

# Preview

## 1989 MRS Fall Meeting

**Boston, Massachusetts**  
**Events Scheduled**  
**November 26-December 2**

**Meeting Chairs:**

**Gary L. McVay, Pacific Northwest Laboratories**  
**Robert J. Nemanich, North Carolina State University**  
**James C. Mikkelsen Jr., Xerox Palo Alto Research Center**

The 1989 Fall Meeting of the Materials Research Society will be held at the Boston Marriott and Westin Hotels/Copley Place, Boston, Massachusetts, with events spanning November 26 through December 2.

Program Chairs Gary McVay, Robert Nemanich, and James Mikkelsen have planned an extensive forum of 24 technical symposia. Over 2,400 papers will be presented, offering a thorough examination of mainstream topics as well as introducing some new ones. In keeping with the spirit of interdisciplinarity, the poster sessions have been expanded to accommodate this increasingly popular medium for individual discussion and in-depth conversation.

Also being offered are 22 specialty, review and survey short courses, an equipment exhibit, and a job placement center. The short courses and equipment exhibi-

tors are listed elsewhere in this issue, and the symposium highlights are described below.

Special events at the 1989 MRS Fall Meeting include a plenary address by Dr. Robert N. Noyce, president and CEO of SEMATECH, vice chairman of Intel Corporation, and co-inventor of the integrated circuit with Jack Kilby of Texas Instruments. The Von Hippel Award and graduate student awards will be presented during ceremonies on Wednesday evening, November 29, 1989. New procedures for selecting graduate student award recipients include a graduate student symposium during which approximately 25 finalists selected prior to the meeting will give short presentations of their work. All meeting participants are invited to attend this symposium.

Among additional highlights planned for the 1989 MRS Fall Meeting are two first-time events. The International Materials Research Committee, a group of leaders representing materials research societies worldwide, will hold its inaugural meeting. "Symposium X: Frontiers of Materials Research" will be broadcast live via satellite to a national audience on Monday, November 27, 1989.

For information about the meeting program and registration, see the 1989 MRS Fall Meeting Preliminary Program, which has been mailed to all MRS members. Complete details and final schedules for all events will be published in the Meeting Guide distributed at the meeting. If you need a Preliminary Program, call the MRS Meetings Department at (412) 367-3003; fax (412) 367-4373.

### Symposia

#### **Symposium A—Beam-Solid Interactions: Physical Phenomena**

**Monday, Tuesday, Thursday, Friday, Nov. 27, 28, 30, Dec. 1**

Chairs: James A. Knapp, Sandia National Laboratories; Ray A. Zuhr, Oak Ridge National Laboratory; Peter Borgesen, Cornell University.

This symposium, the latest in a series of MRS symposia on energetic-beam interactions with solids, will consist of 84 oral and 100 poster presentations on both fundamental and applied research on ion, laser,

and electron-beam modification or deposition of materials, with particular emphasis on the physical aspects of these interactions. Presentations will focus on: fundamentals of beam-solid interactions; high-energy ion irradiation effects; phase formation; metastable phase and structure formation; fast transient processing; ion beam mixing; focused ion beams; and molecular dynamics simulations. Invited speakers include J.J. Cuomo, E. Chason, K. Miyake, J. Bottiger, W.L. Johnson, B.J. Garrison, O. Meyer, M.O. Thompson, and E. Johnson.

#### **Symposium B—In-Situ Patterning: Selective Area Deposition and Etching**

**Wednesday-Friday, Nov. 29-Dec. 1**

Chairs: Robert Rosenberg, IBM T.J. Watson Research Center; Anthony F. Bernhardt, Lawrence Livermore National Laboratory; Jerry G. Black, MIT Lincoln Laboratory.

This symposium will serve as a forum on the development of energy-beam-assisted techniques for thin films and their practical application. Approximately 66 oral and 15 poster papers will cover the following ar-

eas: laser photolithography; selective deposition and etching; laser-assisted chemical modification and doping of solids; beam-induced decomposition processes for surface-adsorbed molecules; laser ablation for patterning polymers, superconductors, and other materials; laser planarization; deep UV and x-ray synchrotron processing of thin films; integrated processing of thin films; and the technological implications of beam-induced processing and process monitoring. Invited speakers include G. Taylor, A. Wilson, T.W. Sigmon, S. Kishida, F. Boazo, Y.S. Liu, G. Bronner, F. