Inside: Energy Quarterly EQ

MRS Bulletin

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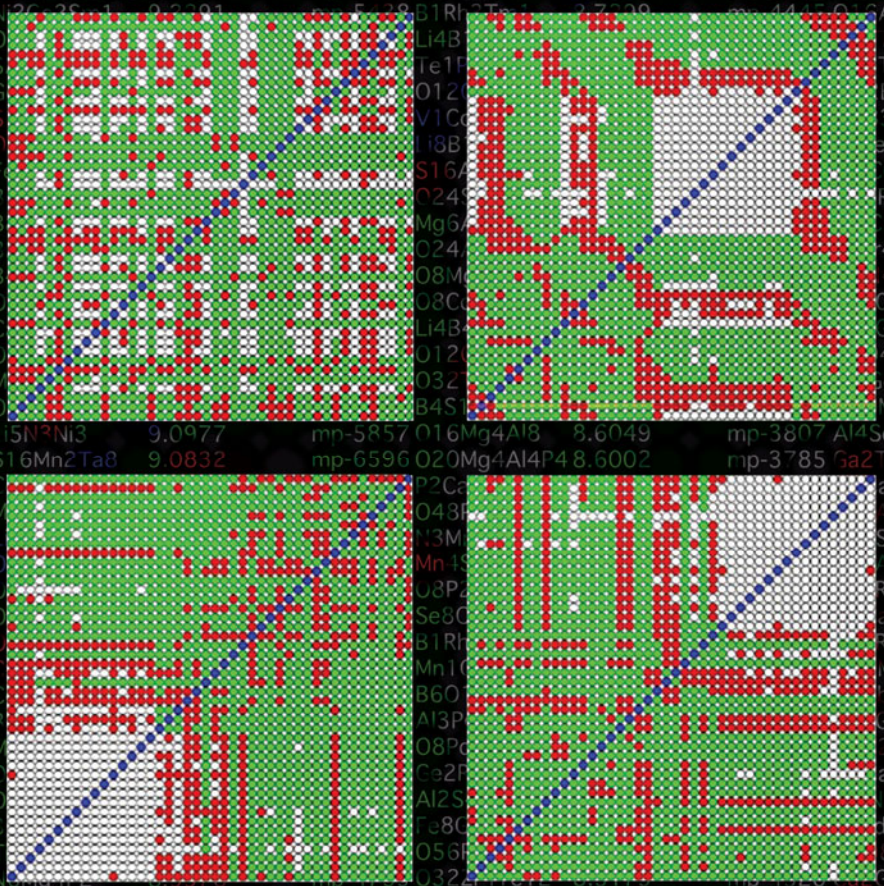
MRS MATERIALS RESEARCH SOCIETY®
Advancing materials. Improving the quality of life.

