korea
Qian Peng	University of the Chinese Academy of Sciences, China
Kanyi Pu	Nanyang Technological University, Singapore
Andrea Pucci	Università di Pisa, Italy
Eric Rivard	University of Alberta, Canada
Dmitri Talapin	The University of Chicago, USA
Ben Zhong Tang	Chinese University of Hong Kong, China
Wei Tao	Harvard University, USA
Dong Wang	Shenzhen University, China
Xingchen Ye	Indiana University Bloomington, USA
Ali K. Yetisen	Imperial College London, United Kingdom
Haoke Zhang	Zhejiang University, China
Y. Shrike Zhang	Harvard University, USA
Haimei Zheng	Lawrence Berkeley National Laboratory, USA
Minjiang Zhong	Yale University, USA

Symposium Organizers

Xin Zhang
Pacific Northwest National Laboratory
Physical Science Division
USA
Tel (806) 789-0648, xin.zhang@pnnl.gov

Qian Chen
University of Illinois at Urbana-Champaign
Department of Materials Science and Engineering
USA
Tel (217) 300-1137, qchen20@illinois.edu

Sijie Chen
The Chinese University of Hong Kong
School of Life Sciences
Hong Kong
Tel (852) 3943 6255, sijie.chen@cuhk.edu.hk

Bin Liu
National University of Singapore
Department of Chemical and Biomolecular Engineering
Singapore
Tel 65-65168049, cheliub@nus.edu.sg

Symposium PM01: Crystal Clear—Recent Advances in Biogenic and Synthetic, Organic and Inorganic Crystallization

This symposium focuses on the latest advances in crystallization and biocrystallization. The symposium will explore recent discoveries on the fundamentals of crystal nucleation, growth and assembly, from biologically-controlled to bio-inspired systems. Crystallization is a vital process in biological and materials science with countless applications, from classic cements and seashell/bone formation to perovskite solar cells and advanced electronics. Despite its long history, classical theories of crystallization are now being challenged, and the subject continues to evolve at the forefront of emerging fields in materials chemistry. Truly understanding crystallization mechanisms and how to manipulate them is a grand challenge in materials chemistry with significant potential for future developments.

The symposium is structured into four sections, with the first covering our current understanding of crystal nucleation, growth, and assembly. We will address ongoing debates in the field, such as the role of prenucleation clusters in the crystal formation and the multiple pathways involved in crystal growth or assembly. The second section will focus on biogenic crystallization and bio-inspired crystallization, discussing the use of biological strategies to control crystal morphology, orientation, and size, to produce materials with unique and desirable structures and properties. This session highlights recent exciting discoveries in biogenic organic crystallization which unlock the potential to create materials with emergent properties that have not been thought about previously. We are excited to discuss the unifying concepts underpinning biological crystallization in this section. The third section will feature interfaces for crystallization, and the last section will focus on recent advances in characterization techniques to investigate crystal formation. The state-of-the-art characterization tools have advanced the field of crystal nucleation and growth and opened up new areas of research. This section also discusses topics such as new synchrotron applications, microfluidics, and continuous and high throughput crystallization systems. We will also highlight the significant development in electron tomography and in-situ analysis.We are confident that this symposium will provide delegates with the latest insights on crystallization relevant to their research.

Topics will include:

- Classical vs. non-classical nucleation: experiments and modelling
- Particle-mediated crystallization
- Liquid-like materials and amorphous materials
- Biocrystallization: unifying inorganic and organic crystallization
- Emerging properties from biogenic and bio-inspired materials
- Organic-inorganic hybrid materials/composites
- Interfacial and templated crystallization and thin film formation
- *State-of-the-art* characterizations for crystallisation
- Cryo and liquid-phase electron microscopy characterization
- Imaging: electron crystallography and tomography
- Microfluidics, High-throughput screening and continuous crystallisation

Invited speakers include:

Andrew Alexander	The University of Edinburgh, United Kingdom	**Willeim Noorduin**	AMOLF, Netherlands
Henrik Birkedal	Aarhus University, Denmark	**Pablo Piaggi**	Princeton University, USA
James De Yoreo	Pacific Northwest National Laboratory, USA	**Boaz Pokroy**	Technion–Israel Institute of Technology, Israel
Lara Estroff	Cornell University, USA	**Yael Politi**	Technische Universität Dresden, Germany
Kathryn Grendfield	McMaster University, Canada	**Jeffery Rimer**	University of Houston, USA
Dvir Gur	Weizmann Institute of Science, Israel	**Matteo Salvalaglio**	University College London, United Kingdom
Derk Joester	Northwestern University, USA	**Netta Vidavsky**	Ben-Gurion University of the Negev, Israel
Dongsheng Li	Pacific Northwest National Laboratory, USA	**Avital Wagner**	Ben-Gurion University of the Negev, Israel
Marianne Liebi	École Polytechnique Fédérale de Lausanne, Switzerland	**Jessica Walker**	Diamond Light Source, United Kingdom
Nadine Nassif	Sorbonne Université, France	**Stephan Wolf**	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Symposium Organizers

Yi-Yeoun Kim

University of Leeds
School of Chemistry
United Kingdom
Tel 44-1133439407, y.y.kim@leeds.ac.uk

Ling Li

Virginia Tech
Department of Mechanical engineering
USA
Tel (540) 231-9594, lingl@vt.edu

Fabio Nudelman

The University of Edinburgh
School of Chemistry
United Kingdom
Tel 44-131-650-7533, fabio.nudelman@ed.ac.uk

Benjamin Palmer

Ben-Gurion University of the Negev
Department of Chemistry
Israel
Tel 972--864-61184, bpalmer@bgu.ac.il

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium PM02: Additive and Digital Manufacturing of Multifunctional Materials

Progress in additive and digital manufacturing has presented scientists and engineers with a revolutionary capability: the design of novel material systems with tailored, spatially programmed properties and structures. From new bioinspired composites and architected materials to forms of soft robotic and living matter, designer materials assembled through additive and digital means are driving innovations across myriad applications. Still, barriers to continued progress lie in the materials, computational tools, hardware, build resolutions, and throughput of these manufacturing methods. This symposium aims to bring together researchers from materials science and engineering, computational materials design, materials chemistry, and more to share interdisciplinary research and insights to continue advancing materials design through additive and digital manufacturing.

This symposium is structured around three core themes. The first, "New Material Chemistries and Designs", will focus on developments in new chemistries and design strategies tailored for 3D printing and the digital assembly of materials. The second, "Novel Capabilities", will focus on emerging strategies for additively and digitally fabricating materials that overcome current limitations. The third, "Data-Driven Design", will highlight advances in computational materials design and engineering. The symposium will also broadly showcase new opportunities for innovating through additive and digital manufacturing of multifunctional materials.

Topics will include:

- New material functionalities via additive and digital assembly
- Hybrid manufacturing methods for multifunctional materials
- Printing bioinspired, hierarchical, and architected materials
- Chemistry-driven innovations in multi-material printing
- Sustainable materials in additive manufacturing
- Stimuli-responsive adaptive / intelligent soft materials
- High performance 3D-printable polymers
- Multimaterial additive manufacturing methods
- Data-driven, computational design and optimization methods for 3D printing

Invited speakers include:

Alexandra Bayles	University of Delaware, USA	**Jennifer Lewis**	Harvard University, USA
Eva Blasco	Heidelberg University, Germany	**Barbara Mazzolai**	Istituto Italiano di Tecnologia, Italy
J. William Boley	Boston University, USA	**Chad Mirkin**	Northwestern University, USA
Keith Brown	Boston University, USA	**Zak Page**	The University of Texas at Austin, USA
Joseph DeSimone	Stanford University, USA	**Emily Pentzer**	Texas A&M University, USA
Julia Greer	California Institute of Technology, USA	**Shu Yang**	University of Pennsylvania, USA
Mina Konaković Luković	Massachusetts Institute of Technology, USA	**Xiaoyu Zheng**	University of California, Berkeley, USA

Symposium Organizers

Ryan Truby

Northwestern University
USA
Tel (847) 467-2341, rtruby@northwestern.edu

Grace Gu

University of California, Berkeley
USA
Tel (510) 643-4996, ggu@berkeley.edu

Yu Jun Tan

National University of Singapore
Singapore
Tel n/a, yujuntan@nus.edu.sg

Daryl Yee

École Polytechnique Fédérale de Lausanne
Switzerland
Tel 41-21-693-17-45, daryl.yee@epfl.ch

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium PM03: Plasmas for Materials Science—Opportunities at the Interface

Plasmas are unique tools for materials science in terms of both versatility and complexity. Plasma-enhanced processes have been crucial for the growth of the semiconductor industry. Today, plasmas continue to be at the cutting edge of materials research. Their use for atomic layer deposition and etching, for the processing of 2D materials, and for the synthesis of materials for quantum computing underscores their critical role in the microelectronics industry. Their inherent state of thermodynamic non-equilibrium sets them apart from any other materials processing technique, enabling access to materials that would be otherwise unachievable. These novel materials offer immense potential in applications such as photonics, energy storage, and biotechnology, among others. Exciting new opportunities are being explored with respect of driving surface chemistry on plasma-exposed catalysts and initiating electrochemical reactions in liquids.

This symposium will bring together the diverse group of researchers, from both academia and industry, that dedicate their efforts to plasma science and technology at the forefront of materials research. It will provide them with an opportunity to showcase their most recent contributions related to plasma-material interfaces. The complexity of these interfaces creates a vast opportunity for discovery, and the growing prevalence of plasma science in materials fields confirms the importance of this area. This symposium will include topics that relate to diagnostics of the plasma-materials interface, ab-initio atomistic modelling of materials under plasma exposure, use of machine learning to investigate interfacial phenomena, and finally the leveraging of the interface to achieve materials with new functionalities.

Topics will include:

- Plasma for 2D materials synthesis and processing
- Plasma synthesis and processing of nanomaterials and quantum materials
- Modelling of plasma-materials interaction
- Plasma synthesis and processing of materials for energy harvesting and storage
- Plasma catalysis and plasma synthesis of materials for catalysis
- Machine Learning and artificial intelligence for autonomous plasma processes
- Diagnostics and fundamental plasma science at materials interfaces
- Plasma surface and interface engineering
- Plasma synthesis and processing of materials for extreme conditions
- Plasma processes for biosensors and biomaterials

Invited speakers include:

Peter Bruggeman	University of Minnesota, USA	**Taesung Kim**	Sungkyunkwan University, Republic of Korea
Emily Carter	Princeton University, USA	**Mark Kushner**	University of Michigan, USA
Fabio Di Fonzo	X-nano Srl, Italy	**Claudia Lopez-Camara**	Technische Universiteit Eindhoven, Netherlands
Zachary Holman	Arizona State University, USA	**Gottlieb Oerhlein**	University of Maryland, USA
Brian Jurczyk	Starfire, USA	**Alok Ranjan**	Advanced Materials, USA
Holger Kersten	Christian-Albrechts-Universität zu Kiel, Germany	**Mohan Sankaran**	University of Illinois at Urbana-Champaign, USA
Erwin Kessels	Technische Universiteit Eindhoven, Netherlands	**Sedina Tsikata**	Georgia Institute of Technology, USA
Tae-hee Kim	Wonkwang University, Republic of Korea	**Meng-Jiy Wang**	National Taiwan University of Science and Technology, Taiwan

Symposium Organizers

Lorenzo Mangolini

University of California, Riverside
USA
Tel (612) 242-1961, lmangolini@engr.ucr.edu

Rebecca Anthony

Michigan State University
USA
Tel (517) 432-7491, ranthony@msu.edu

I-Chun Cheng

National Taiwan University
Taiwan
Tel +886-2-33669648, iccheng@ntu.edu.tw

Davide Mariotti

Ulster University
United Kingdom
Tel 442895365266, mariute@gmail.com

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium QT01: Chirality and Spin in Halide Perovskites

Halide perovskites have emerged as a new class of semiconductors with exceptional material properties, making them promising candidates for a plethora of spin- and optoelectronic applications. Despite their rapid development, halide perovskites remain highly enigmatic, simultaneously featuring properties reminiscent of organic and traditional inorganic semiconductors. The origin and extent of novel features, such as defect tolerance or high ion mobility, are not fully understood. Even much less is known about these materials with respect to the influence of structural chirality on their properties. Spin properties in halide perovskites are in early infancy, despite their great potential due to an inverted spin-orbit coupling structure originating from lead atoms as well as chirality. To date, a lack of comprehensive insight into the interplay between structure and morphology, composition, dimensionality, and impact of electronic and phononic response in these materials, impedes the further advancement of halide perovskites for spin-optoelectronic applications.

This symposium will be a platform for researchers whose work addresses underlying fundamental material aspects related to chirality and spin in halide perovskites. Research topics covered in the symposium will include, among others, the latest advances in photophysics, charge and spin transport, ultrafast spectroscopy, band-structures and spin textures, phonon-carrier interactions, magneto-optical properties, circularly polarized light emission, and mapping/imaging techniques. As the prevalence of individual features can depend on the perovskite morphology, submitted abstracts may focus on bulk-like 3D thin films and single crystals or explore low-dimensional structures, such as 2D Ruddlesden-Popper phases or nanocrystals. Sessions focusing on the theoretical description of these phenomena and the development of new computational methods and approaches, for example, machine learning, will complement the experimental parts of this symposium.

