Journal of MATERIALS RESEARCH
FOCUS ISSUE · MAY 2015

Submission Deadline—September 15, 2014

CALL FOR PAPERS

Radiation Damage and Effects Characterization: State of the Art, Challenges, and Protocols

To enable the development and optimization of advanced materials for in-reactor use in advanced nuclear fission and fusion reactors, and to be able to develop predictive models of irradiation-induced microstructure evolution in these materials, it is essential to understand the mechanisms of radiation damage formation, accumulation, and evolution in these materials. Characterization of radiation damage and effects can be difficult for a variety of reasons associated with the available techniques and/or the materials of interest.

Due to the dynamic nature of irradiation-induced phenomena, the development of *in situ* characterization techniques is necessary to provide a more accurate depiction of radiation damage evolution under irradiation. Three-dimensional tomography and atomic-scale characterization are needed to better characterize radiation damage structures and interface processes. Whether because of the radioactivity induced in neutron irradiated samples or the short depth of penetration of ion irradiation, characterization of radiation damage and effects must be done in small volumes, which calls for the development of small-scale testing of irradiated materials. This Focus Issue is dedicated to the most recent advances in the characterization of radiation damage and effects in nuclear materials (fuels, structural materials, waste forms, and diagnostics/sensors materials).

Contributed articles are sought on the characterization of:

- Radiation damage formation and evolution (e.g., cluster, loop, dislocation)
- Changes in microstructure such as bubble and void formation
- Micro and nanochemistry of irradiation-induced phenomena (e.g., radiation-induced segregation, GB enrichment/depletion, solute segregation at loops)
- Phase transformations under irradiation
- Mechanical property changes due to irradiation

Using techniques including (but not restricted to):

- TEM, *in situ* TEM, TEM tomography of radiation damage
- Atom probe tomography
- Synchrotron radiation characterization, *in situ* synchrotron techniques
- Small scale testing of irradiated materials

Also welcome are papers on multi-scale modeling of radiation damage which can provide a better understanding of damage formation and evolution under irradiation, especially when coupled with characterization experiments.

GUEST EDITORS

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William J. Weber, University of Tennessee-Knoxville, USA
Khalid Hattar, Sandia National Laboratory, USA
Joel Ribis, CEA Saclay, France

MANUSCRIPT SUBMISSION

To be considered for this issue, new and previously unpublished results significant to the development of this field should be presented. The manuscripts must be submitted via the *JMR* electronic submission system by September 15, 2014. Manuscripts submitted after this deadline will not be considered for the issue due to time constraints on the review process. **Submission instructions may be found at www.mrs.org/jmr-instructions.** Please select "Focus Issue: *Radiation damage and effects characterization: state of the art, challenges, and protocols*" as the manuscript type. **Note our manuscript submission minimum length of 6000 words.** All manuscripts will be reviewed in a normal but expedited fashion. Papers submitted by the deadline and subsequently accepted will be published in the Focus Issue. Other manuscripts that are acceptable but cannot be included in the issue will be scheduled for publication in a subsequent issue of *JMR*.

jmr@mrs.org
Please contact **jmr@mrs.org** with questions.

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from the Materials Research Society and Cambridge University Press

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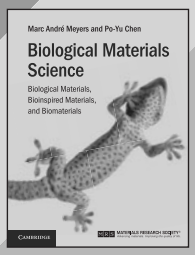

Biological Materials Science
Biological Materials, Bioinspired Materials, and Biomaterials

AUTHORS: Marc André Meyers and Po-Yu Chen
ISBN: 9781107010451
List Price: $99.00
MRS Member Discount Price: $79.00

Split into three sections—Basic Biology Principles, Biological Materials, and Bioinspired Materials and Biomimetics—this book presents biological materials along with the structural and functional classification of biopolymers, bioelastomers, foams, and ceramic composites.

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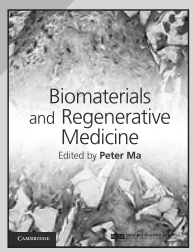
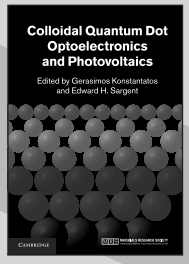


Biomaterials and Regenerative Medicine

EDITOR: Peter Ma
ISBN: 9781107012097
List Price: $185.00
MRS Member Discount Price: $148.00

Emphasizing basic principles and methodology, this book covers stem cell interactions, fabrication technologies, design principles, physical characterization and biological evaluation, across a broad variety of systems and biomaterials.

www.cambridge.org/biomaterials

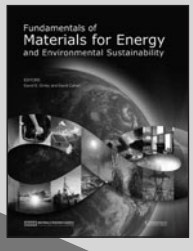


Colloidal Quantum Dot Optoelectronics and Photovoltaics

EDITORS: Gerasimos Konstantatos and Edward H. Sargent
ISBN: 9780521198264
List Price: $130.00
MRS Member Discount Price: $104.00

Written in an accessible style by the world's leading experts, this book captures the most up-to-date research in colloidal quantum dot devices.

www.cambridge.org/colloidal



Fundamentals of Materials for Energy and Environmental Sustainability

EDITORS: David S. Ginley and David Cahen
ISBN: 9781107000230
List Price: $105.00
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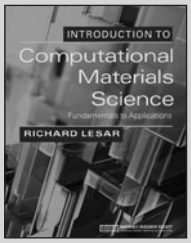

Introduction to Computational Materials Science
Fundamentals to Applications

AUTHOR: Richard LeSar
ISBN: 9780521845878
List Price: $95.00
MRS Member Discount Price: $76.00

Emphasizing essential methods and universal principles, this textbook provides everything students need to understand the basics of simulating materials behavior.

