

MRS Bulletin

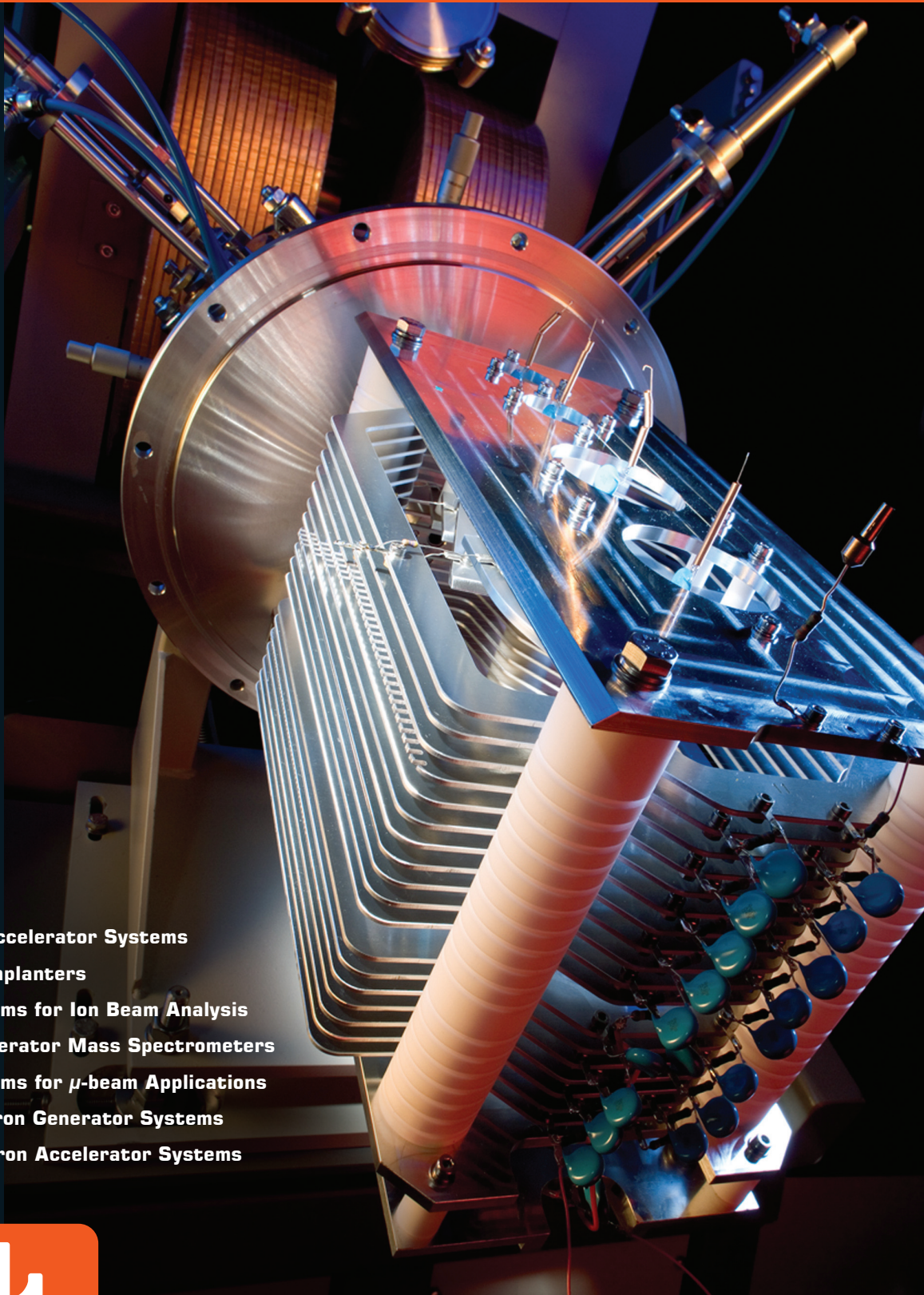
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Bioinspired far- from-equilibrium materials



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Spring Meeting registrations include MRS Membership July 1, 2019 – June 30, 2020