Topics will include:

- Chiral perovskites: synthesis & properties
- Experimental & computational characterization of charge & spin transport
- Ultrafast processes in halide perovskites (hot carriers, localization, spin depolarization etc.)
- Micro- and nano-scale imaging of perovskites
- Coupling of charge carriers, excitons, phonons, polarons to spin
- Low-dimensional perovskites (nanocrystals, layered perovskites, 2D heterostructures)
- Magnetic dopants and their spin-properties
- Band structure calculations & theoretical modelling of optoelectronic properties; materials discovery
- Emerging properties & applications (ferroelectricity, polaritonics, chiral light emission, quantum applications, etc.)

Joint sessions are being considered with **EL04 - Recent Advances in Hybrid Perovskites**.

Invited speakers include:

Michal Baranowski	Politechnika Wroclawska, Poland
Matthew Beard	National Renewable Energy Laboratory, USA
Daniel Gamelin	University of Washington, USA
Libai Huang	Purdue University, USA
Young Chul Jun	Ulsan National Institute of Science and Technology, Republic of Korea
Maksym Kovalenko	ETH Zürich, Switzerland
Leeor Kronik	Weizmann Institute of Science, Israel
Dennis Kudlacik	Technical University of Dortmund, Germany
Linn Leppert	University of Twente, Netherlands
Dehui Li	Huazhong University of Science and Technology, China
Efrat Lifshitz	Technion–Israel Institute of Technology, Israel
Haipeng Lu	The Hong Kong University of Science and Technology, Hong Kong
David Mitzi	Duke University, USA
Angshuman Nag	Indian Institute of Science Education and Research, Pune, India
Barbara Pietka	University of Warsaw, Poland
Yuan Ping	University of Wisconsin–Madison, USA
Peter Sercel	Center for Hybrid Organic Inorganic Semiconductors for Energy, USA
Dali Sun	North Carolina State University, USA
Shuxia Tao	Technische Universiteit Eindhoven, Netherlands
Zhi-Gang Yu	Washington State University, USA

Symposium Organizers

Sascha Feldmann

École Polytechnique Fédérale de Lausanne
USA
Tel (617) 798-0967, sascha.feldmann@epfl.ch

Volker Blum

Duke University
Thomas Lord Department of Mechanical Engineering and Materials Science
USA
Tel (919) 660-5279, volker.blum@duke.edu

Paulina Plochocka

Centre National de la Recherche Scientifique
Laboratoire National des Champs Magnétiques Intenses
France
Tel 33-562-17-28-62, Paulina.plochocka@lncmi.cnrs.fr

Tze Chien Sum

Nanyang Technological University
Singapore
Tel 65-6316-2971, tzechien@ntu.edu.sg

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium QT02: Interfaces in Spintronics

Interfaces between materials that are characterized by different chemical, structural, magnetic, and/or (magneto)-transport properties play a crucial role in *spintronics*. In fact, the functionalities of any spintronic device are intimately interlaced with the electron's spin degree of freedom, and with its control and/or creation and/or manipulation across interfaces between neighboring materials. The symposium will discuss the development of novel materials (topological matter, low-dimensional ferromagnets, Heusler alloys, high T_C superconductors, emerging ferroics, …) and their interfacing towards their use in spintronic devices. The constant decrease in devices' dimensions brings to the point where the interfaces become the device. It is therefore of paramount importance to achieve an increasingly high control on their quality and understanding of their physical properties. Within this symposium, contributions focusing on understanding the direct link between interface properties in driving devices' functionalities are very welcome, together with studies addressing the comprehensive characterization of interfaces by making use of wide range of analytical tools, such as (but not limited to) spin-orbit torque, terahertz spectroscopy, ferromagnetic resonance, hyperfine methods, synchrotron-based techniques, ... Thanks to the expected highly multidisciplinary contributions, the symposium will serve as a basis to establish fruitful connections among research groups with complementary expertise, thus bringing the community towards fruitful collaborations with the aim of addressing present and future open questions in spintronics, and to shape the next generation of spintronic devices.

Topics will include:

- Heterostructures combining topological matter, multiferroics, high temperature superconductors, 2D materials, synthetic antiferromagnets
- Spintronic devices: magnetic tunnel junctions, SOT-MRAM, racetracks, MESO device, spin logic, probabilistic and neuromorphic computing
- Spin-Charge interconversion phenomena
- Skyrmions' hosting systems
- Topological superconductivity for quantum applications
- Interface-sensitive methods (experiment and theory)
- Magneto-electric effects at interfaces
- Light effects on interface properties
- Magneto-ionic effects at interfaces
- Tailoring magnetic properties with molecules

Invited speakers include:

Johan Akerman	University of Gothenburg, Sweden
Onur Can Avci	ICMAB-CSIC, Spain
David Awschalom	The University of Chicago, USA
Agnes Barthelemy	CNRS/Thales, France
Geoffrey S.D. Beach	Massachusetts Institute of Technology, USA
Saroj Prasad Dash	Chalmers University of Technology, Sweden
José Maria De Teresa	INMA Facultad de Ciencias, Spain
Valentin Alek Dediu	Consiglio Nazionale delle Ricerche, Italy
Atanasious Dimoulas	INN, Greece
Shunsuke Fukami	Tohoku University, Japan
Eric Fullerton	University of California, San Diego, USA
Marcos H. D. Guimarães	University of Groningen, Netherlands
Luis E. Hueso	CIC nanoGUNE, Spain
Benjamin Jungfleisch	University of Delaware, USA
Andrew Kent	New York University, USA
Mathias Kläui	Johannes Gutenberg-University, Germany
Xiaoqin Elaine Li	The University of Texas at Austin, USA
Robert G. Moore	Oak Ridge National Laboratory, USA
Branislav Nikolic	University of Delaware, USA
Stuart Parkin	Max Planck Institute of Microstructure Physics, Germany
Ramamoorthy Ramesh	University of California, Berkeley, USA
Dafine Ravelosona	Université Paris-Saclay, France
Evgeny Tsymbal	University of Nebraska, USA
Sergio Valenzuela	ICN2, Spain
Peng Xiong	Florida State University, USA
Hongxin Yang	Zhejiang University, China
Lijun Zhu	Institute of Semiconductors, Chinese Academy of Sciences, China

Symposium Organizers

Roberto Mantovan
Consiglio Nazionale delle Ricerche
Unit of Agrate Brianza
Italy
Tel 00390396037624, roberto.mantovan@cnr.it

Tobias Kampfrath
Freie Universität Berlin
Department of Physics
Germany
Tel 49-30-838-63747, tobias.kampfrath@fu-berlin.de

Chiara Ciccarelli
University of Cambridge
Cavendish Laboratory
United Kingdom
Tel 44-(0)1223-337200, cc538@cam.ac.uk

Jianhua Zhao
Institute of Semiconductors, Chinese Academy of Sciences
State Key Laboratory of Superlattices and Microstructures
China
Tel 86-10-8230-4998, jhzhao@semi.ac.cn

Symposium QT03: Topological Materials—Growth, Theoretical Models and Applications

Topological materials are a new class of materials that can, thanks to their extraordinary properties, project us in the Beyond CMOS world. The symposium will cover the growth, the theoretical models on physics and the applications for topological materials. The first part will focus on the growth of this new kind of exotic materials. The growth of a new generation of topological materials, which is one of the fundamental aspects to trigger the discovery of new phenomema, will be presented and will have an important place. We will highlight the issues concerning the capacity to obtain materials that do not react with ambient environment using opportune protection without changing the materials properties and their functionalization for band gap engineering. The second part of the symposium will deal with the theoretical models explaining the topological behavior. A part will be devoted to the way and the conditions for the Quantum Spin Hall effect (QSH) to take place in 2D and 3D Topological insulators and also to new topological features in Weyl semimetal. Theoretical models that will link the QSH with other properties, such as ZT (figure of merit) for Thermoelectrics (TE) materials will be also be highlighted. The way to decouple phonon and charge in these materials exploiting functionalization or adding defects will be pointed out in this session. In the third part of the symposium, first applications of these materials will be presented. Computational materials contributions thta deal with the prediction of new topological materials will also been considered. Topological materials can be a game changer in different fields such as TE with large ZT (i.e. avionics, space, energy consumption reduction in new intelligent buildings), new forms of quantum computing/memories at subatomic level and beyond CMOS electronics exploiting spin transport with very low energy consumption. From the point of view of low TRL physics, we can also consider the potential for Majorana Fermion detection that can be implemented with 3D topological insulators. Abstract discussing potential applications but also exploratory research in these fields will be strongly solicited.

Topics will include:

- Growth of topological materials, Chemical synthesis approach for topological materials, Ambient stability of topological materials
- Surface functionalization, Theoretical modelling of topological materials, Quantum transport
- Thermoelectric properties and devices, Sub-atomic quantum computing based on materials
- Beyond CMOS electronics based on topological materials, Topological effects and strain
- Topological insulators, Weyl semimetals, Computational materials predictive model

Invited speakers include:

Gabriel Aeppli	ETH Zürich, Switzerland
Pantelis Bampoulis	University of Twente, Netherlands
Claudia Felser	Max Planck Institute for Chemical Physics of Solids, Germany
Lydie Ferrier	INSA Lyon, France
Benedetta Flebus	Boston University, USA
Duncan Haldane	Princeton University, USA
Zahid Hasan	Princeton University, USA
Thomas Heine	Technische Universität Dresden, Germany
Mathieu Jamet	Commissariat à l'énergie atomique et aux énergies alternatives, France
Charles Kane	University of Pennsylvania, USA
Alessandra Lanzara	Lawrence Berkeley National Laboratory, USA
Gil-Ho Lee	Pohang University of Science and Technology, Republic of Korea
Frederic Leroy	Aix-Marseille Université, France
Mingda Li	Massachusetts Institute of Technology, USA
Eugene J Mele	University of Pennsylvania, USA
Laurens W. Molenkamp	Julius-Maximilians-Universität Würzburg, Germany
Jagadeesh Moodera	Massachusetts Institute of Technology, USA
Lukas Muechler	The Pennsylvania State University, USA
Camelia Prodan	New Jersey Institute of Technology, USA
Raquel Queiroz	Columbia University, USA
niels schroeter	Max Planck Institute, Germany
Susanne Stemmer	University of California, Santa Barbara, USA
Alberto Verdini	Consiglio Nazionale delle Ricerche, Italy
Maia G. Vergniory	Donostia International Physics Center, Spain
Hanno Weitering	The University of Tennessee, Knoxville, USA
Justin Wells	University of Oslo, Norway
Bohm Jung Yang	Seoul National University, Republic of Korea
Junji Yuhara	Nagoya University, Japan

Symposium Organizers

Paolo Bondavalli

Thales
France
Tel 0033640595198, paolo.bondavalli@thalesgroup.com

Nadya Mason

The University of Chicago
Pritzker School of Molecular Engineering (PME)
USA
Tel 773.834.2943, nmason1@uchicago.edu

Marco Minissale

Aix-Marseille Université
PIIM
France
Tel 003313946454, marco.MINISSALE@univ-amu.fr

Pierre Seneor

Université Paris-Saclay
Albert Fert Laboratory
France
Tel 0033 1 69 41 58 66, Pierre.seneor@cnrs-thales.fr

mrs.org/fall2024

2024 MRS FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium QT04: Molecular Quantum Systems

Quantum technologies are expected to revolutionize the way in which we process, communicate and secure information, and provide novel methods to detect fields and analytes with unprecedented sensitivity. However, current quantum technology platforms face challenges related to scalability, positioning of individual qubits, and the influence and correction of errors. To overcome these challenges, molecular qubits, which can be tailored with atomic precision, and lattice defects in wide bandgap semiconductors offer promising solutions. Besides, they are fascinating systems for research, with a focus on controlled formation of spin qubits and external error resilience. In the case of molecules, chemical design and synthesis afford creating highly reproducible, yet also tunable, spin qubits, enable accurately positioning and assembling them within each molecule, but also in large 3D or 2D arrays, and can engineer states that allow an efficient control and readout, e.g. by optical addressing.

The symposium will cover the latest advances in the fabrication and characterization of atomic and molecular qubits and their potential applications in quantum technology. Topics include the design and synthesis of molecular magnets and atomic defects in solids, their spectroscopic and theoretical investigation, as well as potential applications in quantum sensing. The development of hybrid qubit systems and the implementation of spin-photon interfaces for quantum control, communication, and computing will also be discussed.

Experts from different fields including chemistry, physics, and engineering will come together to provide a comprehensive overview of the current state-of-the-art in the field, discuss future challenges and opportunities, and inspire new collaborations and directions for future research.

