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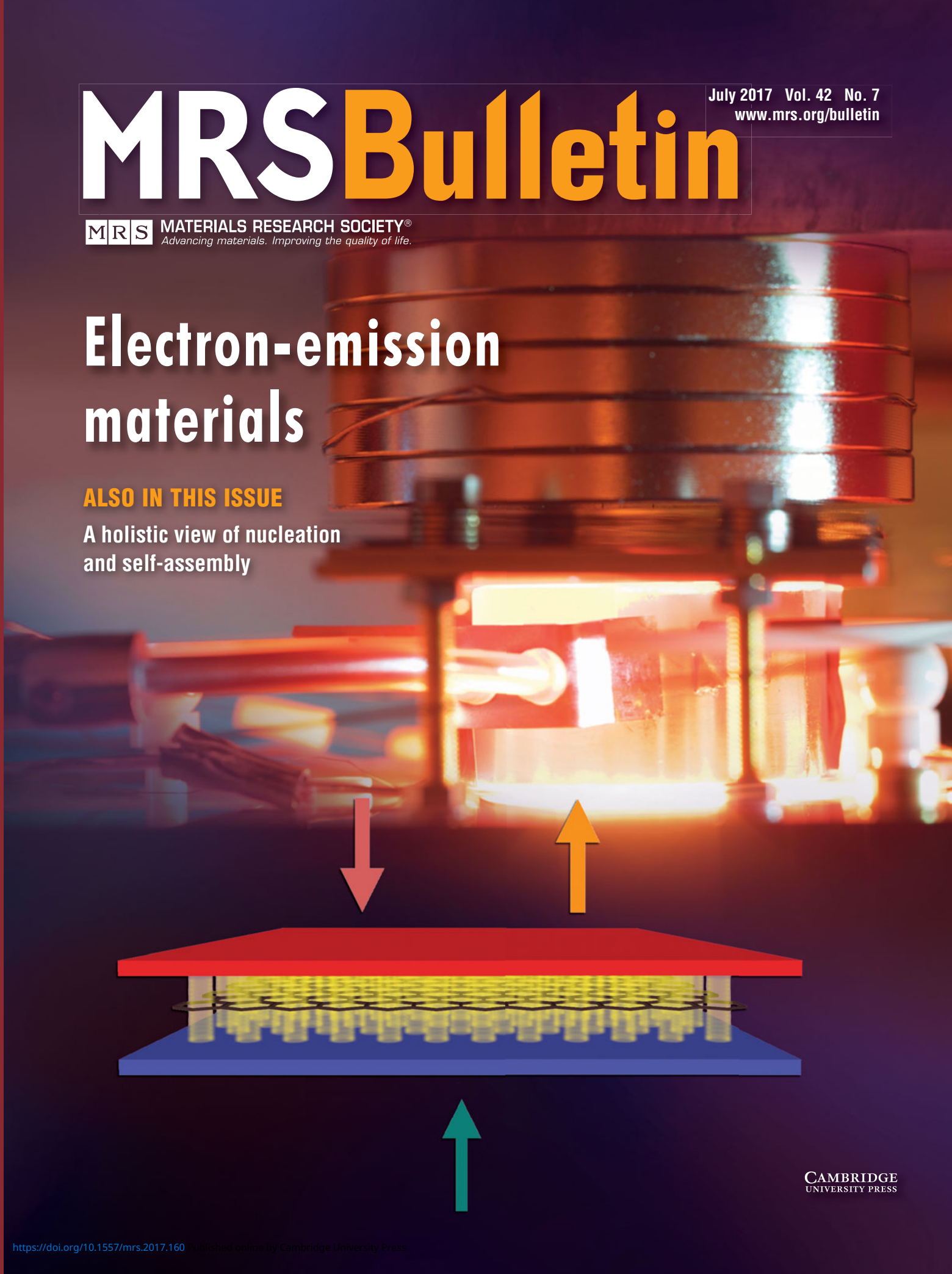
MRS Bulletin

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

Electron-emission materials

ALSO IN THIS ISSUE

A holistic view of nucleation and self-assembly



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2017 MRS® FALL MEETING & EXHIBIT

November 26–December 1, 2017 | Boston, Massachusetts

PREREGISTRATION OPENS MID-SEPTEMBER

BROADER IMPACT

BI01 Community College and University Partnerships as Catalysts for Promoting Materials Science Education
BI02 Materials Innovation for Sustainable Agriculture and Energy

BIOMATERIALS AND SOFT MATERIALS

BM01 Multiscale Mechanobiology and Biomechanics—Theory, Experiments, Computations
BM02 Multiphase Fluids for Materials Science—Droplets, Bubbles and Emulsions
BM03 Biological and Bioinspired Materials for Photonics and Electronics—From Living Organisms to Devices
BM04 Biomaterials for Regenerative Engineering
BM05 Polymer Gels in Materials Science—3D/4D Printing, Fundamentals and Applications
BM06 2D Nanomaterials in Health Care
BM07 Emerging Materials and Devices for Engineering Biological Function and Dynamics
BM08 Materials Design for Neural Interfaces
BM09 Stretchable Bioelectronics—From Sensor Skins to Implants and Soft Robots
BM10 Bioinspired Interfacial Materials with Superwettability
BM11 Modeling, Characterization, Fabrication and Applications of Advanced Biopolymers—Where Form Meets Function
BM12 Biomolecular Self-Assembly for Materials Design