Data-centric science for materials innovation



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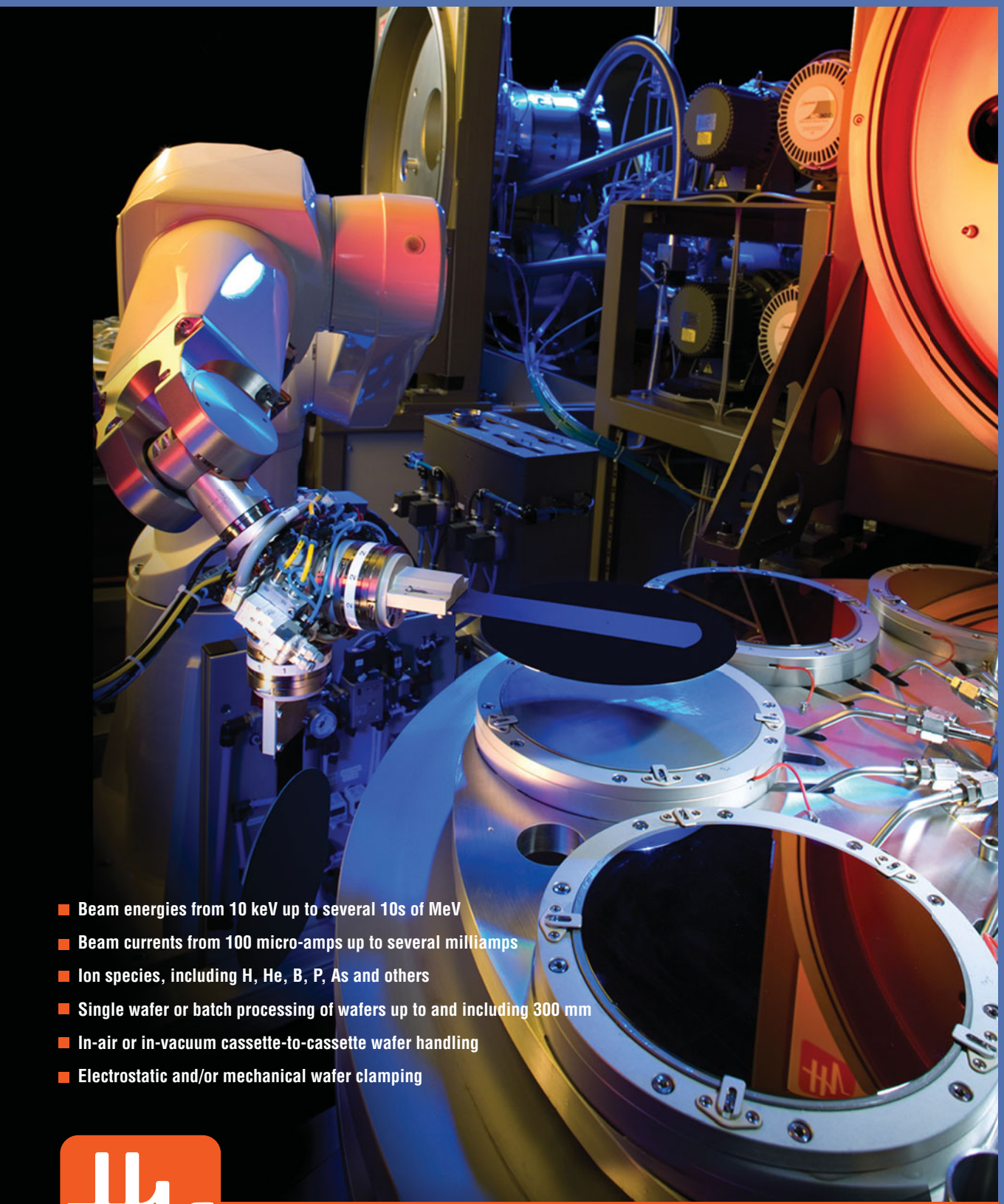
CUSTOMIZED PRODUCTION ION IMPLANTERS



- 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
- Single wafer or batch processing of wafers up to and including 300 mm
- In-air or in-vacuum cassette-to-cassette wafer handling
- Electrostatic and/or mechanical wafer clamping

High Voltage Engineering

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2018 MRS® FALL MEETING & EXHIBIT

November 25–30, 2018 | Boston, Massachusetts

PREREGISTRATION OPENS MID-SEPTEMBER

Fall Meeting registrations include MRS Membership January – December 2019

BROADER IMPACT

BI01 Sustainable Development in Materials Science and Related Societal Aspects
BI02 The Future of Materials Science Academia—Preparing for a Career in Higher Education

BIOMATERIALS AND SOFT MATERIALS

BM01 3D Printing of Passive and Active Medical Devices
BM02 Electronic and Coupled Transport in Biology
BM03 Multiscale Modeling of Soft Materials and Interfaces
BM04 Biomaterials for Regenerative Engineering
BM05 Advanced Manufacturing Technologies for Emulating Biological Tissues
BM06 Plasma Processing and Monitoring for Bioengineering and Biomedical Engineering
BM07 Bioelectronics—Fundamentals, Materials and Devices
BM08 Materials-to-Devices for Integrated Wearable Systems—Energy Harvesting and Storage, Sensors/Actuators and Integration
BM09 Bioinspired Macromolecular Assembly and Inorganic Crystallization—From Tissue Scaffolds to Nanostructured Materials

CHARACTERIZATION, MECHANICAL PROPERTIES AND STRUCTURE–PROPERTY RELATIONSHIPS

CM01 Solid-State Chemistry of Inorganic Materials
CM02 Structure–Property Relations in Non-Crystalline Materials
CM03 *In Situ/Operando* Analysis of Electrochemical Materials and Interfaces
CM04 Ultrafast Optical Probes for Advanced Materials Characterization and Development
CM05 Fundamentals of Materials Property Changes Under Irradiation

ELECTRONIC, PHOTONIC AND MAGNETIC MATERIALS

EP01 New Materials and Applications of Piezoelectric, Pyroelectric and Ferroelectric Materials
EP02 Materials for Manipulating and Controlling Magnetic Skyrmions
EP03 Beyond-Graphene 2D Materials—Synthesis, Properties and Device Applications
EP04 Novel Photonic and Plasmonic Materials Enabling New Functionalities
EP05 Excitons, Electrons and Ions in Organic Materials
EP06 Coherent Electronic Spin Dynamics in Materials and Devices
EP07 Tailored Disorder—Novel Materials for Advanced Optics and Photonics
EP08 Ultra-Wide-Bandgap Materials and Devices
EP09 Diamond Electronics, Sensors and Biotechnology—Fundamentals to Applications