Topics will include:

- New molecular quantum bits with improved coherence times
- Few-qubit molecular quantum systems: design, synthesis, characterization, quantum gate operations
- Molecular qubit arrays, local addressing
- Investigation of decoherence mechanisms, decoherence free subspaces
- Optimal control of molecular quantum bits
- Optically addressable molecular quantum bits
- Electrical addressing of molecular quantum bits
- Strong coupling phenomena with molecular quantum bits
- Molecular quantum bit devices
- Quantum sensing, simulation, and computing with molecular quantum bits
- Color centers as atomic defects in diamond and related materials (in joint session with diamond symposium)

Joint sessions are being considered with **EL08 - Diamond Functional Devices—From Material to Applications**.
Also, a **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Ken Albrecht	Kyushu University, Japan	**Shang-Da Jiang**	South China University of Technology, China
David Awschalom	The University of Chicago, USA	**Heike Riel**	IBM Research-Zurich, Switzerland
Paola Cappelaro	Massachusetts Institute of Technology, USA	**Mario Ruben**	Karlsruhe Institute of Technology, Germany
Eugenio Coronado	Universitat de València, Spain	**Roberta Sessoli**	Universita degli Studi di Firenze, Italy
Selvan Demir	Michigan State University, USA	**Floriana Tuna**	The University of Manchester, United Kingdom
Emrys Evans	Swansea University, United Kingdom	**Joris van Slageren**	University of Stuttgart, Germany
Giulia Galli	The University of Chicago, USA	**Joseph Zadrozny**	Colorado State University, USA
Stephen Hill	Florida State University, USA		

Symposium Organizers

Anke Krueger

Universität Stuttgart
Institute of Organic Chemistry
Germany
Tel 4971168564288, anke.krueger@oc.uni-stuttgart.de

Alexander J C Kuehne

Ulm University
Institute of Organic Chemistry
Germany
Tel 497315022870, alexander.kuehne@uni-ulm.de

Danna E Freedman

Massachusetts Institute of Technology
Department of Chemistry
USA
Tel (857) 225-4540, danna@mit.edu

Fernando Luis

Universidad de Zaragoza
Instituto de Nanociencia y Materiales de Aragón, Quantum Materials and Devices
Spain
Tel 34-876-553342, fluis@unizar.es

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium QT05: Quantum Phenomena, Measurements and Engineering in Materials

Solid-state materials set the ideal platform for future devices with quantum applications, such as quantum computing, quantum simulations, quantum communications, and quantum sensing. This rapidly evolving field calls for profound understanding of quantum phenomena in materials and quantitative measurements of entanglement in real time and in operando. Together with these understanding and measurements comes the engineering and design of quantum materials. This includes the design of new material structures exhibiting novel quantum phenomenon and the control of existing quantum materials for application purpose. All these quantum material applications have been driven by the synergy of experiments and theory in recent decade. Given these rapidly evolving applications, we feel obliged to organize a symposium to address the three aspects of quantum materials and how these research studies can lead to new revolutions in industry. We envision this first part of this symposium to highlight the most recent progress in novel quantum phenomenon in materials with, such as topological superconductivity, quantum spin liquidity, many-body localization, and Wigner crystallization. This symposium should also cover as it second objective the experimental techniques for quantum materials characterization and theoretical proposals about for novel quantum measurements, such as coherent spectroscopy, color-center measurements, and quantum noise. Finally, we emphasize the engineering of quantum materials in samples and devices and their potential connections to industrial applications. The goal of this symposium is to provide an interactive forum to facilitate materials scientists from all these three fields to communicate cutting-edge progress and discuss synergistic collaborations. Specific sessions will be organized regarding the scientific theme topics to benefit cross-fertilization.

Topics will include:

- Topological quantum materials; Strongly correlated quantum materials
- Photonic quantum materials; Quantum simulations based on materials
- Phonon spectroscopy for quantum measurements
- Microscopy probe for quantum entanglement
- Ultrafast quantum control; Interface control of quantum states
- Synthesis of quantum materials; Quantum sensors

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Igor Aharonovich	University of Technology Sydney, Australia	**Hae-Young Kee**	University of Toronto, Canada
Peter Armitage	Johns Hopkins University, USA	**Junichiro Kono**	Rice University, USA
Leon Balents	University of California, Santa Barbara, USA	**Ju Li**	Massachusetts Institute of Technology, USA
Dmitri Basov	Columbia University, USA	**Charles Marcus**	University of Washington, USA
Denitsa Baykusheva	Institute of Science and Technology Austria, Austria	**Janina Maultzsch**	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
Mona Berciu	The University of British Columbia, Canada	**Matteo Mitrano**	Harvard University, USA
Laurent Cognet	Université de Bordeaux, France	**Prineha Narang**	University of California, Los Angeles, USA
Maria Daghofer	Universität Stuttgart, Germany	**Titus Neupert**	University of Zurich, Switzerland
Eugene Demler	ETH Zürich, Switzerland	**Elke Neu-Ruffing**	RPTU Kaiserslautern, Germany
Michel Devoret	Yale University, USA	**Branislav Nikolic**	University of Delaware, USA
Chunhui Du	Georgia Institute of Technology, USA	**Markus Oberthaler**	Heidelberg University, Germany
Universität Düsseldorf	Heinrich-Heine-Universität Düsseldorf, Germany	**Hongkun Park**	Harvard University, USA
Danna Freedman	Massachusetts Institute of Technology, USA	**Friedrich Prinz**	Stanford University, USA
Kai-Mei Fu	University of Washington, USA	**Stephanie Reich**	Freie Universität Berlin, Germany
Liang Fu	Massachusetts Institute of Technology, USA	**Ivano Tavernelli**	IBM Research-Zurich, Switzerland
Tony Heinz	Stanford University, USA	**Lieven Vandersypen**	Delft University of Technology, Netherlands
James Hone	Columbia University, USA	**Shuo Yang**	Tsinghua University, China
Ania Jaych	University of California, Santa Barbara, USA	**Yi Yin**	Zhejiang University, China

Symposium Organizers

Avetik Harutyunyan

Honda Research Institute USA Inc.
USA
Tel (617) 253-8137, aharutyunyan@honda-ri.com

Annabelle Bohrdt

Universität Regensburg
Institute of Theoretical Physics
Germany
Tel 49-941-943-01, Annabelle.Bohrdt@physik.uni-regensburg.de

Paola Cappellaro

Massachusetts Institute of Technology
Nuclear Science and Engineering
USA
Tel (617) 253-8137, pcappell@mit.edu

Yao Wang

Emory University
Chemistry
USA
Tel (310) 498-1649, yao.wang@emory.edu

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB01: Electrifying Biomaterials—Frontiers of Biohybrid Devices

New sustainable processes are needed to meet the increasing energy and materials demands of our society. Applications ranging from the chemical synthesis and power generation to agriculture, sensing, and waste treatment all contribute to this growing demand. Biological materials offer a promising basis for replacing current energy and material-intensive processes with more sustainable solutions. The advantages of these materials are amplified when coupled with abiotic components that can augment biological performance with increased control on functionality.

Recent efforts have focused on the use of biomaterials in biohybrid electrochemical systems. These systems incorporate biological components such as enzymes, extracted scaffolds, organelles, and even intact photosynthetic organisms like macroalgae and plants for applications in energy and sensing. However, these technologies suffer from bottlenecks such as limited electron transfer, diminished signal transduction, long term instability, and low yields. An interdisciplinary approach is therefore needed to overcome these bottlenecks, with joint efforts from material scientists, chemists, synthetic biologists, microbiologists, and engineers. We aim to create a symposium that brings together diverse scientists and engineers with the complementary expertise needed to realize the breadth of emerging technologies. The symposium will also include an open discussion session on the future research needs that the biomaterials society is called to address. Such a discussion will foster future collaborations and openness among researchers in all stages of their career.

Topics will include:

- Electroactive biomaterials
- Bio-based and biodegradable electrodes
- Semi-artificial photosynthesis
- Artificial biofilms
- Bio-photovoltaics
- Bioelectrosynthesis of valuable compounds
- Biohybrids systems for biomedical applications
- Redox polymers
- Biocatalyst engineering
- Biomaterials for sensing
- Waste treatment

Invited speakers include:

Caroline Ajo-Franklin	Rice University, USA
Arpita Bose	Washington University in St. Louis, USA
David Cliffel	Vanderbilt University, USA
Gianluca Farinola	Università degli Studi di Bari Aldo Moro, Italy
Renee Kroon	Linköping University, Sweden
Seonyeong Kwak	Seoul National University, Republic of Korea
Rossella Labarile	Consiglio Nazionale delle Ricerche, Italy
Ross Milton	Université de Genève, Switzerland
Nicolas Plumere	Technische Universität München, Germany
Melania Reggente	École Polytechnique Fédérale de Lausanne, Switzerland
Achilleas Savva	Delft University of Technology, Netherlands
Lior Sepunaru	University of California, Santa Barbara, USA
Federico Tasca	Universidad de Santiago de Chile, Chile
Claudia Tortiglione	Consiglio Nazionale delle Ricerche, Italy
Massimo Trotta	Consiglio Nazionale delle Ricerche, Italy

Symposium Organizers

Matteo Grattieri
Università degli Studi di Bari Aldo Moro
Department of Chemistry
Italy
Tel 39-0805442042, matteo.grattieri@uniba.it

Ardemis Boghossian
École Polytechnique Fédérale de Lausanne
Institute of Chemical Sciences and Engineering
Switzerland
Tel 41-(0)21-693-58-76, ardemis.boghossian@epfl.ch

Shelley D. Minteer
Missouri University of Science and Technology
Department of Chemistry
USA
Tel (573) 341-4433, shelley.minteer@mst.edu

Eleni Stavrinidou
Linköping University
Department of Science and Technology
Sweden
Tel 4611363352, eleni.stavrinidou@liu.se

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB02: Biotronics—Soft Ionic and Electronic Devices for Biological Applications

The intrinsic bioelectric activities at the cellular level result in ionic activities and charge gradients in the bioenvironment surrounding the cell. This charge gradient is a key component of inter- and intra-cellular signaling and process control. This symposium explores the domain of biotronics, which concerns the study of ionic and/or electronic devices that emulate and function at the interface of biology at the cellular level through interactions with the bioenvironment. This symposium highlights the recent advancements in ionic and electronic materials, technologies, and biotronics for *in vivo* and *in vitro* applications. The symposium will consist of two main segments: the first segment will be primarily dedicated to the design of materials and material interfaces for biotronics, including soft polymeric nanocomposites, biomaterials, nanomaterials, 2D and 3D nanostructured materials (*e.g.*, graphene, MXenes, MOFs, COFs, etc.), and cell-inspired surfaces. The other segment will be focused on the design and fabrication of various biotronics, including soft biotronics, bioelectronics, organ-on-a-chip devices with integrated biotronics, and emerging *in vivo* and *in vitro* applications of biotronics, as well as emerging technological breakthroughs, including signal processing and computing capabilities of biotronics. This interdisciplinary symposium would bring together emerging and cutting-edge advancements at the intersection of materials science, biology, nanotechnology, electronics, and ionics to shape the future of biotronics.

Topics will include:

- Soft bioionics and bioelectronics
- Organic bioionics and bioelectronics
- Emerging materials for biotronics/bioelectronics
- 2D electronic materials for biotronics/bioelectronics
- 3D frameworks for biotronics/bioelectronics
- Biomolecular and biomembrane biotronics/bioelectronics
- Ionic transistors and transistor-like devices for biotronics/bioelectronics
- Bioelectronics for system-on-a-chip applications
- Bioelectronics for cellular & subcellular interfaces and models

Joint sessions are being considered with **SB04 - Materials and Devices for *in vitro* Cell—Tissue-Electronic Interfaces**.

Invited speakers include:

Mohammad Reza Abidian	University of Houston, USA	**Stéphanie P. Lacour**	École Polytechnique Fédérale de Lausanne, Switzerland
Polina Anikeeva	Massachusetts Institute of Technology, USA	**Nanshu Lu**	The University of Texas at Austin, USA
Ana Claudia Arias	University of California, Berkeley, USA	**Katherine Mirica**	Dartmouth College, USA
Zhenan Bao	Stanford University, USA	**Roisin Owens**	University of Cambridge, United Kingdom
David Cahen	Weizmann Institute of Science, Israel	**Xing Sheng**	Tsinghua University, China
Huanyu Chen	The Pennsylvania State University, USA	**Bozhi Tian**	The University of Chicago, USA
Susan Daniel	Cornell University, USA	**Luisa Torsi**	Università degli Studi di Bari, Italy
Martin Kaltenbrunner	Johannes Kepler Universität Linz, Austria	**Klas Tybrandt**	Linköping University, Sweden
Dion Khodagholy	Columbia University, USA	**Lan Yin**	Tsinghua University, China
Dae-Hyeong Kim	Seoul National University, Republic of Korea		

Symposium Organizers

Reza Montazami

Iowa State University
Mechanical Engineering
USA
Tel (515) 294-8733, reza@iastate.edu

Jonathan Rivnay

Northwestern University
Biomedical Engineering
USA
Tel (847) 467-6622, jrivnay@northwestern.edu

Andrew Sarles

The University of Tennessee, Knoxville
Mechanical Engineering
USA
Tel (865) 974-3488, ssarles@utk.edu

Sihong Wang

The University of Chicago
Molecular Engineering
USA
Tel (773) 834-2630, sihongwang@uchicago.edu

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB03: Wood Nanoscience, Nanoengineering and Materials

Wood is the most extensively used biological material ascribing to its nature-designed hierarchical structure. Within the concept of the circular bioeconomy, many new opportunities are being uncovered considering a sustainable society while simultaneously lowering the net carbon footprint. Wood and derived materials are accessed as suitable solutions to fulfill the needs of a range of technologies beyond traditional applications. There are grand challenges in the fundamental research to bring wood and wood-based materials closer to a fossil-free future, many of which relate to the fractionation, handling and processing in ways that diverge from practices that are currently applied. Tailoring the nanostructure and resultant properties of wood, for instance, in the design of advanced materials demands new approaches and fundamental understanding beyond the existing ones. On top of that, novel devices with both excellent functionality and mechanical flexibility call for system-level integration. Finally, efficient use and increase of wood resources will secure the circularity of the bioeconomy if green and energy-efficient processing and recycling/recovery/reuse is ensured.

