

1998 MRS Fall Meeting Preview

November 30–December 4, 1998, Boston, Massachusetts
 Boston Marriott/Copley Place, Westin Hotel/Copley Place, Sheraton Boston Hotel and Towers

Meeting Chairs: Clyde Briant (Brown University), Eric Chason (Brown University)
 Howard Katz (Lucent Technologies, Bell Labs Innovations), and Yuh Shiohara (ISTEC)

From liquids confined to nanometer spaces to vehicles bombarded with particles while traveling in outer space, the 1998 MRS Fall Meeting program will span the range of materials research. The meeting will be filled with a record 44 symposia with nearly 4,000 presentations scheduled, 1,600 of them posters; a packed exhibit; tutorials; special presentations and workshops; and interactive materials science displays. This promises to create a stimulating backdrop for intellectual discussions among colleagues and across disciplines.

A strong emphasis on structural materials emerges in several symposia with the continuing High-Temperature-Ordered Intermetallic Alloys (Symposium KK), and the introduction of a new symposium on Aging of Engineered Systems with Focus on Aircraft, (NN). The latter Symposium will address crack detection and probabilities and risk. It concludes on Tuesday with a panel discussion. In addition, two symposia focus on structural ceramics: PP, Recent Advances in Ceramic Matrix Composites—Structural Design, Fabrication, and Long-Term Use, covering standards and test methods; and Symposium OO, Properties and Processing of Vapor-Deposited Coatings. This symposium includes coverage of superlattices, multilayers, and diamondlike coatings. A major portion of the materials modeling symposia (J and M) will be devoted to issues regarding structural materials and prediction of their mechanical properties. Also, in the area of modeling is Symposium K, Computation of Rates of Activated Processes.

In Symposium M, Fracture and Ductile versus Brittle Behavior—Theory, Modeling and Experiment, findings will be presented on whether faulty rivets might have played a role in the sinking of the Titanic. Earlier analysis of the ship's wrought iron rivets showed that they contained too much slag, the glassy residue left behind after the smelting of ore, making them more brittle than they should have been. Faulty rivets that popped off, causing hull seams to "unzip," might have caused the ship to sink more rapidly than it would have if the rivets had kept the seams closed.

A wide array of topics center around semiconductors, covering polycrystalline thin films, heteroepitaxy, surface and interface dynamics, integration of dissimilar materials in micro- and optoelectronics, film growth using hyperthermal beams, and micro- and nanocrystalline semiconductors (Symposia A–F). Symposium G, GaN and Related Alloys, one of the largest symposia of the meeting, starts on Monday with a morning plenary session of invited talks. This session provides a broad perspective on devices, properties, defects, etching, and contacts. On Wednesday afternoon, a panel discussion will address high-temperature electronics in Japan and the United States. Compound semiconductor lasers, infrared detectors, and thermophotovoltaics will be covered in Symposium H, Infrared Semiconductor Materials and Devices. Commercial applications for compound and SiGe-based semiconductors will be presented in Symposium I, with a particular focus on processing challenges that need to be met for successful production.

Symposium N, Microstructural Pro-

cesses in Irradiated Materials, covers radiation effects in semiconductors, ceramics, nuclear waste materials, and metals, including reactor pressure vessel steels. Session N4, Ceramics and Nuclear Waste Materials, relates also to Symposium QQ: Scientific Basis for Nuclear Waste Management XXII.

Ferroelectric Thin Films VII, Symposium O, is a long-standing symposium, but one that continues to rise rapidly in popularity. Ferroelectric nonvolatile memories and smart cards are coming onto the scene, instigating a need to integrate these materials with other established technologies.

Other important oxides are discussed in Symposia P and Q: Magnetic Oxides and Oxide Devices, and High-Temperature Superconductors—Materials Challenges

A relatively new area for MRS is covered in Symposium T, Recent Progress in Optical Data Storage and Processing. With new DVD technologies emerging, associated storage methods such as three-dimensional optical storage and holography are gaining attention. Although in some cases materials are not limiting progress in this area, there is a need to develop reliable ultrahigh density rewritable storage technologies, such as phase-change technology.