GENERAL INTEREST

NEW! GI01 Advancing Materials Discovery with Data-Driven Science

BROADER IMPACT

BI01 High Impact Practice—Increasing Ethnic and Gender Diversification in Engineering Education

CHARACTERIZATION, PROCESSING AND THEORY

- CP01 Advances in *In Situ* Experimentation Techniques Enabling Novel and Extreme Materials/Nanocomposite Design
- CP02 Design and *In Situ* TEM Characterization of Self-Assembling Colloidal Nanosystems
- CP03 Advances in *In Situ* Techniques for Diagnostics and Synthetic Design of Energy Materials
- CP04 Interfacial Science and Engineering—Mechanics, Thermodynamics, Kinetics and Chemistry
- CP05 Materials Evolution in Dry Friction—Microstructural, Chemical and Environmental Effects
- CP06 Smart Materials for Multifunctional Devices and Interfaces
- CP07 From Mechanical Metamaterials to Programmable Materials
- CP08 Additive Manufacturing of Metals
- CP09 Mathematical Aspects of Materials Science—Modeling, Analysis and Computations

ELECTRONICS AND PHOTONICS

Soft Organic and Biomolecular Electronics

- EP01 Liquid Crystalline Properties, Self-Assembly and Molecular Order in Organic Semiconductors
- EP02 Photonic Materials and Devices for Biointerfaces
- EP03 Materials Strategies and Device Fabrication for Biofriendly Electronics
- EP04 Soft and Stretchable Electronics—From Fundamentals to Applications
- EP05 Engineered Functional Multicellular Circuits, Devices and Systems
- EP06 Organic Electronics—Materials and Devices

Semiconductor Devices, Interconnects, Plasmonic and Thermoelectric Materials

- EP07 Next-Generation Interconnects—Materials, Processes and Integration
- EP08 Phase-Change Materials for Memories, Photonics, Neuromorphic and Emerging Application
- EP09 Devices and Materials to Extend the CMOS Roadmap for Logic and Memory Applications
- EP10 Heterovalent Integration of Semiconductors and Applications to Optical Devices
- EP11 Hybrid Materials and Devices for Enhanced Light-Matter Interactions
- EP12 Emerging Materials for Plasmonics, Metamaterials and Metasurfaces
- EP13 Thermoelectrics—Materials, Methods and Devices

ENERGY AND SUSTAINABILITY

Energy Storage

- ES01 Organic Materials in Electrochemical Energy Storage
- ES02 Next-Generation Intercalation Batteries
- ES03 Electrochemical Energy Materials Under Extreme Conditions
- ES04 Solid-State Electrochemical Energy Storage

Catalysis, Alternative Energy and Fuels

- ES05 Cooperative Catalysis for Energy and Environmental Applications
- ES06 Atomic-Level Understanding of Materials in Fuel Cells and Electrolyzers
- ES07 New Carbon for Energy—Materials, Chemistry and Applications
- ES08 Materials Challenges in Surfaces and Coatings for Solar Thermal Technologies
- ES10 Rational Designed Hierarchical Nanostructures for Photocatalytic System
- ES11 Advanced Low Temperature Water-Splitting for Renewable Hydrogen Production via Electrochemical and Photoelectrochemical Processes

- ES12 Redox-Active Oxides for Creating Renewable and Sustainable Energy Carriers

Water-Energy Materials and Sustainability

- ES09 Advanced Materials for the Water-Energy Nexus
- ES13 Materials Selection and Design—A Tool to Enable Sustainable Materials Development and a Reduced Materials Footprint

- ES14 Materials Circular Economy for Urban Sustainability

Photovoltaics and Energy Harvesting

- ES15 Fundamental Understanding of the Multifaceted Optoelectronic Properties of Halide Perovskites
- ES16 Perovskite Photovoltaics and Optoelectronics
- ES17 Perovskite-Based Light-Emission and Frontier Phenomena—Single Crystals, Thin Films and Nanocrystals
- ES18 Frontiers in Organic Photovoltaics
- ES19 Excitonic Materials and Quantum Dots for Energy Conversion
- ES20 Thin-Film Chalcogenide Semiconductor Photovoltaics
- ES21 Nanogenerators and Piezotronics