This symposium aims to bring together scientists and engineers from diverse and multidisciplinary fields with a strong interest in wood and wood-derived materials science and related fields. We provide a forum to communicate recent achievements, to exchange the latest knowledge, and discuss the possibilities of implanting wood and wood-derived materials for advanced materials and systems towards a real sustainable bioeconomy.

Topics will include:

- Fundamental science of wood: Formation, Nanostructure understanding and multi-scale modeling, chemical, mechanical, thermal, acoustic, and optical properties, interaction with water/moisture, diffusion, etc.
- Nanocellulose, lignin, hemicellulose, and their functional structures: Characterizing cellulosic materials, lignin, hemicellulose, and hierarchical structures, multifunctional composites, functionalization, lightweight and strong composites, transparent substrates, magnetic nanostructures, 3D aerogel, hydrogel.
- Wood nanoengineering: Wood nanostructural control, functional materials design, composite materials, biorefinery (chemicals, biofuel), nanomanufacturing.
- Electronics: Flexible and printed electronics, optoelectronics, actuators, liquid crystals, and displays, piezo electronics.
- Bioengineering: Microfluidics, Biosensors, cellulose plasmonics and nanofluidics, bioactive materials, biomedical.
- Energy management: Solar cells, batteries, power generators, novel carbon and fuel cells, flexible energy storage, water splitting, energy storage, thermal insulation.
- Water treatment: Water purification, solar water evaporation, water oil separation, metal ion adsorption.
- Other Emerging applications: Smart materials, emerging membranes.
- Circularity: Green chemistry, energy-efficient processing, recycling, circular economy, resources increase and efficient use.

Invited speakers include:

Federico Bella	Politecnico di Torino, Italy	**Pedro Sarmento**	The Navigator Company, Portugal
Bernard Cathala	Institut National de la Recherche Agronomique, France	**Gilberto Siqueira**	Empa–Swiss Federal Laboratories for Materials Science and Technology, Switzerland
Reverant Crispin	Linköping University, Sweden	**Emil Thybring**	University of Copenhagen, Denmark
Feng Jiang	The University of British Columbia, Canada	**Xiaoqing Wang**	Chinese Academy of Forestry, China
Martin Lawoko	KTH Royal Institute of Technology, Sweden	**Lining Yao**	Carnegie Mellon University, USA
Anna Loromaine	Institute of Materials Science of Barcelona, Spain	**Yao Yuan**	Yale University, USA
Shuangxi Nie	Guangxi University, China	**Hongli Zhu**	Northeastern University, USA
Tiina Nypelö	Aalto University, Finland	**Junyong Zhu**	United States Department of Agriculture, USA
Hugh O'Neill	Oak Ridge National Laboratory, USA		

Symposium Organizers

Yuanyuan Li
KTH Royal Institute of Technology
Sweden
Tel 46728410615, yua@kth.se

Liangbing Hu
University of Maryland
USA
Tel (301) 405-9303, binghu@umd.edu

Ingo Burgert
ETH Zürich
Switzerland
Tel 41446337773, iburgert@ethz.ch

Luis Pereira
Universidade Nova de Lisboa
Portugal
Tel 351212948525, lmnp@fct.unl.pt

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB04: Materials and Devices for *in vitro* Cell—Tissue-Electronic Interfaces

Over the last two decades, the field of bioelectronics has greatly progressed due to parallel advances in materials chemistry, bioengineering, and electronics. This progress has been further amplified by the advent of organic and 2D electronic materials that can be used as alternatives to traditional electronics. These materials not only can promote the seamless connection and communication with the biological content, but also allows for the efficient transduction and amplification of biological signals using bioelectronic devices both *in vivo* and *in vitro*.

This symposium will provide a timely opportunity to discuss advances in *in vitro* bioelectronics, covering a range of multifunctional materials (from organics to hybrids and 2D materials) for interfacing with biological systems at different scales and complexity levels. It will focus on novel *in vitro/on-chip* bioelectronic device designs and functions, as well as on fabrication techniques and real world biomedical applications. This symposium aims to bring together scientists working in academia and industry in the fields of chemistry, physics, biomaterials, bioengineering and electrical engineering. Topics of interest include bioelectronics for *in vitro* cell models, cell-based biosensing, biointegrated electronics, bioprinting/biofabrication, 3D bioelectronics, cell-free biological models (cell membranes, vesicles etc.).

Topics will include:

- Bioelectronics for cellular & subcellular interfaces and models.
- 2D electronic materials for biotronics/bioelectronics
- Bioelectronics for system-on-a-chip applications (organ- /membrane-on-chips, electrophoretic chips, wound healing assays etc.)
- Bioinspired and biomimetic electronic materials and architectures
- Cell-electronics interface engineering (i.e., functionalization, micro-/nano-structuring)
- Electrochemical cell-based biosensors
- Bioelectronics for *in vitro* tissue regeneration
- Additive manufacturing technologies (i.e. bioprinting) for functional tissue-electronic interfaces
- Electro-responsive systems for controlled drug release & delivery
- Interfacing subcellular components (i.e., organelles, vesicles etc) with bioelectronics

Joint sessions are being considered with **SB02 - Biotronics—Soft Ionic and Electronic Devices for Biological Applications**.

Invited speakers include:

Herdeline Ann Ardoña	University of California, Irvine, USA
Magnus Berggren	Linköping University, Sweden
Susan Daniel	Cornell University, USA
Tal Dvir	Tel Aviv University, Israel
Vasiliki Giagka	Delft University of Technology, Netherlands
Sahika Inal	King Abdullah University of Science and Technology, Saudi Arabia
Sungjune Jung	Pohang University of Science and Technology, Republic of Korea
Massimo Mastrangeli	Delft University of Technology, Netherlands
Anna Maria Pappa	Khalifa University, United Arab Emirates
Agneta Richter Dahlfors	Karolinska Institutet, Sweden
Marco Rolandi	University of California, Santa Cruz, USA
Francesca Santoro	Forschungszentrum Jülich GmbH, Germany
Xenophon Strakosas	Linköping University, Sweden
Bozhi Tian	The University of Chicago, USA
Luisa Torsi	Università degli studi di Bari Aldo Moro, Italy
Christina Tringides	Harvard University, USA

Symposium Organizers

Charalampos Pitsalidis

Khalifa University of Science and Technology
Department of Physics
United Arab Emirates
Tel 971-0544502933, charalampos.pitsalidis@ku.ac.ae

Roisin Owens

University of Cambridge
Chemical Engineering and Biotechnology
United Kingdom
Tel 01223763969, rmo37@cam.ac.uk

Achilleas Savva

Delft University of Technology
Department of Microelectronics
Netherlands
Tel 447725434766, a.savva@tudelft.nl

Jadranka Travas Sejdic

The University of Auckland
School of Chemical Sciences
New Zealand
Tel 64-9-373-7599-ext--88272, j.travas-sejdic@auckland.ac.nz

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB05: Biomaterials for Regenerative Engineering

Regeneration of damaged tissues represents a major medical need. A promising approach for development of properly functioning tissue replacements is to utilize engineered biomaterials. Regenerative engineering aims to repair and regenerate damaged or diseased tissues and organs by converging materials science, developmental biology, stem cell incorporation, and clinical approaches.

This symposium will cover interdisciplinary topics such as materials science, chemistry, cell biology, physics, engineering, and medicine. The sessions of this symposium will emphasize material properties and applications of biomaterials (polymers, hydrogels, ceramics, metals, elastomers, fibers, composites, gradients) for regenerative tissue engineering. Additionally, we will cover delivery of small molecules (proteins, peptides, growth factors, drugs, micro/nanoparticles, DNA, RNA), and applications of micro- nano-technologies to control cell behavior. We will also emphasize the importance of translation of bench information into patient care by facilitating discussions between engineers, clinicians, and medical device companies. Professionals from different areas of expertise including materials scientists, members of national laboratories, professors, students (undergraduate/gradate), early career scientists, industry members, biotechnology experts, and medical practitioners will be interested in this symposium. This multidisciplinary symposium will serve towards the objectives of the MRS by contributing to education and training of the next generation of materials researchers, providing opportunities for career and professional development of materials scientists, and help broaden diversity.

Topics will include:

- Hydrogels to control and direct cellular behavior
- Synthetic biomaterials for fabrication of implantable scaffolds
- Scaffolds from biomaterials of natural origin
- Stimuli-responsive polymers and intelligent materials for regenerative medicine
- Rapid prototyping approaches to generate tissue-mimetics
- Biomaterials as artificial tissue replacements
- Cardiovascular biomaterials
- Instructive materials to modulate stem cell behavior
- Micro- nano- technologies for fabrication of tissue scaffolds
- Composite hydrogels and multi-network biomaterials
- Clinical translation of bench information into bed-side care
- High-throughput approaches for synthesis and screening of biomaterials
- Biomaterials for musculoskeletal tissue engineering

Invited speakers include:

Francois Berthiaume	Rutgers University, USA	**Cato Laurencin**	University of Connecticut Health Center, USA
George Christ	University of Virginia, USA	**Milica Radisic**	University of Toronto, Canada
Murat Guvendiren	New Jersey Institute of Technology, USA	**Kaushal Rege**	Arizona State University, USA
Ana Jaklenec	Massachusetts Institute of Technology, USA	**Basak Uygun**	Massachusetts General Hospital, Harvard, USA
Roger Kamm	Massachusetts Institute of Technology, USA	**Shyni Varghese**	Duke University, USA
Srivatsan Kidambi	University of Nebraska–Lincoln, USA	**Ruogang Zhao**	University at Buffalo, The State University of New York, USA

Symposium Organizers

Gulden Camci-Unal

University of Massachusetts Lowell
Chemical Engineering
USA
Tel (978) 934-3143, Gulden_CamciUnal@uml.edu

Natesh Parashurama

University at Buffalo, The State University of New York
Chemical and Biological Engineering
USA
Tel (716) 645-1201, nateshp@buffalo.edu

Michelle Oyen

Washington University in St. Louis
Biomedical Engineering
USA
Tel (314) 935-7038, oyen@wustl.edu

Janet Zoldan

The University of Texas at Austin
Biomedical Engineering
USA
Tel (512) 471-4884, zjanet@austin.utexas.edu

mrs.org/fall2024

2024 MRS FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB06: 2D Materials for Theranostics

Nanomedicine in oncology potentiates great innovations, by the synergy of two or more forms of treatment and diagnostic techniques, aka theranostics. Specifically, two dimensional (2D) materials are considered as promising nanotheranostic tools since they can act as imaging agents for cancer detection/visualization with customized therapeutic properties and/or as vectors for controlled drug/gene release. They have outstanding properties, such as light weight, flexibility, high surface-to-volume ratio, highly efficient light absorption and high reactivity to high energy excitations. Hence, 2D materials enable the combination of multiple imaging modalities and therapeutic functions, such as passive/active targeting of tumors, and stimuli-responsive, controlled drug release, into a single nanoplatform. The symposium focuses on the *state-of-the-art* research of 2D materials in theranostics, extending to large-scale material production for biological applications, functionalization and conjugation, integration with other nanomaterials, applications to cancer treatment and other novel applications, such as anti-viral and anti-bacterial ones. The symposium addresses the fundamental principles of 2D materials; their interaction with biological systems, including safety assessment (a prerequisite for the successful translation to clinical research); their hazard potential, including the presence of endotoxins, bio-distribution, degradation and excretion from the body. Contributions on graphene-like (graphene, graphene oxide, boron nitride) and beyond-graphene materials, (transition metal dichalcogenides, MXenes, black phosphorus and more) will be considered.

Topics will include:

- 2D materials fabrication and properties (including large scale production)
- Layered materials based nanostructures for bio-applications: quantum dots, nanoparticles, nanoflakes, etc.
- Functionalization of 2D materials (including chemical conjugation)
- Smart multi-functional 2D nanoplatforms and composites for theranostic applications
- Single cell interactions
- Nanotoxicology and biocompatibility
- Degradation and excretion of 2D materials from the body
- Cancer cell targeting with polymeric and bio inspired approaches
- *In vitro* and *in vivo* imaging methods
- Drug and/or gene delivery
- 2D materials for Photo Thermal Therapy / Photo Dynamic Therapy (including ROS production)
- Anti-viral and anti-bacterial applications
- 2D materials as radiosensitizing agents
- Excitation with high energy particles (X-ray, gamma ray, electrons and protons)
- Immunomodulation and nano-immunity

Joint sessions are being considered with **EL04 - Recent Advances in Hybrid Perovskites**.

