Preview: 2012 Materials Research Society Fall Meeting & Exhibit

Hynes Convention Center Boston, Massachusetts

Meeting: November 25–30 Exhibit: November 27–29

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The Materials Research Society will hold its 2012 Fall Meeting at the Hynes Convention Center in Boston, Mass., November 25–30, 2012. The meeting will include a technical program, tutorials, a plenary session, an awards ceremony, an equipment exhibit, poster sessions, a career center, funding seminars, and other special activities. Symposium proceedings will be published and made available free online to MRS members.

The increasingly cross-disciplinary worldwide activity on materials research culminates every year in the MRS Fall Meetings. Symposium organizers from around the world have created a program of 52 symposia that addresses leadingedge research and captures the extraordinary progress in materials science and technology, featuring an exciting mix of well-established and popular topics. The symposia are organized into the following clusters.

Advances in fundamental materials science are needed in all areas of energy research; the cluster Materials for energy technologies captures the progress and opportunities in energy production, storage, and sustainability. Developments in thermoelectrics, electrocatalysis, solid-oxide fuel cells, and lithiumion batteries will comprise the storage and power conversion areas. Photovoltaic technologies from the materials to systems level will be discussed, and a specific focused symposium on smallmolecule organic solar cells is included. Novel developments in hierarchically structured materials for energy storage and conversion and functional oxides for renewable energy applications will be described. Crucial issues regarding energy-critical materials and

materials for sustainability will be addressed in separate symposia.

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The cluster Soft materials and biomaterials comprises a diverse array of activity, highlighting the versatility of this class of materials. Symposia concerning the electronic properties of polymers, from single-crystalline materials for semiconducting applications to polymer-based photovoltaics, will be presented. Self-assembly forms another core area, with separate symposia concerning biomolecular and biomimetic self-assembly, protein- and peptide-directed self-assembly, colloidal crystals, quasicrystals and their assemblies, and directed self-assembly for nanopatterning. Novel approaches to the creation of bioinspired surfaces, precision polymeric materials, new membrane platforms, and the application of biomimetic nanoscale platforms for biomedical applications will also be reviewed.

Symposia concerning the synthesis and function of a broad range of materials will be available in the cluster **Functional materials and nanomaterials**, providing coverage from nanostructures (semiconductor nanowires, carbon nanostructures, and Group-IV nanostructures) to oxide semiconductors, and oxide nanoelectronics and multifunctional dielectrics. Recent advances in optical, acoustic, and other emerging nanomaterials, as well as optically active nanostructures,

Hotels in Boston

The 2012 MRS Fall Meeting will be held at the Hynes Convention Center and Sheraton Hotel in Boston, Massachusetts. For your convenience, special room rates have been arranged at the following hotels. Rooms are limited at these rates, so make your reservations early. Reservations can be made online at www.mrs.org/f12-lodging.

Discounted Reservation Deadline: November 2, 2012

- Sheraton Boston Hotel Tel: 617-236-2000
 39 Dalton Street Boston, MA 02199
- Boston Marriott Copley Place Tel: 617-236-5800
 110 Huntington Avenue Boston, MA 02116
- The Westin, Copley Place Boston Tel: 617-262-9600
 10 Huntington Avenue Boston, MA 02116
- The Boston Park Plaza Hotel & Towers
 Tel: 800-225-2008
 50 Park Plaza at Arlington Street Boston, MA 02116-3912
- Hilton Boston Back Bay Tel: 617-236-1100
 40 Dalton Street Boston, MA 02115

Discounted Reservation Deadline: November 26, 2012

Embassy Suites Boston at Logan Airport Tel: 617-567-5000 207 Porter Street Boston, MA 02128

State and local taxes are currently at 14.45%



| 2012 MRS Fall Meeting Registration Rates | | |
|--|---|--|
| | Pre-Registration Before 5:00 p.m. (EST) November 9, 2012 | On-Site Registration After 5:00 p.m. (EST) November 9, 2012 |
| Member | \$485 | \$585 |
| Student Member | \$110 | \$140 |
| Nonmember | \$595 | \$695 |
| Student Nonmember | \$135 | \$165 |
| Unemployed/Retired | \$135 | \$165 |

comprise separate themes. Two topical symposia concerning flame synthesis of nanostructures and the geometry and topology of functional nanomaterials are also included.

