

# MRS Bulletin

April 2019 Vol. 44 No. 4  
www.mrs.org/bulletin

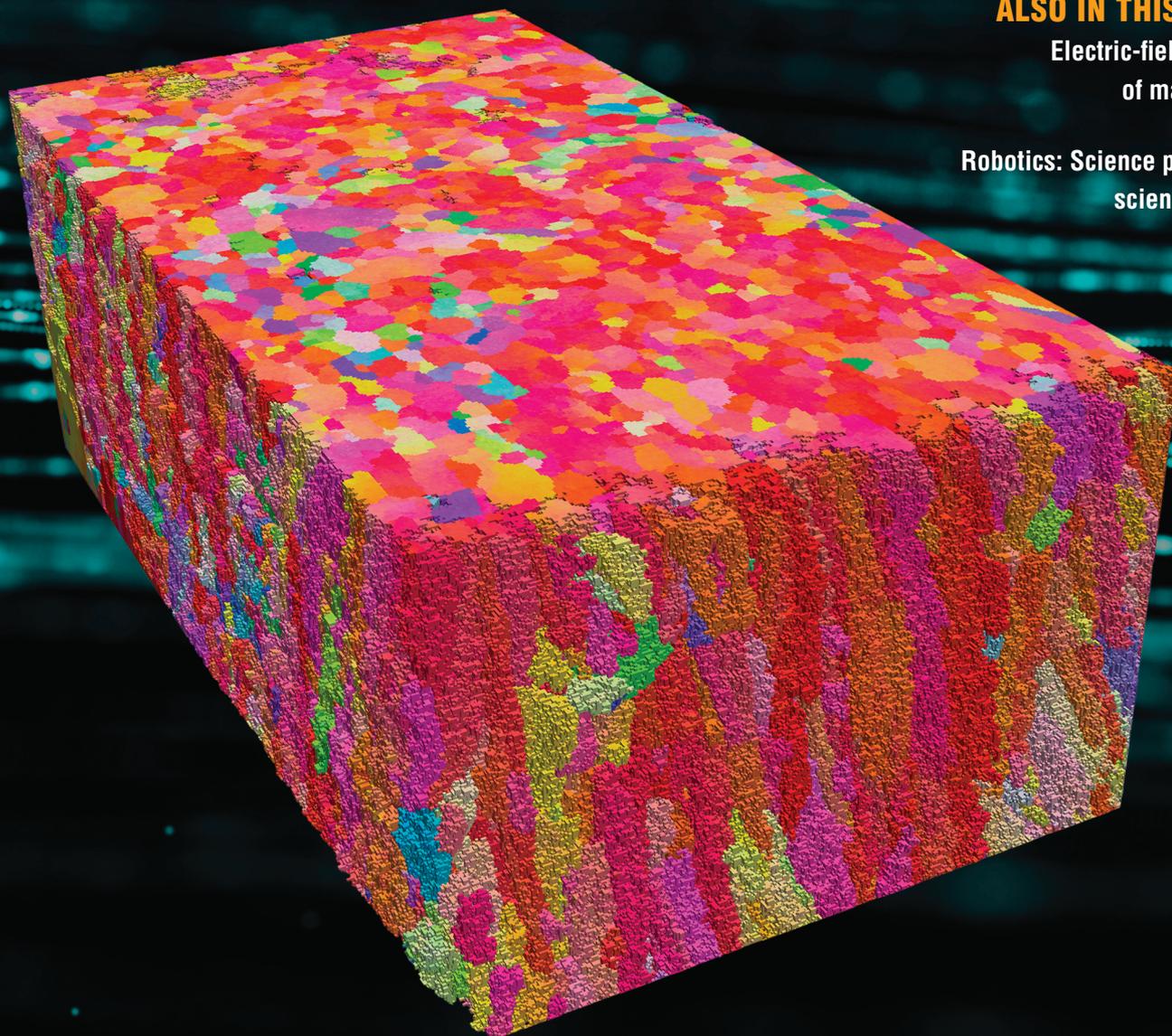
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*Advancing materials. Improving the quality of life.*

## Computational design and development of alloys

### ALSO IN THIS ISSUE

Electric-field control  
of magnetism

Robotics: Science preceding  
science fiction



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# CUSTOMIZED PRODUCTION ION IMPLANTERS



- Beam energies from 10 keV up to several 10s of MeV
- Beam currents from 100 micro-amps up to several milliamps
- Ion species, including H, He, B, P, As and others
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- Electrostatic and/or mechanical wafer clamping



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**Abstract Submission  
Opens  
May 13, 2019**  
**Abstract Submission  
Closes  
June 13, 2019**

# CALL FOR PAPERS

Fall Meeting registrations include MRS Membership January – December 2020

## BROADER IMPACT

BI01 Materials Data Science—Transformations in Interdisciplinary Education

## ELECTRONIC, PHOTONIC AND MAGNETIC MATERIALS

- EL01 Emerging Material Platforms and Approaches for Plasmonics, Metamaterials and Metasurfaces  
EL02 Molecular and Organic Ferro- and Piezoelectrics—Science and Applications  
EL03 Multiferroics and Magnetolectrics  
EL04 Emerging Chalcogenide Electronic Materials—From Theory to Applications  
EL05 Diamond and Diamond Heterojunctions—From Growth and Technology to Applications