Invited speakers include:

Christoffer Åberg	University of Groningen, Netherlands
Francesco Bonaccorso	BeDimensional, Italy
Mattia Bramini	Universidad de Granada, Spain
Cinzia Casiraghi	The University of Manchester, United Kingdom
Lucia Gemma Delogu	Università degli Studi di Padova, Italy
Bengt Fadeel	Karolinska Institutet, Sweden
Akhilesh Gaharwar	Texas A&M University, USA
Robert Hurt	Brown University, USA
David Leong	National University of Singapore, Singapore
Xia Li	National Institute for Materials Science, Japan
Cecilia Mattevi	Imperial College London, United Kingdom
Giancarlo Salviati	Consiglio Nazionale delle Ricerche, Italy
Paolo Samori	Université de Strasbourg, France
Avi Schroeder	Technion–Israel Institute of Technology, Israel
Zdenek Sofer	University of Chemistry and Technology. Prague, Czech Republic
Michael Strano	Massachusetts Institute of Technology, USA

Symposium Organizers

Filippo Fabbri

Istituto Nanoscienze, Consiglio Nazionale delle Ricerche
Italy
Tel 39050509525, filippo.fabbri@nano.cnr.it

Evie L. Papadopoulou

BeDimensional S.p.A.
Italy
Tel 39-01023641710, p.papadopoulou@bedimensional.it

María Carmen Rodríguez Arguelles

Universidade de Vigo
Inorganic Chemistry Department
Spain
Tel 34986812410, mcarmen@uvigo.gal

Jeny Shklover

Technion–Israel Institute of Technology
Chemical Engineering faculty
Israel
Tel 972-778871862, jenysh@technion.ac.il

Symposium SB07: 3D Bioinspired Biomaterials

This symposium will be focused on a grand challenge in biomaterials science, which is the design of bioinspired materials to support active processes in nature by materials, which can interact with biological systems at different scales. In vivo materials often contain pores, are soft and react in an autonomous way, e.g., in healing. A particular focus will be on the molecular understanding and manufacturing of porous, conductive and responsive materials, to mimic the responsiveness, activity and self-healing ability of living systems. This is an emerging topic in materials research with the potential for large-scale impact, ranging from optimizing implants for living systems to organoid and disease models. The first part of the symposium will focus on the molecular mechanisms leading to soft, porous and responsive materials. The second part will cover larger scale systems, with a particular focus on porous and biohybrid systems that can host living cells and can be controlled by external stimuli. The meeting will bring together researchers with different interdisciplinary materials science background in order to generate novel ideas and applications in the field.

Contributions can address topics including 3D biomaterials that mimic biology from a structural perspective (e.g., porous materials, 3D printed materials) or mechanical properties (e.g., viscoelastic properties). In addition, responsive materials, particularly in conjunction with biological systems (e.g., synthesis of responsive molecules, responsive materials, mechanical control of materials), and methods to generate biohybrid systems based on such materials are welcomed.

Topics will include:

- Methods to generate and analyse 3D biomaterials
- 3D (bio)printing methods and advanced manufacturing for biomaterials
- Viscoelastic properties of biomaterials and biological systems
- Characterization of biological systems in the context of 3D materials
- Responsive molecules and materials
- Self-healing biomaterials
- Applications of 3D materials in tissue engineering
- Controlling multicellular systems in 3D materials
- Biohybrid 3D systems engineering

Invited speakers include:

Nasim Annabi	University of California, Los Angeles, USA	**Kristopher Kilian**	University of New South Wales, Australia
Aysu Arslan	BionInx Inc., Belgium	**John Klier**	The University of Oklahoma, USA
Cecile Bidan	Max Planck Institute for Colloids and Interfaces, Germany	**Aldo Leal-Egana**	Heidelberg University, Germany
Eva Blasco	Heidelberg University, Germany	**Cornelia Lee-Thedieck**	Hannover University, Germany
Aránzazu del Campo	INM–Leibniz Institute for New Materials, Germany	**Berit Lokensgaard Strand**	Norwegian University of Science and Technology, Norway
Zvonomir Dogic	University of California, Santa Barbara, USA	**Mary Beth Monroe**	Syracuse University, USA
John Dunlop	Paris-Lodron-Universität Salzburg, Austria	**Humberto Palza**	Universidad de Chile, Chile
Akhilesh Gaharwar	Texas A&M University, USA	**Benjamin Richter**	Nanoscribe Inc., Germany
John Hardy	Lancaster University, United Kingdom	**Adrianne Rosales**	The University of Texas at Austin, USA
Julianne Holloway	Arizona State University, USA	**Shane Scott**	McMaster University, Canada
Don Ingber	Harvard University, USA	**Motomu Tanaka**	Kyoto University, Japan
Roger Kamm	Massachusetts Institute of Technology, USA	**Andreas Walther**	Johannes Gutenberg-Universität Mainz, Germany

Symposium Organizers

Christine Selhuber-Unkel

Heidelberg University
Institute for Molecular Systems Engineering and Advanced Materials (IMSEAM)
Germany
Tel 4962215415712, selhuber@uni-heidelberg.de

Elizabeth Cosgriff-Hernández

The University of Texas at Austin
USA
Tel (512) 471-4679, cosgriff.hernandez@utexas.edu

Reza Foudazi

The University of Oklahoma
School of Chemical, Biological and Materials Engineering
USA
Tel (405) 325-0465, rfoudazi@ou.edu

Markus Muellner

The University of Sydney
School of Chemistry
Australia
Tel 61-2-8627-0953, markus.muellner@sydney.edu.au

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)
Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB08: Smart and Living Materials for Advanced Engineering Systems

This symposium will broadly cover the current status and future research trends in emerging smart and living materials. Smart materials can be defined as stimuli-responsive materials, capable of sensing external stimuli and responding to them through physical, chemical or biological changes, allowing their usage in a wide variety of applications. Among several families of responsive materials, living materials with embedded archaea, bacteria, and eukaryotic cells, are emerging as the most promising ones in recent years due to their "living" features, including self-healing and self-regeneration. Given the extensive landscape of smart and living materials and the radical change due to the development of design and fabrication (including 3D and 4D (bio)printing) of these matters in unprecedented ways, it is fundamental to exchange good practices and strategies for effectively utilizing these materials and empowering them towards true societal transformations. In this symposium, we aim to bring together the community of living materials and abiotic smart materials to initiate a knowledge exchange and strengthen mutual interests and overlaps. The symposium will focus on the evolution of smart and living materials, their underlying working principles, process development, and integration into devices. The emphasis will be on the engineering of these materials and derived structures and applications, starting from the basic scientific principles, mathematical modeling, and processing through novel fabrication technologies, including synthetic biology, 3D bioprinting, additive manufacturing, and electrohydrodynamic printing, to name a few, and their deployment to a broader range of end-use cases. Smart and living materials may include but are not limited to, shape-morphing materials, shape-memory materials, electroactive materials, responsive biofilms, biohybrid materials, and biohybrid actuators. The speakers in the symposium should address the fundamental scientific background to their topic, scientific challenges, the involvement of smart or living materials in their solution, and future directions in the interface between materials science, synthetic biology and engineering design.

Topics will include:

- Smart materials and structures for intelligent engineering systems
- Engineered living materials, including biohybrid living materials and biological living materials
- Biohybrid materials, devices, systems, living smart matter
- Stimuli responsive materials with bioinspired and biomimetic features
- Biomimetic materials, structures, and architectures with quasi living behabior
- Synthetic biology for engineering materials: current capabilities and challenges
- Novel synthesis routes through chemical, mechanical or biological self-assembly
- Fabrication and characterization of living and smart materials
- Applications of living and smart materials
- Ethical, legal, and social aspects related to the technological development of smart and living materials
- Sustainable design approaches and life cycle assessment of smart and living materials for advanced engineering systems

Invited speakers include:

Caroline Ajo-Franklin	Rice University, USA
Mahdi Bodaghi	Nottingham Trent University, United Kingdom
Aránzazu del Campo	INM–Leibniz Institute for New Materials, Germany
Mette Ebbesen	Aalborg University, Denmark
Christoph Eberl	Fraunhofer Institute for Mechanics of Materials IWM, Germany
Matthew Fields	Montana State University, USA
Zhibin Guan	University of California, Irvine, USA
Chris Hernandez	University of California, San Francisco, USA
Aitziber Lopez Cortajarena	CIC biomaGUNE, Spain
Anne Meyer	University of Rochester, USA
Jon Molina Aldareguia	IMDEA Materials Institute, Spain
Sara Molinari	University of Maryland, USA
Alisa Morss Clyne	University of Maryland, USA
Alshakim Nelson	University of Washington, USA
Jenny Sabin	Cornell University, USA
Thomas Speck	University of Freiburg, Germany
Will V Srubar III	University of Colorado Boulder, USA
Taylor Ware	Texas A&M University, USA
Tak-Sing Wong	The Pennsylvania State University, USA
Ryo Yoshida	The University of Tokyo, Japan
Rayne Zhang	University of California, Berkeley, USA

Symposium Organizers

Andres Diaz Lantada
Universidad Politécnica de Madrid
Mechanical Engineering
Spain
Tel 34627786019, andres.diaz@upm.es

Carmelo De Maria
University of Pisa
Research Center E. Piaggio
Italy
Tel 39-050-2217056, carmelo.demaria@unipi.it

Chelsea Heveran
Montana State University
Mechanical and Industrial Engineering
USA
Tel (406) 994-2010, chelsea.heveran@montana.edu

Monsur Islam
Karlsruhe Institute of Technology
Institute of Microstructure Technology
Germany
Tel 49-721-608-23944, monsurislam79@gmail.com

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024

Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB09: Fundamental Processes at Electroactive Biological Interfaces

This symposium will cover the fundamental processes at the interface between biological systems and electroactive materials, including experimental and simulation-based studies. In this context, biological systems refer to living matter at different scales, from extracted cells and unicellular organisms to higher-order animals and plants, which have been used to explore phenomena at the interface between electroactive materials and biological systems. Our objective is to stimulate a discussion on how the different classes of electroactive materials, such as conducting polymers, metals, metal oxides, inorganic semiconductors and carbon-based materials affect the efficiency of signal transfer at the biotic-abiotic interface. Our symposium will cover monitoring of the biological systems but also aspects of the active stimulation of biological functions by electroactive systems. The symposium will address how physical stimulation (e.g., electrical, electromagnetic, mechanical) can impact the biointerface and the fate and behaviour of the biological counterpart under analysis.

We expect this symposium to attract a broad multidisciplinary audience, including materials scientists and engineers, biologists as well as neuroscientists and medical doctors, from academia, national laboratories, and industry. The symposium will last 3 days and will be tentatively divided into three parts: 1) emerging materials for electroactive interfaces, 2) progress in active bio-stimulation, 3) *in vitro* and *in vivo* characterization of electroactive bio-interfaces.

Topics will include:

- Electroactive materials (carbon-based, silicon-based, polymer-based)
- Fundamental investigation of the biointerfaces
- Bioelectrochemistry
- Electroactive monitoring of biological systems
- Physical stimulation
- Numerical simulations

Invited speakers include:

Oliya Abdullaeva	Luleå University of Technology, Sweden
Maria Rosa Antognazza	Istituto Italiano di Tecnologia, Italy
Eric D. Glowacki	CEITEC - Central European Institute of Technology, Czech Republic
Sohini Kar-Narayan	University of Cambridge, United Kingdom
Sam Kassegne	San Diego State University, USA
Christopher Proctor	University of Oxford, United Kingdom
Xenofon Strakosas	Linköping University, Sweden
Claudia Tortiglione	Consiglio Nazionale delle Ricerche, Italy
Maria Vomero	NeuroOne Medical Technologies, USA
Tomoyuki Yokota	The University of Tokyo, Japan
Myung-Han Yoon	Gwangju Institute of Science and Technology, Republic of Korea

Symposium Organizers

Donata Iandolo

INSERM
France
Tel +330477420019, donata.iandolo@inserm.fr

Maria Asplund

Chalmers University of Technology
Sweden
Tel 46-31-772-41-14, maria.asplund@chalmers.se

Fabio Cicoira

Polytechnique Montréal
Canada
Tel (514) 340-4711, fabio.cicoira@polymtl.ca

Anna Herland

KTH Royal Institute of Technology
Sweden
Tel 46-8-790-84-31, aherland@kth.se

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024

Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB10: Soft Materials for Sensors and Actuators in e-textiles and e-skins

E-textiles and e-skins with embedded sensors and electronics receive widespread interest for applications ranging from health monitoring, tactile devices to displays and antennas, as well as energy harvesting and storage. At the same time there is growing interest in actuating e-textiles for adapting shape, supporting motion of limbs, haptic feedback, or even acting as exoskeletons. For these e-textile actuators, high-performance materials are combined with soft robotic approaches. The sensitivity of e-skins is often coupled with artificial intelligence to enable autonomy in driving e-textile actuators.

Some key challenges of e-textiles include (1) transferring actuation approaches into development of fibers, yarns and fabrics with an optimal combination of electrical and mechanical properties, (2) energy efficiency (3) developing effective manufacturing methods (4) issues of use, 'wear' and 'washing' and (5) methods to reuse and recycle. Some key challenges in e-skins include (1) compact integration methodologies to include advanced bionic features, (2) constructing stretchy structures, (3) enhancing sensitivity, selectivity, and reliability of the sensors.