ELECTRONICS, MAGNETICS AND PHOTONICS

EM01 Organic Semiconductors—Surface, Interface, Bulk Doping and Charge Transport
EM02 Multiferroics and Magnetoelectrics
EM03 Novel Materials and Architectures for Plasmonics—From the Ultraviolet to the Terahertz
EM04 Wide- and Ultra-Wide-Bandgap Materials and Devices
EM05 Oxide Interfaces—Lattice and Electronic Defect Interactions
EM06 Diamond Electronics, Sensors and Biotechnology—Fundamentals to Applications
EM07 Materials, Devices and Architectures for Neuromorphic Engineering and Brain-Inspired Computing
EM08 Emerging Materials for Quantum Information
EM09 Electronic and Ionic Dynamics at Solid-Liquid Interfaces
EM10 Solution-Processed Inorganics for Electronic and Photonic Device Applications

ENERGY AND SUSTAINABILITY

ES01 Perovskite Materials and Devices—Progress and Challenges
ES02 On the Way to Sustainable Solar Fuels—New Concepts, Materials and System Integration
ES03 Earth Abundant Metal Oxides, Sulphides and Selenides for Energy Systems and Devices
ES04 Interfaces in Electrochemical Energy Storage
ES05 Materials and Design for Resilient Energy Storage
ES06 Alkali Solid Electrolytes and Solid-State Batteries
ES07 Chromogenic Materials and Devices
ES08 Advanced Nuclear Materials—Design, Development and Deployment
ES09 Thermal Energy—Transfer, Conversion and Storage
ES10 Materials Efficiency to Enable a Circular Materials Economy
ES11 Silicon for Photovoltaics

NANOMATERIALS

NM01 Carbon Quantum Dots—Emerging Science and Technology
NM02 Anisotropic Carbon Nanomaterials—Frontiers in Basic and Applied Research
NM03 Progress in Developing and Applications of Functional One-Dimensional Nanostructures
NM04 Atomically Thin, Layered and 2D Non-Carbon Materials and Systems
NM05 Nanomaterials, Nanoparticles and Nanostructures Produced by Plasmas—Synthesis, Characterization and Applications
NM06 Semiconductor Nanocrystals, Plasmonic Nanoparticles and Metal-Hybrid Structures
NM07 Nanostructure-Based Optical Bioprobes—Advances, Trends and Challenges in Optical and Multimodular Bioimaging and Sensing
NM08 Defect-Induced Phenomena and New States of Matter at the Nanoscale

PROCESSING AND MANUFACTURING

PM01 Explore New Frontiers in Materials Design Using Plasmas—Synthesis, Processing and Characterization
PM02 Advances and Upcoming Research Strategies in Reactive Materials
PM03 Interfaces and Interface Engineering in Inorganic Materials
PM04 Micro-Assembly Technologies—Fundamentals to Applications

THEORY, CHARACTERIZATION AND MODELING

TC01 Multifunctional and Multifrequency Scanning Probe Microscopy
TC02 *In Situ* Studies of Materials Transformations
TC03 Emerging Prospect and Capabilities in Ion Beam Technology and Applications
TC04 Advanced Atomistic Algorithms in Materials Science
TC05 Uncertainty Quantification in Multiscale Materials Simulation
TC06 Mechanical Behavior at the Micro and Nanoscale—Bridging Between Computer Simulations and Experiments
TC07 Design, Control and Advanced Characterization of Functional Defects in Materials

Meeting Chairs

Ilke Arslan Pacific Northwest National Laboratory
Jason A. Burdick University of Pennsylvania
Tao Deng Shanghai Jiao Tong University
James B. Hannon IBM T.J. Watson Research Center
Sanjay Mathur University of Cologne

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CALL FOR EARLY-STAGE STARTUPS
Submission Deadline: August 1, 2017
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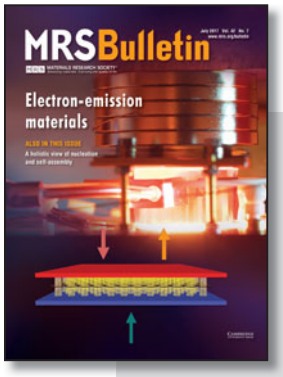
ELECTRON-EMISSION MATERIALS

TECHNICAL FEATURE



ON THE COVER

Electron-emission materials: New generations of emission devices are continuously being improved based on innovative materials and the introduction of physical concepts. Nanotubes, nanowires, graphene, and electron emission models are discussed in this issue, as well as original mechanisms, such as the thermoelectric effect, thermionic emission, and heat-trap processes. The cover shows a photograph of a thermoelectronic energy converter in operation and a sketch of a thermoelectronic energy converter, which shows that input energy absorbed in the top electrode (emitter) causes the emission of electrons, and are guided by a grid potential to the bottom electrode (collector). Images courtesy of R. Wanke et al. See the technical theme that appears on page **488**.

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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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