QUANTUM AND NANOMATERIALS

- QN01 2D Layered Materials Beyond Graphene—Theory, Discovery and Design
- QN02 Defects, Electronic and Magnetic Properties in Advanced 2D Materials Beyond Graphene
- QN03 2D Materials—Tunable Physical Properties, Heterostructures and Device Applications
- QN04 Nanoscale Heat Transport—Fundamentals
- QN05 Emerging Thermal Materials—From Nanoscale to Multiscale Thermal Transport, Energy Conversion, Storage and Thermal Management
- QN06 Emerging Materials for Quantum Information
- QN07 Emergent Phenomena in Oxide Quantum Materials
- QN08 Colloidal Nanoparticles—From Synthesis to Applications

SOFT MATERIALS AND BIOMATERIALS

- SM01 Materials for Biological and Medical Applications
- SM02 Progress in Supramolecular Nanotheranostics
- SM03 Growing Next-Generation Materials with Synthetic Biology
- SM04 Translational Materials in Medicine—Prosthetics, Sensors and Smart Scaffolds
- SM05 Supramolecular Biomaterials for Regenerative Medicine and Drug Delivery
- SM06 Nano- and Microgels
- SM07 Bioinspired Materials—From Basic Discovery to Biomimicry

www.mrs.org/spring2019

Meeting Chairs

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- Bruce Dunn** University of California, Los Angeles
- Subodh Mhaisalkar** Nanyang Technological University
- Ruth Schwaiger** Karlsruhe Institute of Technology—
Institute for Applied Materials
- Subhash L. Shinde** University of Notre Dame

Don't Miss These Future MRS Meetings!

2019 MRS Fall Meeting & Exhibit
December 1–6, 2019, Boston, Massachusetts

2020 MRS Spring Meeting & Exhibit
April 13–17, 2020, Phoenix, Arizona

FOLLOW THE MEETING!

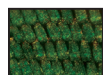
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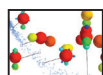
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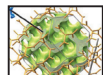
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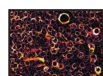
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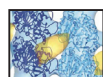
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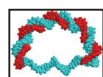
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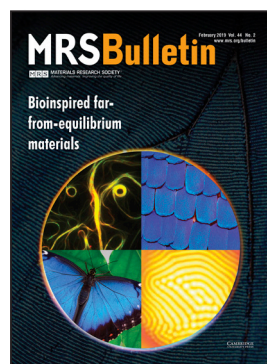
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Bioinspired far-from-equilibrium materials.

Traditional approaches to materials synthesis have mostly relied on uniform, equilibrated phases, leading to static condensed-matter structures. However, departures from such modes of materials design are pervasive in biology, where equilibrium structures, determined by global free-energy minima, are replaced by highly structured dynamical states that are out of equilibrium. The articles in this issue of *MRS Bulletin* elucidate the fundamental principles for the design of out-of-equilibrium dynamic self-assembling

materials systems. The cover shows (clockwise from top right) an optical micrograph of the scales of a *Menelaus blue morpho* butterfly, thermal image of convection cells, a *Menelaus blue morpho* butterfly, and an optical micrograph of actin filaments "flowing" by molecular motors powered by adenosine triphosphate. See the technical theme that begins on page 91.



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About the Materials Research Society

The Materials Research Society (MRS), a not-for-profit scientific association founded in 1973 and headquartered in Warrendale, Pennsylvania, USA, promotes interdisciplinary materials research. Today, MRS is a growing, vibrant, member-driven organization of over 16,000 materials researchers spanning over 80 countries, from academia, industry, and government, and a recognized leader in the advancement of interdisciplinary materials research.

The Society's interdisciplinary approach differs from that of single-discipline professional societies because it promotes information exchange across many scientific and technical fields touching materials development. MRS conducts three major international annual meetings and also sponsors numerous single-topic scientific meetings. The Society recognizes professional and technical excellence and fosters technical interaction through University Chapters. In the international arena, MRS implements bilateral projects with partner organizations to benefit the worldwide materials community. The Materials Research Society Foundation helps the Society advance its mission by supporting various projects and initiatives.

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