This symposium will provide a forum for collaborative discussions to address these challenges, in order to address both academic and industrial research needs and further developments. It will bring together researchers from highly diverse, interdisciplinary backgrounds such as materials engineers, polymer chemists, device physicists as well as entrepreneurs from industry.

Sessions will be dedicated to the selection of materials and development of yarns and fibres, approaches to implement actuation in textiles, and failure mechanisms and modelling. Sessions will also focus on the materials and devices developed to establish the form factor of e-skins and on the applications for e-textiles, wearables, nearables, and soft robotic hybrids will be reported. Challenges in commercializing the e-textile and e-skin devices will be discussed from both academia and industry perspectives.

Topics will include:

- Tailored materials for e-textiles and e-skins
- Wearability, washability, and reliability
- Commercialization for various applications
- Sensing and actuating in textiles and garments
- Tactile sensors and haptic feedback
- Conformable and/or stretchable sensor skins
- Soft robotics for exoskeletons and protection
- Soft and wearable actuators
- Sustainability and recycling
- Mechanical/thermal/electrical modelling
- Interconnects and interfacing
- Innovative device structures

Joint sessions are being considered with **EN09 - Innovations in Materials and Processes for Printed, Flexible and Stretchable Energy-autonomous Sensing Systems**.

Invited speakers include:

Ana Claudia Arias	University of California, Berkeley, USA
Michael Bartlett	Virginia Tech, USA
Stephen Beeby	University of Southampton, United Kingdom
Tricia Breen Carmichael	University of Windsor, Canada
Anastasia Elias	University of Alberta, Canada
Tae-Il Kim	Sungkyunkwan University, Republic of Korea
Ahyeon Koh	Binghamton University, The State University of New York, USA
Pooi See Lee	Nanyang Technological University, Singapore
Darren Lipomi	University of California, San Diego, USA
Jose Martinez	Linköping University, Sweden
Aurelie Mosse	Ecole Nationale Supérieure des Arts Décoratifs, France
Nils-Krister Perrson	University of Boras, Sweden
Vanessa Sanchez	Rice University, USA
Anne Ladegaard Skov	Technical University of Denmark, Denmark
Chad Webb	Rhaeos Inc., USA
Myung-Han Yoon	Gwangju Institute of Science and Technology, Republic of Korea

Symposium Organizers

Madhu Bhaskaran

RMIT University
Australia
Tel 61-3-99250441, madhu.bhaskaran@rmit.edu.au

Hyun-Joong Chung

University of Alberta
Canada
Tel (780) 492-4790, chung3@ualberta.ca

Ingrid Graz

Johannes Kepler Universität Linz
Austria
Tel 43-(0)732-2468-9766, ingrid.graz@jku.at

Edwin Jager

Linköping University
Sweden
Tel 46-13-281246, edwin.jager@liu.se

Symposium SB11: Biological and Bioinspired Polymers

Life relies on naturally occurring polymers (including melanins, cellulose, lignin, biosilica, and structural proteins like silk fibroins and collagen) that perform diverse and complex biological functions in living organisms. Biological polymers have been increasingly utilized in designing advanced materials that mimic nature, owing to their molecular functionalities, macromolecular structures, and versatile material properties for photonics, electronics, sustainable wearable products and architectural design, and nanotechnology. While natural sources provide an abundant supply of biological polymers, chemical modifications and implementation into hybrid architectures offer promising avenues for the development of advanced materials with superior performances.

The 2nd edition of the MRS Fall Symposium on Biological and Bio-Inspired Polymers aims to bring together leading scientists from diverse backgrounds and technical fields across academia and industry to share cutting-edge progress and challenges on biological and bio-inspired polymers. Discussion will focus on the materials aspect with applications discussed to complement and illustrate underlying chemical and physical properties. These will include biosynthesis, self-assembly, chemical or biological modification, and generation of new bio-hybrid systems, with the ultimate goal of unravelling the physical properties of complex chemical and biological systems. Advanced materials based on bio-inspired nano- and micro-structures will be covered, as well as devices and applications in photonics, electronics, biomedicine, and energy.

Topics will include:

- Biological polymers as materials
- Biological materials for electronics and photonics, structural and product design
- Bio-inorganic materials (including biosilica, calcite, structural materials)
- Synthesis of bio-mimetic and bio-inspired polymers
- Chemical modification of bio-polymers
- Biotechnological production of bio-materials
- Bio-photonic and bioelectronic devices
- Bio-materials for biomedical devices
- Bioinspired functional materials and devices

Invited speakers include:

Jinhye Bae	University of California, San Diego, USA
Davide Blasi	Università degli Studi di Bari Aldo Moro, Italy
Ardemis Boghossian	École Polytechnique Fédérale de Lausanne, Switzerland
Luisa De Cola	Università degli Studi di Milano, Italy
Michele Di Lauro	Istituto Italiano di Tecnologia, Italy
Gianluca Maria Farinola	Università degli Studi di Bari, Italy
Javier G. Fernandez	Singapore University of Technology and Design, Singapore
Neil Gershenfeld	Massachusetts Institute of Technology, USA
Seung Goo Lee	University of Ulsan, Republic of Korea
Giulia Guidetti	Tufts University, USA
Kenichiro Iuchi	Canon Virginia, USA
Jonathan Kluge	Vaxess Technologies Inc., USA
Guglielmo Lanzani	Istituto Italiano di Tecnologia, Italy
Yuhan Lee	Harvard Medical School, USA
Benedetto Marelli	Massachusetts Institute of Technology, USA
Fiorenzo Omenetto	Tufts University, USA
Changhyun Pang	Sungkyunkwan University, Republic of Korea
Melania Reggente	École Polytechnique Fédérale de Lausanne, Switzerland
Young Min Song	Gwangju Institute of Science and Technology, Republic of Korea
Eleni Stavrinidou	Linköping University, Sweden
Tzu-Chieh Tang	Harvard University, USA
Serpil Tekoglu	Johannes Kepler Universität Linz, Austria
Massimo Trotta	Consiglio Nazionale delle Ricerche, Italy
Silvia Vignolini	Max Planck Institute of Colloids and Interfaces, Germany
David D. Weitz	Harvard University, USA
Jonathan Wilker	Purdue University, USA
Shu Yang	University of Pennsylvania, USA
Lining Yao	Carnegie Mellon University, USA

Symposium Organizers

Rossella Labarile

Consiglio Nazionale delle Ricerche
Istituto per i Processi Chimico Fisici
Italy
Tel 00393288866752, r.labarile@ba.ipcf.cnr.it

Marco Lo Presti

Tufts University
Silklab, Department of Biomedical Engineering
USA
Tel (392) 898-6907, Marco.lopresti@tufts.edu

Laia Mogas-Soldevila

University of Pennsylvania
DumoLab Research, Department of Architecture, Weitzman School of Design
USA
Tel (617) 335-0940, laiams@upenn.design.edu

Junyong Park

Kumoh National Institute of Technology
School of Materials Science and Engineering
Republic of Korea
Tel +82-54-478-7732, jpark@kumoh.ac.kr

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SB12: Conductive Biological Materials

Electronic materials are conventionally the domain of human-made devices, but recent discoveries in cross-disciplinary areas have established that Nature makes materials that transport charges over long length scales as part of normal biological processes. Conductivity in such unconventional electronics materials, made of amino and nucleic acids and other biopolymers, are often poorly described by conventional transport models and require new theory for understanding long-range conductivity. These bioelectronic materials aim to interface synthetic electronic devices with biological systems, from biomolecules to cells, tissues, and entire organisms. Biological materials are ideal building blocks for satisfying these criteria due to their properties of biocompatibility, self-assembly and molecular recognition. In addition, the chemical diversity and specificity of sequence-programmable biopolymers can be designed to drive the formation of functional nanostructures and interfaces. The construction of electronic materials from biological building blocks also represents a promising approach to autonomous assembly of electronic devices from engineered organisms, including new electronic inputs and outputs for synthetic biology systems. In this symposium we will highlight work shedding light on mechanisms of charge transport in biological materials as well as bring together researchers from across traditional disciplinary boundaries to understand the guiding physical, chemical, and biological principles underlying conductivity in biological materials. The community studying these materials is spread across biology, physics, chemistry and engineering, but with recent advances in experimental and computational tools to probe these systems, there is a timely opportunity to convene a discussion on how these insights inform a materials science understanding of structure-processing-property relationships in these materials and resulting devices. In addition, this proposed symposium will highlight ways in which synthetic biology can be used to create functional bioelectronic interfaces in innovative device designs. We invite abstracts related to electronic conductivity in peptide- and protein-based materials, proton and other ion conductivity in biological materials, synthetic biology approaches to bioelectronic interfaces, structure and properties of novel conductive biological materials, the stimuli responsive assembly of conductive biomolecular materials, and bioelectronic interfaces and devices based on biological materials.

Topics will include:

- Electronic conductivity in peptide and protein based materials
- Structure and properties of novel conductive biological materials
- Synthetic biology approaches to bioelectronic interfaces
- Computational approaches to understanding conductivity in biological materials
- Bioelectronic interfaces and devices based on biological materials
- Proton and other ion conductivity in biological materials

Invited speakers include:

Caroline Ajo-Franklin	Rice University, USA	**Filip Meysman**	University of Antwerp, Belgium
Nurit Ashkenasy	Ben-Gurion University of the Negev, Israel	**Ron Naaman**	Weizmann Institute of Science, Israel
David Beratan	Duke University, USA	**Ki Tae Nam**	Seoul National University, Republic of Korea
Jochen Blumberger	University College London, United Kingdom	**Christian Nijhuis**	University of Twente, Netherlands
Ismael Diez-Perez	King's College London, United Kingdom	**Marco Rolandi**	University of California, Santa Cruz, USA
Moh El-Naggar	University of Southern California, USA	**Clara Santato**	Polytechnique Montréal, Canada
Ariel Furst	Massachusetts Institute of Technology, USA	**Sahar Sharifzadeh**	Boston University, USA
Pau Gorostiza	Institute for Bioengineering of Catalonia, Spain	**David Waldeck**	University of Pittsburgh, USA
Stuart Lindsay	Arizona State University, USA	**Jonathan Yuly**	Princeton University, USA
Nikhil Malvankar	Yale University, USA		

Symposium Organizers

Allon Hochbaum

University of California, Irvine
Materials Science and Engineering
USA
Tel (949) 824-1194, hochbaum@uci.edu

Nadav Amdursky

Technion–Israel Institute of Technology
Schulich Faculty of Chemistry
Israel
Tel 972-4-829-3386, amdursky@technion.ac.il

Joshua Atkinson

Princeton University
USA
Tel (609) 258-5324, joshatkinson@princeton.edu

Noémie-Manuelle Dorval Courchesne

McGill University
Chemical Engineering
Canada
Tel (514) 398-4494, noemie.dorvalcourchesne@mcgill.ca

Symposium SB13: Soft Materials for Harsh Environments

This symposium will delve into the transformative impact of soft materials on electronics for extreme environments, redefining our approach, particularly in aerospace applications. Extreme environments, characterized by factors such as ionizing and non-ionizing radiation, temperature cycling, vacuum, and atomic oxygen, pose unique challenges for electronics. Recent insights have reshaped our understanding and highlighted that while traditional semiconductors tolerate these stressors, they lack the lightweight, flexible, and cost-effective attributes offered by soft materials.

While the symposium will primarily focus on soft materials, it will also incorporate talks on the effects of extremes on traditional materials. This intentional cross-pollination aims to spark innovative ideas for discovering the next generation of soft, reconfigurable materials tailored for applications in these challenging conditions. Metal-halide perovskite and organic semiconductors will be specifically discussed. Expert discussions will cover topics such as radiation tolerance, self-healing properties, and efficient packaging designs, with abstract submissions encouraged in areas including radiation tolerance of perovskites and organic semiconductors, next-gen concepts for extreme-tolerant soft materials, lightweight device architectures using traditional semiconductors, and robust packaging designs.

Topics will include:

- Next-generation electronics for harsh environments
- Radiation-tolerant perovskite, organic, and low-dimensional semiconductors
- Mechanistic understanding of self healing
- Radiation detection and temperature sensing using soft materials
- Radiation tolerant biofilms and biomaterials
- Space effects in biological systems
- Thermal and mechanical stressing
- Lightweight packaging for harsh environments
- Technoeconomic analysis for next-generation space electronics

A **tutorial** complementing this symposium is tentatively planned. Further information will be included in the MRS Program that will be available online in September.

Invited speakers include:

Antonio Abate	Helmholtz-Zentrum Berlin, Germany	**Stephen Jesse**	Oak Ridge National Laboratory, USA
Niaz Abdolrahim	University of Rochester, USA	**Oana Jurchescu**	Wake Forest University, USA
Christos Athanasiou	Georgia Institute of Technology, USA	**Yosuke Kanai**	University of North Carolina at Chapel Hill, USA
Mario Borunda	Oklahoma State University, USA	**Arkady Krasheninnikov**	Helmholtz-Zentrum Dresden-Rossendorf, Germany
Jean-Luc Bredas	University of Arizona, USA	**Lyndsey McMillon-Brown**	NASA, USA
Sergio Brovelli	Università degli Studi Milano-Bicocca, Italy	**Wanyi Nie**	Los Alamos National Laboratory, USA
Stefania Cacovich	Centre National de la Recherche Scientifique, France	**Sokrates Pantelides**	Vanderbilt University, USA
Romain Cariou	Commissariat à l'énergie atomique et aux énergies alternatives, France	**Adam Printz**	University of Arizona, USA
Jeffery Chancellor	Louisiana State University, USA	**Bibhudutta Rout**	University of North Texas, USA
Giles Eperon	Swift Solar Inc., USA	**Laura Schelhas**	National Renewable Energy Laboratory, USA
Beatrice Fraboni	Università di Bologna, Italy	**Michael Short**	Massachusetts Institute of Technology, USA
Sean Garner	Corning Incorporated, USA	**Samuel Stranks**	University of Cambridge, United Kingdom
Aman Haque	The Pennsylvania State University, USA	**Xueju Wang**	University of Connecticut, USA
Jinsong Huang	University of North Carolina at Chapel Hill, USA	**William Weber**	The University of Tennessee, Knoxville, USA
Seth Hubbard	Rochester Institute of Technology, USA	**Narges Yaghoobi Nia**	Università degli Studi di Roma Tor Vergata, Italy

Symposium Organizers

Ahmad Kirmani

Rochester Institute of Technology
USA
Tel (240) 614-1354, ahmad.kirmani@rit.edu

Felix Lang

University of Potsdam
Germany
Tel 49-331-977-5630, lang1@uni-potsdam.de

Joseph Luther

National Renewable Energy Laboratory
USA
Tel (720) 289-4608, joey.luther@nrel.gov

Ian Sellers

University at Buffalo, The State University of New York
USA
Tel (405) 640-0721, isellers@buffalo.edu

Symposium SF01: Bulk Metallic Glasses

The ability to create bulk metallic alloys lacking long-range order and grain boundaries has attracted significant attention in both the academic and commercial communities. These materials, called bulk metallic glasses (BMGs) They exhibit unique properties, including near theoretical strength, high elastic strain limit and wear resistance along with excellent soft-magnetic and catalytic properties. Modern BMGs can also show processing advantages, and additive manufacturing recently has enabled large scale components to be produced. They have established themselves as a viable class of engineering materials with exciting opportunities in fundamental science and broad potential commercial applications. The continuation of rapid growth in the field of BMGs can be attributed to advancements in our fundamental understanding of their structure and deformation, improved understanding of the liquid structural state, the development of BMG forming alloys based on elements essentially covering all transition metals, and new processing methods such as thermo-plastic forming and additive manufacturing. The unique vitrification behavior of BMGs allows them to be processed similar to both plastics and metals. Various plastic processing and fabrication techniques have been adapted and tailored to the specific characteristics of BMGs. The sluggish crystallization kinetic, coupled with the absence of an intrinsic feature size limitation enables one to use BMGs over a wide range of length scales. Novel insights into processing has also been explored for improving and tailoring properties of BMGs. From a fundamental point of view, recent research progress has involved micromechanistic models for processing-structure-property relationships of BMGs, which has been a significant challenge due to the lack of long-range order, grains and their boundaries, and other typical structural features observed in metals.

Topics will include:

- Atomic structure of bulk metallic glasses and its relationship with properties
- Manipulation strategies of properties through atomic structure, including rejuvenation and relaxation
- Glass formation motifs, theories, and development strategies
- Processing methods and opportunities including additive manufacturing
- Mechanical properties and mechanisms of plastic deformation and failure
- Functional physical properties including magnetism and catalysis
- Application opportunities
- Vitrification kinetics and atomic mobility

Invited speakers include:

Ralf Busch	Universität des Saarlandes, Germany
Na Chen	Tsinghua University, China
Wen Chen	University of Massachusetts Amherst, USA
Karin A. Dahmen	University of Illinois at Urbana-Champaign, USA
Takeshi Egami	Oak Ridge National Laboratory, USA
Michael Falk	Johns Hopkins University, USA
Michael Ferry	University of New South Wales, Australia
Katherine Flores	Washington University in St. Louis, USA
Lindsay Greer	University of Cambridge, United Kingdom
Douglas Hofmann	NASA Jet Propulsion Laboratory, USA
Lina Hu	Shandong University, China
Sebastian Kube	University of Wisconsin–Madison, USA
Golden Kumar	The University of Texas at Dallas, USA
Dongwoo Lee	Sungkyunkwan University, Republic of Korea
Maozhi Li	Renmin University of China, China
Mo Li	Georgia Institute of Technology, USA
Jörg Löffler	ETH Zürich, Switzerland
Robert Maaß	Federal Institute of Materials Research and Testing, Germany
Sundeep Mukherjee	University of North Texas, USA
Corey O'Hern	Yale University, USA
Eun Soo Park	Seoul National University, Republic of Korea
Birte Riechers	Federal Institute of Materials Research and Testing, Germany
Beatrice Ruta	CNRS Institut Néel Grenoble, France
Udo Schwarz	Yale University, USA
Frans Spaepen	Harvard University, USA
Paola Tiberto	Istituto Nazionale di Ricerca Metrologica, Italy
Paul Voyles	University of Wisconsin–Madison, USA
Wei-Hua Wang	Institute of Physics, Chinese Academy of Sciences, China
Shuai Wei	Aarhus University, Denmark
Chenchen Yuan	Southeast University, China

Symposium Organizers

Isabella Gallino
Technische Universität Berlin
Materials Science and Technology
Germany
Tel +4915750661020, gallino@tu-berlin.de

Yanhui Liu
Institute of Physics, Chinese Academy of Sciences
China
Tel 861082649311, yanhui.liu@iphy.ac.cn

Jamie Kruzic
University of New South Wales
School of Mechanical and Manufacturing Engineering
Australia
Tel 61293854017, j.kruzic@unsw.edu.au

Jan Schroers
Yale University
Materials Science and Engineering
USA
Tel (203) 432-4346, jan.schroers@yale.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SF02: High Entropy Materials

High-entropy materials (HEMs) have become an exciting and vibrant field of materials science as a new generation of materials. The HEM design concept shifts the focus away from the corners of phase diagrams toward their centers, and allows compositions beyond the scope of traditional materials, offering unprecedented properties, challenges, and opportunities for a wide range of structural and functional applications. Although we understand HEMs much better today, there are still significant gaps in our knowledge that hinder the widespread use of HEMs. The goal of this symposium is to share the latest research advances in materials with high configurational entropy, including high-entropy and complex concentrated alloys, high-entropy oxides/ nitrides, high-entropy metallic glasses, etc., and discuss major materials issues for HEMs from property-targeted alloy design to process optimization, from structures to properties, and from the fundamental science to viable industrial applications. This symposium will cover fundamental theory and data-driven material design, fabrication, processing, and microstructure control, such as homogenization, precipitation, nanostructure, and grain-boundary engineering using conventional equipment, combinatorial fabrication, additive manufacturing, etc., phase stability and diffusivity under extreme environment, mechanical behavior under different deformation mechanisms, corrosion, physical, magnetic, electric, thermal, coating, and biomedical behavior, advanced characterization, such as synchrotron, three-dimensional atom probe, and 4-D STEM, computational modeling and simulations, and industrial applications, such as structural, mechanical, biomedical, energy applications. In this symposium, we hope to deepen our understanding of why HEMs attract such intensive interest, as well as highlight some challenging issues awaiting resolution to provide viable paths to widespread application and adoption of HEMs.

Topics will include:

- Fundamental Theory and Data-driven Design of HEMs
- Process Development for Tailor-made Synthesis and Microstructure Control
- Phase Transformation (thermodynamics and kinetics) under Extreme Environments
- Structural/Mechanical Properties of HEMs, such as fatigue, creep, and fracture behavior
- Dynamic Mechanical Behavior under Different Deformation Mechanisms
- Physical, Chemical and Functional Properties of HEMs
- Intensive Structural Characterization using Cutting-edge Analysis Techniques
- Theoretical Modeling and Computational Simulations
- Innovative Industrial Applications, e.g. Structural Parts, Catalysis and Energy Storage Materials

Invited speakers include:

Ben Breitung	Karlsruhe Institute of Technology, Germany
Brian Cantor	University of Oxford, United Kingdom
Cecilia Cao	Shanghai University, China
Jean-Philippe Couzinié	Centre National de la Recherche Scientifique, France
Andrew Detor	Defense Advanced Research Projects Agency, USA
Jurgen Eckert	Montanuniversität Leoben, Austria
Katharine Flores	Washington University, USA
Easo George	The University of Tennessee, Knoxville, USA
Olivia Graeve	University of California, San Diego, USA
Haruyuki Inui	Kyoto University, Japan
Veerle M. Keppens	The University of Tennessee, Knoxville, USA
Andrew M. Minor	University of California, Berkeley, USA
DANIEL B. MIRACLE	Air Force Research Laboratory, USA
Taheri Mitra	Johns Hopkins University, USA
B.S. Murty	Indian Institute of Technology Hyderabad, India
Noah Philips	ATI Inc., USA
Tresa Pollock	University of California, Santa Barbara, USA
Dierk Raabe	Max-Planck-Institut für Eisenforschung GmbH, Germany
Robert Ritchie	Lawrence Berkeley National Laboratory, USA
Chaewoo Ryu	Hongik University, Republic of Korea
John Sharon	Raytheon Technologies, USA
An-Chou Yeh	National Tsing Hua University, Taiwan

Symposium Organizers

Eun Soo Park

Seoul National University
Materials Science and Engineering
Republic of Korea
Tel 821087128644, espark@snu.ac.kr

Daniel S. Gianola

University of California, Santa Barbara
Materials
USA
Tel (805) 893-8143, gianola@engineering.ucsb.edu

Jiyun Kang

Stanford University
Mechanical Engineering
USA
Tel (857) 265-8104, jiyunk@stanford.edu

Cem Tasan

Massachusetts Institute of Technology
Department of Materials Science and Engineering
USA
Tel (617) 253-3318, tasan@mit.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SF03: Materials for Robotics

Many advancements in robotics depend on the development of new materials and processing technologies. By focusing on innovative manufacturing approaches, researchers can unlock new possibilities for designing advanced robotic architectures and end-effectors. Additionally, by modeling material and actuation behaviors, researchers can develop more efficient and effective robotic systems. To this end, researchers are exploring a wide range of materials that can sense external stimuli and be reconfigured into manipulators and components at various scales for use in a variety of technological areas, including automotive, minimally invasive medicine, and food industry. Programmable matter and inter-communication between materials are also research areas of interest. The goal of this symposium is to bring together researchers interested in materials and processing techniques for robotics applications. The symposium covers the development of new materials and actuation mechanisms (i.e.: magnetic fields, electric fields, light, ultrasound, chemical fuels) using innovative manufacturing sequences and approaches, such as additive manufacturing. It also focuses on designing advanced robotic architectures and end-effectors, as well as modeling material and actuation behaviors, with applications in several fields such as biomedicine, bionics, minimally invasive medicine and automobiles. The symposium will also feature advanced manipulation and navigation systems, and the use of artificial intelligence to control the actuation of materials. The symposium also embraces materials with varying mechanical, magnetic, and electric properties or devices composed of building blocks that can communicate upon stimuli. Theoretical and experimental aspects of these materials are both welcomed. This symposium offers an excellent opportunity for researchers to exchange ideas and learn about the latest developments in materials and processing technologies for robotics applications.

Topics will include:

- Soft matter and soft robotics
- Stimuli responsive and/or reconfigurable materials
- Magnetic materials
- Biocompatible Polymers
- Manufacturing, including micro- and nanofabrication
- Micro- and nanorobotics
- Programmable and/or multifunctional matter
- Manipulation and navigation systems
- Actuation and sensing approaches including magnetic, electric, ultrasound, light, chemistry
- Applications in minimally invasive medicine, assistive robotics, automobile

Invited speakers include:

Buse Aktas	ETH Zürich, Switzerland
Sarah Berbreiter	Carnegie Mellon University, USA
Xiangzhong Chen	Fudan University, China
Hongsoo Choi	Daegu Gyeongbuk Institute of Science and Technology, Republic of Korea
Donglei Fan	The University of Texas at Austin, USA
Peer Fischer	Heidelberg University, Germany
Dario Floreano	École Polytechnique Fédérale de Lausanne, Switzerland
Ankita Hume	MagnebotiX AG, Switzerland
Cecilia Laschi	National University of Singapore, Singapore
Veronika Magdanz	University of Waterloo, Canada
Denys Makarov	Helmholtz-Zentrum Dresden-Rossendorf, Germany
Sylvain Martel	Polytechnique Montréal, Canada
Barbara Mazzolai	Istituto Italiano di Tecnologia, Italy
Berna Özkale Edelmann	Technische Universität München, Germany
Salvador Pané	ETH Zürich, Switzerland
Giovanni Pittiglio	Harvard Medical School, USA
Martin Pumera	Central European Institute of Technology, Czech Republic
Jerry Qi	Georgia Institute of Technology, USA
Carlos Sanchez Somolinos	Universidad de Zaragoza, Spain
Oliver Schmidt	Technische Universität Chemnitz, Germany
Simone Schuerle	ETH Zürich, Switzerland
Joseph Tracy	North Carolina State University, USA
Franziska Ullrich	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
Robert Wood	Harvard University, USA
Li Zhang	Chinese University of Hong Kong, Hong Kong
Xuanhe Zhao	Massachusetts Institute of Technology, USA

Symposium Organizers

Bradley Nelson

ETH Zürich
Mechanical and Process Engineering
Switzerland
Tel 41797776130, bnelson@ethz.ch

Yu Sun

University of Toronto
Mechanical and Industrial Engineering
Canada
Tel (416) 946-0549, sun@mie.utoronto.ca

Kirstin Petersen

Cornell University
Electrical and Computer Engineering
USA
Tel (607) 255-9335, kirstin@cornell.edu

Renee Zhao

Stanford University
Mechanical Engineering
USA
Tel (650) 723-3148, rrzhao@stanford.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024

Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SF04: Advanced Functional Materials for Extreme Conditions

The ability to collect and transmit signals and control operations within harsh environments is essential for the emerging advanced technologies in energy production and conversion, efficient power transmission, space exploration, nuclear medicine, and other frontier technologies. Developing advanced functional materials for high power devices and novel sensors that can operate in extreme radiation, temperature, stress, and corrosion are at forefront of materials research to meet these growing technological demands. A thorough understanding of wide band gap semiconductor and photonic materials and developing novel approaches in their design, synthesis, and modulating their structures and properties are crucial to advance functional materials and develop new sensors and devices.

This symposium will bring researchers from the electronic and photonic hard materials spectrum working on broad areas including -but not limited to- developing new hard semiconductor materials and devices for high power applications, radiation tolerant hard semiconductor and photonic materials, inorganic material-based radiation detectors, and the next generation of hard material sensors for extreme conditions as these materials most likely share some common properties. The symposium topics will cover fundamental theory, data driven material design, novel synthesis, processing, microstructure and defect control, characterization, and novel device approaches. Artificial Intelligence (AI) and Machine Learning (ML) helps develop new functional materials for extreme conditions through a variety of perspectives. For example, the relationship between input features and target outputs are often unknown. AI and ML enables the implicit mapping the inputs and outputs, resulting in flexible models. In-situ characterization can monitor phase and structural stability, defect production and evolution, changes in electronic and optical properties during extreme irradiation, stress, and temperature conditions. The latest research from academia with the input on the frontier technologies from industry leaders during this symposium will help identifying the material fundamentals of universal radiation tolerance, transmitting high voltage, sustaining harsh structural, physical, and chemical attacks.

Topics will include:

- 2D materials for extreme environments
- Defects in wide band gap materials and 2D materials
- Hard functional materials for extreme environments
- Hard material-based sensors for extreme environments
- Radiation tolerant hard semiconductors
- New materials for radiation detectors
- Multicomponent wide band gap materials for electronics and photonics
- Phonon and electron transport in wide band gap materials

Joint sessions are being considered with **SF05 - Structural and Functional Intermetallics**.

Invited speakers include:

George Brandes	Wolfspeed Inc, USA
Eric Brosha	Los Alamos National Laboratory, USA
Sergio Brovelli	Università degli Studi di Milano-Bicocca, Italy
Ekaterine Chikoidze	Université de Versailles Saint-Quentin-en-Yvelines, France
Francesca Cova	Università degli Studi Milano-Bicocca, Italy
Vladimir Dobrosavljevic	Florida State University, USA
Cyrus Dreyer	Stony Brook University, The State University of New York, USA
Elzbieta Guziewicz	Polish Academy of Sciences, Poland
Aman Haque	The Pennsylvania State University, USA
Ray-Hua Horng	National Yang Ming Chiao Tung University, Taiwan
Anderson Janotti	University of Delaware, USA
Djamel Kaoumi	North Carolina State University, USA
Andrej Kuznetsov	University of Oslo, Norway
Robert Nemanich	Arizona State University, USA
Andrei Osinsky	Agnitron Technology Inc., USA

Stephen Pearton	University of Florida, USA
Siddharth Rajan	The Ohio State University, USA
Manijeh Razeghi	Northwestern University, USA
Farshchi Rouin	First Solar, USA
Kohei Sasaki	Novel Crystal Technology, Japan
Achim Strass	Nexperia, Germany
Anjana Talapatra	Los Alamos National Laboratory, USA
Seth Ariel Tongay	Arizona State University, USA
Blas Uberuaga	Los Alamos National Laboratory, USA
Joel Varley	Lawrence Livermore National Laboratory, USA
Yongqiang Wang	Los Alamos National Laboratory, USA
Grace Xing	Cornell University, USA
Qimin Yan	Northeastern University, USA
Andriy Zakutayev	National Renewable Energy Laboratory, USA
Mary Ellen Zvanut	The University of Alabama at Birmingham, USA

Symposium Organizers

Farida Selim
Arizona State University
School for Engineering of Matter, transport and Energy
USA
Tel (509) 592-7240, Farida.Selim@asu.edu

Jianlin Liu
University of California, Riverside
USA
Tel (951) 827-7131, jianlin.liu@ucr.edu

C.C.(Chih-Chung) Yang
National Taiwan University
Taiwan
Tel 886223657624, ccycc@ntu.edu.tw

Houlong Zhuang
Arizona State University
School for Engineering of Matter, Transport and Energy
USA
Tel (480) 965-0362, hzhuang7@asu.edu

mrs.org/fall2024

2024 MRS® FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SF05: Structural and Functional Intermetallics

The goal of this symposium is to discuss recent progress in understanding, designing and developing intermetallic-based materials for structural and functional applications by bringing together multi-scale experimental and computational research activities on the composition-processing-structure-property relationships. The unique physical and mechanical properties of intermetallic compounds originate from their ordered structures and various crystallographic defects. This basic theory still remains incomplete, and holistic but deep understanding of intermetallics is necessary for their future advancement. Revisiting the definition of intermetallics, in contrast to high entropy alloys that are based on an opposite concept, can highlight the advantages and disadvantages of intermetallics. Intermetallic materials and phases of interest include aluminides, silicides, Laves phases, Heusler phases, and various other geometrically-, topologically- and close-packed compounds. From an applications perspective, presentations related to intermetallic compounds intended for structural and functional applications, including high temperature use in the aerospace and automotive industries, will be considered. This also includes applications for fossil fuel and nuclear industries, energy conversion and storage, ferromagnetic, catalysis, medical, and thermoelectric power.

Topics will include:

- Phase equilibria and phase transformations
- Defect structures and their evolution
- Mechanical and physical properties
- Environmental effects including oxidation and hot corrosion
- Deformation, fracture and underlying mechanisms
- Processing-structure-property relationships
- Design of next-generation intermetallic-based materials
- Advanced processing techniques including additive manufacturing
- Advanced characterization techniques from an atomic level to a macroscopic level
- Computation and modeling studies and informatics approach
- Intermetallic composites and novel superalloys
- Shape memory, catalysis, magnetic, thermoelectric, energy storage and medical applications
- Recent applications in the aircraft, automotive and other industries

Invited speakers include:

Melissa Allen	GfE Metalle und Materialien GmbH, Germany
Dipankar Banerjee	Department of Materials Engineering, Indian Institute of Science, India
Ken Cho	Osaka University, Japan
Alain Couret	Centre d'Élaboration des Matériaux et d'Etudes Structurales, France
Anders Engström	ThermoCalc SA, Sweden
Martin Friak	Czech Academy of Sciences, Czech Republic
Easo George	The University of Tennessee, Knoxville, USA
Bronislava Gorr	Universität Siegen, Germany
David Holec	Montanuniversität Leoben, Austria
Kyosuke Kishida	Kyoto University, Japan
Eric Lass	The University of Tennessee, Knoxville, USA
Yonghoon Lee	KELK Ltd., Japan
John Lewandowski	Case Western Reserve University, USA
Sadao Nishikiori	IHI Corporation, Japan
Toshihiro Omori	Tohoku University, Japan
Tresa Pollock	University of California, Santa Barbara, USA
Pierre Sallot	Safran Aircraft Engines, France
Frank Stein	Max-Planck-Institut für Eisenforschung, Germany
Howard Stone	University of Cambridge, United Kingdom
Naoki Takata	Nagoya University, Japan
Koichi Tsuchiya	National Institute for Materials Science, Japan
Hsin-Jay Wu	National Yang Ming Chiao Tung University, Taiwan
Ying Yang	Oak Ridge National Laboratory, USA
Christopher Zenk	Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Symposium Organizers

Akane Suzuki

GE Global Research
Materials & Manufacturing Technologies
USA
Tel (518) 387-6968, suzukia@ge.com

Yoshisato Kimura

Tokyo Institute of Technology
School of Materials Science and Chemical Technology, Department of Materials Science and Engineering
Japan
Tel 81-45-924-5157, kimura.y.ac@m.titech.ac.jp

Florian Pyczak

Helmholtz-Zentrum Hereon
Institute of Materials Physics
Germany
Tel 49-(0)4152-87-2545, florian.pyczak@hereon.de

Petra Spörk-Erdely

Graz University of Technology
Institute of Materials Science, Joining and Forming
Austria
Tel 43-(0)316-873-1670, petra.spoerk-erdely@tugraz.at

mrs.org/fall2024

2024 MRS FALL MEETING & EXHIBIT

December 1–6, 2024 | Boston, Massachusetts

CALL FOR PAPERS

Abstract Submission Opens–Friday, May 24, 2024
Abstract Submission Closes–Monday, June 24, 2024 (11:59 pm ET)

Reminder: In fairness to all potential authors, late abstracts will not be accepted.

Symposium SF06: From Robotic Towards Autonomous Materials

Soft robotics has made tremendous strides over recent years, with new forms of soft actuators, sensors, and control strategies paving the way for physical intelligence. However, the field still faces challenges in power, performance, and control due to limited materials availability. To overcome these limitations, researchers are turning to nature for inspiration. Multifunctionality is the key to building emergent autonomous behavior that can integrate distributed actuation, perception, control, and energy capabilities in robotic agents. This requires new materials design paradigms that can tightly integrate multiple robotic capabilities to create functional materials that can perform tasks without human intervention. The symposium aims to bring together experts from materials science, soft robotics, chemistry, and mechanics to achieve this interdisciplinary vision. By collaborating across these fields, researchers can build beyond the current visions of robotic materials and create truly autonomous ones. The potential applications of this technology are vast, from soft robots that can perform delicate surgical procedures to autonomous systems that can monitor and repair infrastructure. This innovative approach provides research opportunities where both theory and experiments can produce discoveries and potential applications in Material science and Engineering, such as self-cleaning and functionalized actuators for AR, VR XR applications, environmentally adaptive surfaces, energy systems, responsive surfaces to communicate biological markers, situation adaptive protective gear and more.

Topics will include:

- Materials with distributed and/or embodied sensorimotor behaviors
- Soft material logic and neuromorphic computation
- Stimuli-responsive hydrogels, liquid crystalline materials, and composites
- Architected materials and Soft Robotic Materials
- Additive and digital fabrication of multifunctional and programmable materials
- Modeling, simulation, and control of autonomous materials
- Self-healing, self-regulatory, and homeostatic materials
- Autonomous soft, bioinspired, and/or microscale robots
- Embodied energy and materials for energy scavenging

Invited speakers include:

Tommy Angelini	University of Florida, USA
Bilge Baytekin	Bilkent University, Turkey
Phil Buskohl	Air Force Research Laboratory, USA
Alfred J. Crosby	University of Massachusetts Amherst, USA
Michael Dickey	North Carolina State University, USA
Daniel I. Goldman	Georgia Institute of Technology, USA
Francesco Greco	Scuola Superiore Sant'Anna, Italy
Ryan Hayward	University of Colorado Boulder, USA
Alexandra Ion	Carnegie Mellon University, USA
Mirko Kovac	Imperial College London, United Kingdom
Shlomo Magdassi	The Hebrew University of Jerusalem, Israel
Shingo Meada	Tokyo Institute of Technology, Japan
Markus P. Nemitz	Worcester Polytechnic Institute, USA
Abdon Pena-Francesch	University of Michigan, USA

Kirstin Petersen	Cornell University, USA
James Pikul	University of Wisconsin–Madison, USA
Jordan Raney	University of Pennsylvania, USA
Sheila Russo	Boston University, USA
Francesco Giorgio Serchi	University of Edinburgh, United Kingdom
Herbert Shea	École Polytechnique Fédérale de Lausanne, Switzerland
Robert Shepherd	Cornell University, USA
David Swanson	United States Air Force, USA
Zeynep Temel	Carnegie Mellon University, USA
Ryan Truby	Northwestern University, USA
Thomas Wallin	Massachusetts Institute of Technology, USA
Timothy J. White	University of Colorado Boulder, USA
Emily Whitting	Boston University, USA
Xuanhe Zhao	Massachusetts Institute of Technology, USA

Symposium Organizers

Lucia Beccai

Istituto Italiano di Tecnologia
Soft BioRobotics Perception (SBRP)
Italy
Tel 39-010-2896-369, lucia.beccai@iit.it

Amir D. Gat

Technion–Israel Institute of Technology
Mechanical Engineering
Israel
Tel 972778871957, amirgat@technion.ac.il

Jeffrey I. Lipton

Northeastern University
Mechanical and Industrial Engineering
USA
Tel (203) 415-9267, j.lipton@northeastern.edu

Yoav Matia

Ben-Gurion University of the Negev
Mechanical Engineering
Israel
Tel 972546589995, yoavmatia@bgu.ac.il