## ENERGY AND ENVIRONMENT

- EN01 Challenges in Battery Technologies for Next-Generation Electric Vehicles and Grid Storage Applications  
EN02 Materials for High-Energy and Safe Electrochemical Energy Storage  
EN03 Green Electrochemical Energy Storage Solutions—Materials, Processes and Devices  
EN04 Advanced Membranes for Energy-Efficient Molecular Separation and Ion Conduction  
EN05 Chemomechanical and Interfacial Challenges in Energy Storage and Conversion—Batteries and Fuel Cells  
EN06 Development in Catalytic Materials for Sustainable Energy—Bridging the Homogeneous/Heterogeneous Divide  
EN07 Materials Science for Efficient Water Splitting  
EN08 Halide Perovskites for Photovoltaic Applications—Devices, Stability and Upscaling  
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EN11 Silicon for Photovoltaics  
EN12 Structure–Function Relationships and Interfacial Processes in Organic Semiconductors for Optoelectronics  
EN13 Flexible and Miniaturized Thermoelectric Devices Based on Organic Semiconductors and Hybrid Materials  
EN14 Thermoelectric Energy Conversion (TEC)—Complex Materials and Novel Theoretical Methods  
EN15 Nanomaterials for Sensing and Control of Energy Systems—Processing, Characterization and Theory  
EN16 Advanced Materials, Fabrication Routes and Devices for Environmental Monitoring  
EN17 Structure–Property Processing Performance Relationships in Materials for Nuclear Technologies

## FABRICATION OF FUNCTIONAL MATERIALS AND NANOMATERIALS

- FF01 Beyond Graphene 2D Materials—Synthesis, Properties and Device Applications  
FF02 2D Nanomaterials-Based Nanofluidics  
FF03 Building Advanced Materials via Particle-Based Crystallization and Self-Assembly of Molecules with Aggregation-Induced Emission  
FF04 Crystal Engineering of Functional Materials—Solution-Based Strategies  
FF05 Advanced Atomic Layer Deposition and Chemical Vapor Deposition Techniques and Applications  
FF06 Advances in the Fundamental Understanding and Functionalization of Reactive Materials

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MQ02 Materials for Quantum Computing Applications  
MQ03 Predictive Synthesis and Advanced Characterization of Emerging Quantum Materials

## MATERIALS THEORY, COMPUTATION AND CHARACTERIZATION

- MT01 Advanced Atomistic Algorithms in Materials Science  
MT02 Closing the Loop—Using Machine Learning in High-Throughput Discovery of New Materials  
MT03 Automated and Data-Driven Approaches to Materials Development—Bridging the Gap Between Theory and Industry  
MT04 Advanced Materials Exploration with Neutrons  
MT05 Emerging Prospects and Capabilities in Focused Ion-Beam Technologies and Applications  
MT06 *In Situ* Characterization of Dynamic Phenomena During Materials Synthesis  
MT07 *In Situ/Operando* Studies of Dynamic Processes in Ferroelectric, Magnetic and Multiferroic Materials

## MECHANICAL BEHAVIOR AND STRUCTURAL MATERIALS

- MS01 Extreme Mechanics  
MS02 Mechanically Coupled and Defect-Enabled Functionality in Atomically Thin Materials  
MS03 Mechanics of Nanocomposites and Hybrid Materials  
MS04 High-Entropy Alloys and Other Novel High-Temperature Structural Alloys

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- SB01 Multifunctional Materials—From Conceptual Design to Application-Motivated Systems  
SB02 Multiscale Materials Engineering Within Biological Systems  
SB03 Smart Materials, Devices and Systems for Interface with Plants and Microorganisms  
SB04 Hydrogel Materials—From Theory to Applications via 3D and 4D Printing  
SB05 Light–Matter Interactions at the Interface with Living Cells, Tissues and Organisms  
SB06 Bringing Mechanobiology to Materials—From Molecular Understanding to Biological Design  
SB07 Bioelectrical Interfaces  
SB08 Advanced Neural Materials and Devices  
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SB10 Electronic Textiles  
SB11 Multiphase Fluids for Materials Science—Droplets, Bubbles and Emulsions

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### Meeting Chairs

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### Don't Miss These Future MRS Meetings!

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

2020 MRS Fall Meeting & Exhibit  
November 29–December 4, 2020, Boston, Massachusetts

### FOLLOW THE MEETING!

#F19MRS  

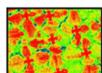
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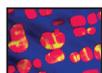
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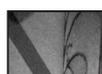
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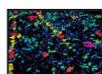
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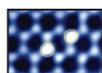
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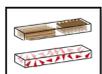
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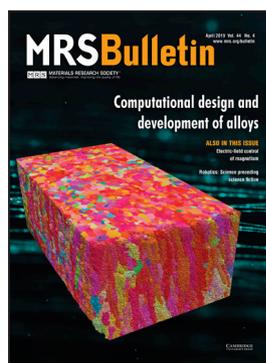


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### ON THE COVER

**Computational design and development of alloys.** The discovery and development of new metallic alloys with unique properties and functionalities have revolutionized entire industries, continuing the centuries-long trend for materials to fundamentally transform society. This issue of *MRS Bulletin* highlights progress in the rapid discovery and design of new multicomponent alloys using improved theory, expanded computational models, and dramatic expansion in data generation, archiving, federation, and analysis. These can be applied across length scales and broad

composition spaces. The cover shows an example of a TriBeam data set of an electron-beam 3D printed nickel alloy. Image courtesy of Andrew Polonsky, University of California, Santa Barbara. See the technical theme that begins on p. 238.



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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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