ENERGY—TRANSFER, STORAGE AND CONVERSION

ET01 Solid-State Batteries—Materials, Interfaces and Performance
ET02 Silicon for Photovoltaics
ET03 Application of Nanoscale Phenomena and Materials to Practical Electrochemical Energy Storage and Conversion
ET04 Perovskite Solar Cells—Challenges and Opportunities
ET05 Fundamental Aspects of Halide Perovskite (Opto)electronics and Beyond
ET06 Advanced Materials and Chemistries for High-Energy and Safe Rechargeable Batteries
ET07 Advanced Processing and Manufacturing for Energy Conversion, Storage and Harvesting Devices
ET08 Emerging Materials and Characterization for Selective Catalysis
ET09 Materials for Chalcogen Electrochemistry in Energy Conversion and Storage
ET10 Redox Active Materials and Flow Cells for Energy Applications
ET11 Emerging Materials and Device Concepts for Flexible, Low-Cost Photovoltaic Technologies
ET12 Harvesting Functional Defects in Energy Materials
ET13 Materials for Multifunctional Windows
ET14 Materials Science Facing Global Warming—Practical Solutions for Our Future
ET15 Scientific Basis for Nuclear Waste Management

GENERAL INTEREST

GI01 Machine Learning and Data-Driven Materials Development and Design
GI02 Materials for Next-Generation Robotics
GI03 Synthetic Biology—An Accelerator of Materials Research and Development **NEW!**

NANOMATERIALS

NM01 Carbon Nanotubes, Graphenes and Related Nanostructures
NM02 Nanometal—Synthesis, Properties and Applications
NM03 Nanowires and Related 1D Nanostructures—New Opportunities and Grand Challenges
NM04 Nanomaterials and Nanomanufacturing for Sustainability

PROCESSING AND MANUFACTURING

PM01 Architected Materials—Synthesis, Characterization, Modeling and Optimal Design
PM02 Conductive Materials Reliability in Flexible Electronics
PM03 Hierarchical, Hybrid and Roll-to-Roll Manufacturing for Device Applications
PM04 High-Entropy Alloys
PM05 Electromagnetic Fields in Materials Synthesis—Far from Equilibrium Effects
PM06 Advances in Intermetallic-Based Alloys for Structural and Functional Applications
PM07 Plasma-Based Synthesis, Processing and Characterization of Novel Materials for Advanced Applications

THERMAL PROPERTIES AND THERMOELECTRIC MATERIALS

TP01 Caloric Materials for Highly Efficient Cooling Applications
TP02 Thermal Analysis—Materials, Measurements and Devices
TP03 Emerging Low-Temperature Thermal Energy Conversion Technologies

MEETING CHAIRS

Kristen H. Brosnan GE Global Research
David LaVan National Institute of Standards and Technology
Patrycja Paruch University of Geneva
Joan M. Redwing The Pennsylvania State University
Takao Someya The University of Tokyo

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2018 iMatSci Innovator Showcase

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FOLLOW THE MEETING!

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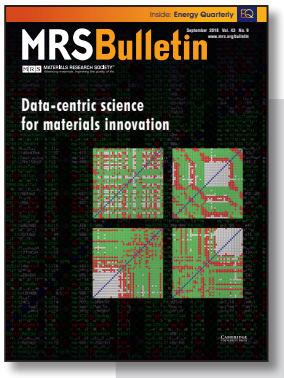
CONTENTS

DATA-CENTRIC SCIENCE FOR MATERIALS INNOVATION

Energy Quarterly



ON THE COVER

Data-centric science for materials innovation. With the development and availability of high-speed computers, networks, and huge data storage, researchers can utilize a large volume and wide variety of materials data generated by experimental facilities and computations. The emergence of these big data as well as advanced analytical techniques has opened unprecedented opportunities for materials research. The cover shows miscibility maps for various combinations of elements in binary alloys. The maps are constructed using data derived from experimental thermodynamic databases, electronic-structure databases, along with data predicted by harnessing machine-learning methods on existing repositories of electronic-structure data. Red and green symbols indicate immiscible and miscible systems, respectively. The white symbols represent systems without available experimental data, while the blue symbols indicate the boundary of alloys consisting of dissimilar elements. The background shows 5000 predicted thermal conductivity results. See the technical theme that begins on p. **659**.

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FEATURES

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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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