Designed functional organic materials take a key spot in this meeting. Symposium U covers Organics with Supramolecular Structure and Function. Symposium BB examines Nonlithographic Methods for Organizing Materials into Functional Structures, which focuses on self-assembly and methods to make ordered arrays, such as with holographic optical tweezers or template synthesis. Liquids and polymers behave in interesting ways when placed in confined systems, and these dynamics are covered in Symposium W. Note a mostly invited session on Thursday morning covering dendrimers and dendritic macromolecules with properties driven by architecture. Organics converge with semiconductors in Symposium R, Organic Electronic and Photonic Materials and Devices.

In the medical field, advanced materials—particularly polymers—are gaining popularity and taking an active role. Symposium GG examines how polymeric



materials interface with drugs, delivery, and devices. Hydrogels and various sizes of spheres have a role to play in this arena. Hydrogels also behave as bioactive surfaces for tissue engineering (Symposium HH) while composites help with bone regeneration. Symposium II addresses tissue repair, bone regeneration, hydroxyapatite, corrosion and wear of implant materials with a focus on advanced materials and coatings and their effects on the interaction of medical implants with their surroundings. A joint session of Symposia II and HH covers novel materials, porous structures, and tissue engineering.

Device fabrication methods and processing of materials are explored in several symposia. Organics are joined by metals and ceramics in Symposium V, where Solid Freeform and Additive Fabrication are explored. Symposium Y, Plasma Deposition and Treatment of Polymers, examines coating and plasma treatments for biomaterials and materials science of microelectromechanical systems (MEMS), among other materials. Fundamentals of plasma processing are covered including the contribution to global warming of plasma treatments performed with fluorine-containing compounds, as well as plasma processing for electronics and optics. Also, Symposium AA focuses specifically on materials science aspects of MEMS devices.

Thermoelectrics, the solid-state materials utilized in cooling devices used, for example, in cooling beer, have seen a recent resurgence. Now thermoelectric materials can be artificially structured into various quantum composite forms, leading the way to better properties by decoupling the ability to move electrons easily from the ability to curb heat transport. These environmentally friendly devices, with no moving parts, are finding their place for cooling and power generation and will be discussed in Symposium Z, Thermoelectric Materials—The Next Generation Materials for Small-Scale Refrigeration and Power Generation Applications.

Symposium CC, Combinatorial Chemistry and Materials Science, is a new symposium specifically targeting and steering the development of new catalysts and solid-state materials such as phosphors. Recent advances will be discussed in the application of combinatorial chemistry and high-throughput screening to the discovery of novel organic and inorganic materials and to process and device optimization. Traditional methods rely on the slow, one-by-one synthesis and characterization of new compounds. In contrast, the combinatorial approach focuses on the rapid synthesis and characterization of hundreds to

thousands of compounds—often performed in parallel—with the aim of increasing the rate of discovery by orders of magnitude over traditional methodologies. Symposium CC will have in-room posters. A joint session with Symposium FF, Advanced Catalytic Materials, covers combinatorial methods in catalysis.

Solid-state inorganic chemistry and physics of inorganics is covered in Symposium DD, including zeolites as framework structures, transparent conducting oxides, nitride materials, intermetallics, oxides with low or negative thermal expansion, and perovskites. Joint sessions are planned with Symposium EE (Solid State Ionics). Symposium EE also includes supercapacitors and batteries, particularly electrode materials.

Symposium JJ, Materials in Space—Science, Technology, and Exploration, explores materials degradation in orbit (tribology and coatings), space photovoltaics, and science of materials for future exploration and missions as well as results from the Mars Pathfinder mission. Incorporated into this symposium is a plenary session examining important materials issues, a keynote session featuring former mission specialists, and a panel discussion on challenges and opportunities for the next millennium.

In the area of quasicrystals, Symposium LL covers plasticity, thermal expansion, bulk mechanical properties, electrical properties, hydrogen storage, thermal barrier properties, and use as surface coatings.

There also will be a Workshop on Materials Education, Symposium RR, including presentations on introductory materials science and engineering courses, multimedia in materials education, and issues in materials education, including the role of the laboratory and increasing diversity. This symposium offers several panel discussions and a session of hands-on demonstrations.