Dramatic advances in structural materials continue apace and will be highlighted in the cluster **Structural and advanced materials** comprising symposia concerning complex metallic alloys, nanostructured metals, intermetallic-based alloys, reactive materials, and amorphous solids. Materials for nuclear energy, nuclear-waste management, and performance of materials in extreme environments link back to the "energy" theme. At a fundamental scale, the atomic structure and chemistry of domain interfaces and grain boundaries will be explored.

Synthesis, characterization, and modeling methods, addressing forefront approaches to materials characterization, will include approaches to chemical imaging with integrated photon, electron, and ion methods; in situ electron microscopy approaches for correlative structure-property measurement; scanning probe microscopy; low-voltage electron microscopy; and materials exploration through neutrons and x-rays. Materials synthesis with roll-to-roll processing approaches and materials for biomedical sensing will be described. Advanced approaches for dealing with defects and microstructural complexity, and understanding materials through materials informatics and through multiscale materials simulation will round out the program.

To complement the scientific sessions, two symposia regarding the social relevancy of materials science and engineering education and the business of nanotechnology will be available, and tutorials will be offered in several technical areas. Poster sessions, an integral feature of MRS meetings, will be held during the evenings. The meeting chairs will award prizes of up to \$500 for the best posters during each session.

Special sessions and events

The **Plenary Session** will be held on Monday, Nov. 26, at 6:30 p.m. in the Grand Ballroom of the Sheraton Hotel. This year's plenary speaker is Nobel laureate **Dan Shechtman** of the Technion in Haifa, Israel, and Iowa State University. Shechtman will outline the discovery of quasicrystals and discuss their structure as well as some of their properties and uses.

The Award Ceremony will convene on Wednesday, Nov. 28 at 6:30 p.m. in the Grand Ballroom of the Sheraton Hotel, at which the Von Hippel Award, Turnbull Lectureship, MRS Medals, Materials Theory Award, and Graduate Student Gold and Silver Awards will be presented. The ceremony will be followed by the Von Hippel Award address by **Stuart S.P. Parkin**, director of the IBM-Stanford Spintronic Science and Applications Center (SpinAps) at IBM Almaden Research Center in San Jose, Calif., on the topic of spintronics.

The other award recipients will deliver their talks as part of Symposium X, held at 12:15 p.m. in the Grand Ballroom of the Sheraton Hotel. **Robert Sinclair**, chair of the Materials Science and Engineering Department of Stanford University and director of the Stanford Nanocharacterization Laboratory, is the recipient of the **David Turnbull Lectureship.** He will present his lecture, "*In situ* high-resolution transmission electron microscopy of material reactions," on Tuesday, Nov. 27. MRS Medalist Jennifer A. Lewis, the Hans Thurnauer Professor of Materials Science and Engineering and director of the Frederick Seitz Materials Research Laboratory at the University of Illinois at Urbana-Champaign, will present her award talk, "Printing functional materials," on Wednesday, Nov. 28. MRS Medalist Miquel B. Salmeron of the University of California-Berkeley and Lawrence Berkeley National Laboratory will present his award talk, "Physics and chemistry of material surfaces under ambient conditions of gases and liquids: What's new?" on Thursday, Nov. 29.

John P. Perdew of Tulane University in New Orleans, La., selected to receive the Materials Theory Award for density functional theory, will present his talk, "Climbing the ladder of density functional approximations," on Monday, Nov. 26. This award is endowed by Toh-Ming Lu and Gwo-Ching Wang and "recognizes exceptional advances made by materials theory to the fundamental understanding of the structure and behavior of materials."