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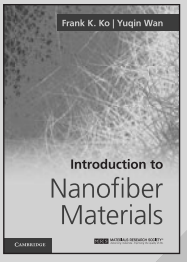

Introduction to Nanofiber Materials

AUTHORS: Frank K. Ko and Yuqin Wan
ISBN: 9780521879835
List Price: $99.00
MRS Member Discount Price: $79.00

Presenting the latest coverage of the fundamentals and applications of nanofibrous materials and their structures for graduate students and researchers, this book bridges the communication gap between fiber technologists and materials scientists and engineers.

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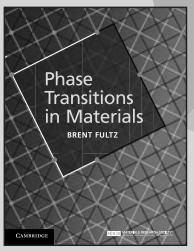

Phase Transitions in Materials

AUTHOR: Brent Fultz
ISBN: 9781107067240
List Price: $90.00
MRS Member Discount Price: $72.00

Offering a fresh viewpoint on phase changes and the thermodynamics of materials, this textbook covers the thermodynamics and kinetics of the most important phase transitions in materials science, spanning classical metallurgy through to nanoscience and quantum phase transitions.

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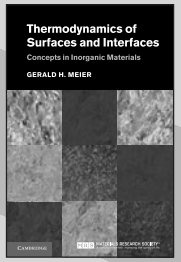

Thermodynamics of Surfaces and Interfaces
Concepts in Inorganic Materials

AUTHOR: Gerald H. Meier
ISBN: 9780521879088
List Price: $120.00
MRS Member Discount Price: $96.00

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- D Materials and Concepts for Biomedical Sensing
- E Hard-Soft Interfaces in Biological and Bioinspired Materials—Bridging the Gap between Theory and Experiment
- F Reverse Engineering of Bioinspired Nanomaterials
- G Plasma Processing and Diagnostics for Life Sciences
- H Micro/Nano Engineering and Devices for Molecular and Cellular Manipulation, Stimulation and Analysis
- I Emerging 1D and 2D Nanomaterials in Health Care

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- J Emerging Non-Graphene 2D Atomic Layers and van der Waals Solids
- K Graphene and Graphene Nanocomposites
- L Optical Metamaterials and Novel Optical Phenomena Based on Nanofabricated Structures
- M Materials and Technology for Nonvolatile Memories
- N Frontiers in Complex Oxides
- O Oxide Semiconductors
- P Hybrid Oxide/Organic Interfaces in Organic Electronics
- Q Fundamentals of Organic Semiconductors—Synthesis, Morphology, Devices and Theory
- R Diamond Electronics and Biotechnology—Fundamentals to Applications

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- U Organic Photovoltaics—Fundamentals, Materials and Devices
- V Sustainable Solar-Energy Conversion Using Earth-Abundant Materials
- W Perovskite-Based and Related Novel Material Solar Cells
- Y Technologies for Grid-Scale Energy Storage
- Z Materials Challenges for Energy Storage across Multiple Scales
- AA Synthesis, Processing and Mechanical Properties of Functional Hexagonal Materials for Energy Applications
- BB Molecular, Polymer and Hybrid Materials for Thermoelectrics
- CC Advanced Materials and Devices for Thermoelectric Energy Conversion
- DD Materials for Advanced Nuclear Technologies
- EE Scientific Basis for Nuclear Waste Management XXXVIII
- FF Materials as Tools for Sustainability

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- GG Nanomaterials for Harsh Environment Sensors and Related Electronic and Structural Components—Design, Synthesis, Characterization and Utilization
- HH Flame and High-Temperature Synthesis of Functional Nanomaterials—Fundamentals and Applications
- II Semiconductor Nanocrystals, Plasmonic Metal Nanoparticles, and Metal-Hybrid Structures
- JJ 3D Mesoscale Architectures—Synthesis, Assembly, Properties and Applications
- KK Directed Self-Assembly for Nanopatterning
- LL Semiconductor Nanowires—Growth, Physics, Devices, and Applications
- MM Carbon Nanotubes—Synthesis, Properties, Functionalization and Applications

THEORY, CHARACTERIZATION AND MODELING

- NN Mathematical and Computational Aspects of Materials Science
- OO *In Situ* Characterization of Dynamic Processes during Materials Synthesis and Transformation
- PP Advances in Scanning Probe Microscopy for Multimodal Imaging at the Nanoscale
- QQ Advances in Nanoscale Subsurface, Chemical and Time-Resolved Studies of Soft Matter
- RR Scaling Effects in Plasticity—Synergy between Simulations and Experiments
- SS Informatics and Genomics for Materials Development
- TT Advanced Materials Exploration with Neutrons and X-Rays—The State-of-the-Art in the International Year of Crystallography

GENERAL

- UU Structure-Property Relations in Amorphous Solids
- VV Reactive Materials—Past, Present and Future
- WW Defects and Radiation Effects in Advanced Materials
- XX Bridging Scales in Heterogeneous Materials
- YY Advanced Structural and Functional Intermetallic-Based Alloys
- ZZ Hierarchical, High-Rate, Hybrid and Roll-to-Roll Manufacturing
- AAA Undergraduate Research in Materials Science—Impacts and Benefits

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The Society's interdisciplinary approach to the exchange of technical information is qualitatively different from that provided by single-discipline professional societies because it promotes technical exchange across the various fields of science affecting materials development. MRS sponsors three major international annual meetings encompassing many topical symposia, as well as numerous single-topic scientific meetings each year. It recognizes professional and technical excellence, conducts tutorials, and fosters technical exchange in various local geographical regions through Section activities and Student Chapters on university campuses.

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