Special Events

The **Plenary Speaker** will be Nobel Laureate **Richard E. Smalley**, Center for Nanoscale Science and Technology, Rice University. He will present his talk, "Buckytubes—New Materials and New Devices from Carbon," on Monday at 6:00 p.m.

A **U.S. Department of Defense Seminar** will be held Tuesday, 5:30–6:30 p.m., covering "Materials Research Support in the Department of Defense." Robert Trew, Director of Research, Office of the Secretary of Defense, will discuss current and future opportunities for funding of fundamental materials research from within the Department of Defense (DoD).

He will give an overview of DoD research activities and discuss some of the specific programs of potential interest to MRS members. Sources for more detailed information on research areas and proposal submission and evaluation will be given. The session will close with a question-and-answer period.

A **seminar on materials research support at the National Science Foundation** will take place Tuesday 6:30–7:30 p.m. This is the third in a series of user-friendly guides to National Science Foundation support for materials research and education, focusing primarily on the activities of the Division of Materials Research. Following outline presentations by NSF staff, there will be a question-and-answer period about NSF programs, proposal submission, and proposal evaluation. The follow-up drop-in session, to be held Wednesday noon–2:00 p.m., will provide ample opportunity to discuss ideas informally with program directors.

On Wednesday, December 2, 6:00–8:00 p.m. an **IUMRS Forum on International Cooperation** will cover, "A Global Approach to Materials Research: Opportunities and Benefits," sponsored by the International Union of Materials Research Societies (IUMRS) and chaired by R.P.H. Chang (Northwestern University). This forum will focus on what the National Science Foundation and IUMRS are doing with other government agencies and societies to globalize materials research. Specific examples will be given from areas of the world in which opportunities and support exist for collaboration. Possible modes of collaboration and benefits to those who participate will be discussed. A demonstration of Internet-II interactive video link among countries will also be included.

On Thursday, December 3, 6:00 p.m., Salon E, Boston Marriott Hotel, the Von Hippel, Turnbull Lectureship, MRS Medal, and Graduate Student Awards will be presented during the **Awards Ceremony**. Von Hippel recipient **Larry L. Hench** (Imperial College of Science, Technology and Medicine) will present his award lecture on "Medical Materials for the Next Millennium." The **Turnbull Lecture**, "Unsolved Mysteries of Water in its Liquid and Glass Phases," will be presented by **H. Eugene Stanley** (Boston University) Wednesday, December 2, 12:15 p.m. as part of Symposium X. **MRS Medal** recipient **William L. Johnson** (California Institute of Technology) will present "Bulk Glass-Forming Metallic Alloys—Science and Technology" on Wednesday, December 2, 5:00 p.m. in Symposium MM. Special talks by the **Graduate Student Award Finalists** will

be given on Monday, beginning at noon.

Five tutorial sessions by leading experts will be held on Sunday. Concentrating on new, rapidly breaking areas of research these sessions will cover GaN Electronic and Photonic Devices; Ferroelectric Thin Films; New Trends in Applications of Plasma Processing of Polymers; Synthesis of Inorganic Materials; and Materials in Space: Science, Technology, and Exploration.

Symposium X, Frontiers of Materials Research, will present authoritative reviews for nonspecialists during noon-time sessions Tuesday through Thursday. In addition to the Turnbull lecture on Wednesday, other presentations will cover materials science in the automotive industry, silicon micromechanics, perspectives from the U.S. Office of Science and Technology Policy's division of sci-

ence, and industrial partnering at Lawrence Livermore National Laboratory.

A major exhibit encompassing the full spectrum of equipment, instrumentation, products, software, publications, and services will be held Tuesday through Thursday in the Boston Marriott and Westin Hotels, with a reception on Tuesday evening from 5:00–6:30 p.m. in University Hall, Boston Marriott.

The meeting also includes major poster sessions Monday through Wednesday in all three hotels along with Best Poster Competitions featuring awards to the presenting authors of the most outstanding posters as selected by the Meeting Chairs. Posters will be judged on their technical content, overall appearance, graphic excellence, and presentation quality.