A special Acta Materialia Materials and Society Award forum on advanced materials and their impact on society will be held in honor of award recipient Mildred Dresselhaus of the Massachusetts Institute of Technology. The full-day forum, chaired by Jay Narayan (North Carolina State University), John Baglin (IBM-Almaden), and Bill Appleton (University of Florida), will be on Sunday, Nov. 25 beginning at 8:30 a.m. The forum will address Dresselhaus's pioneering contributions in advanced materials with emphasis on thermoelectric and carbon-related materials, and how these contributions have resulted in the significant improvements in the quality of life.

New this year is a special emphasis on graphene. Organizers in Symposium W have included technical coverage of this topic as well as a tutorial to be held on Sunday, Nov. 25, and a forum to be held on Tuesday, Nov. 27, 1:30–6:00 p.m. in Ballroom B, Hynes. The forum will be coupled with the *MRS Bulletin* expanded issue on graphene, with guest editors John J. Boeckl and Weijie Lu of the US Air Force Research Laboratory, and Patrick Soukiassian of Universite de Paris-Sud/Orsay and Commissariat a l'Energie Atomique et aux Energies Alternatives.

The discussion on materials and sustainability that began at the 2012 MRS Spring Meeting in San Francisco continues in this Meeting as Symposium G, "Materials as tools for sustainability." Complementing the symposium is a forum sponsored by the National Science Foundation (NSF) titled "Sustainability: Building teams to tackle complex problems." The forum will exemplify successful research efforts in sustainability and address challenges the materials community faces in conducting highly interdisciplinary research, forming teams with diverse backgrounds, and training the next-generation workforce. The forum will be held on Sunday, Nov. 25, then continue on Monday, Nov. 26 in conjunction with the MRS symposium.

Of particular concern in the area of sustainability is the availability of critical elements for energy, to be addressed in Symposium D. Disruptions in the supply of these materials can impede or prevent the adoption of new technologies and ultimately threaten energy security. The organizers will open the symposium with a panel discussion on global issues on Monday, Nov. 26, 11:00–12:00 p.m. in Hynes, room 313.

In the first session of Symposium ZZ, NSF will hold an interactive communications event helping researchers learn how to explain to the public the relevance of materials research, and, more broadly, the value of scientific research to society. The session will be held on Monday, Nov. 26, 1:30–3:30 p.m., Hynes, room 300.

In the area of entrepreneurship, Symposium AAA is holding a roundtable where venture capitalists, lawyers, CEOs, patent attorneys, and bankers will gather to offer their time and advice to potential founder candidates of start-up companies. This is scheduled for Wednesday, Nov. 28, 1:30–5:00 p.m. in Hynes, room 205. The traditional Technology Innovation Forum will precede that on Monday, Nov. 26, 8:30–12:00 p.m. in the Sheraton Hotel, room Back Bay B.

MRS will also host a Congressional Fellowship Program Information Session on Wednesday, Nov. 28, 5:00–6:15 p.m. in Fairfax B at the Sheraton. Materials researchers will be able to hear about opportunities to participate in, and contribute to, the federal policymaking process, while learning firsthand about the intersection of science and US government policy.

A number of other events will also take place throughout the Meeting, including the Professional Development Workshop on "Achieving success through implementation of effective work-life satisfaction and mentoring strategies," with speakers Masha Fridkis-Hareli and Cindy Simpson, and a Career Center for meeting attendees, to be held Nov. 27-29 at the Hynes Convention Center. Services include access to current job postings, a resume file for prospective employers, and on-site interview opportunities. To stay up-to-date with additional events and activities, access www.mrs.org/fall2012.

For more information

See the following pages for a list of exhibitors and of proceedings that will be available for order.

The deadline to pre-register for the meeting is November 9, 2012, 5:00 p.m. (EST). International travelers are reminded to allow ample time to obtain a visa, if necessary. For additional details about the meeting, contact MRS Member Services, Materials Research Society, 506 Keystone Drive, Warrendale, PA 15086-7573, USA; email info@mrs.org, tel. 724-779-3003, and fax 724-779-8313. Details of various events and activities will be published in the Meeting Guide available on-site. The MRS website can be accessed for updated information on confirmed talks and details of special events, for more information on obtaining a visa, and for pre-registration: www.mrs.org/fall2012.







Hynes Convention Center · Level 2

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FALL MEETING Symposium Proceedings

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