A Student Mixer is planned Sunday evening for graduate students and mem-

bers of MRS University Chapters. Also, University Chapter officers and faculty advisors are invited to attend a meeting of MRS University Chapter representatives to compare notes on recent activities and brainstorm on new projects and issues of common concern.

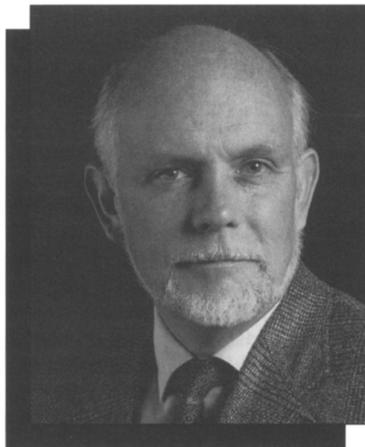
For job seekers a Job Center will be conducted 9:00 a.m.–5:00 p.m. Tuesday through Thursday and a Career Workshop is scheduled for Wednesday.

The 1998 Fall Meeting program is available on the MRS Website: www.mrs.org/meetings/Fall98. For additional copies of the program to share with colleagues, call MRS: 724-779-3003, or e-mail: info@mrs.org. The deadline to preregister for the meeting is **Friday, November 13**. See the following pages for a matrix of symposia sessions, profiles of exhibitors, and other information. 

Plenary Speaker Richard E. Smalley to Discuss Commercially Available Buckytubes

Distinguished recipient of the 1996 Nobel Prize in Chemistry Richard E. Smalley of Rice University will deliver the plenary talk at the 1998 Materials Research Society Fall Meeting in Boston on November 30, at 6:00 p.m. in Salon E of the Boston Marriott. In his talk entitled, "Buckytubes: New Materials and New Devices from Carbon," Smalley will address the tubular extensions of fullerenes now available commercially in small quantities. According to Smalley, in short lengths buckytubes are expected to be the most rigid of beams and effectively unbreakable even when bent in half. He said, "Grown in long ropes they are expected to form the strongest fiber made, with a tensile strength approximately 100 times stronger than steel at only one-sixth the weight." Buckytubes have potential applications in molecular electronics.

Since joining Rice University in 1976, Smalley has risen rapidly through the academic ranks. He was one of the founders of the Rice Quantum Institute in 1979, and served as chair of this interdisciplinary institute from 1986 to 1996. In 1982 he was named to the Gene and Norman Hackerman Chair in Chemistry. Since January 1990 he has also been a Professor in the Department of Physics. He was appointed Director of the new



Richard E. Smalley

Center for Nanoscale Science and Technology at Rice in 1996.

Smalley has made pioneering advances in the development of experimental techniques—including supercold pulsed beams; the ultrasensitive laser detection technique; laser-driven production of free radicals, triplets, metals, and both metal and semiconductor cluster beams—and has applied these techniques to a broad range of vital questions in chemical physics. He is widely known for the dis-

covery and characterization of C_{60} (buckminsterfullerene) which, together with other fullerenes such as C_{70} , now constitutes the third elemental form of carbon (after graphite and diamond). His group was the first to generate fullerenes with metals trapped on the inside.

Smalley received his BS degree in 1965 from the University of Michigan and his PhD degree from Princeton University in 1973, with an intervening four-year period as a research chemist with Shell Chemical Co. During an unusually productive post-doctoral period with Lennard Wharton and Donald Levy at the University of Chicago, Smalley pioneered supersonic beam laser spectroscopy, which has become one of the most powerful techniques in chemical physics.

In 1990 Smalley was elected to the National Academy of Sciences, and in 1991 to the American Academy of Arts and Sciences. He is the recipient of several prizes, including the 1991 Irving Langmuir Prize in Chemical Physics from the American Physical Society; the 1992 APS International Prize for New Materials, which he shares with his colleagues R.F. Curl and H.W. Kroto; the 1997 American Carbon Society Medal; and the 1997 Distinguished Public Service Award from the Department of the Navy. 

Online Materials Research Society Membership Application is available at website:
www.mrs.org/membership/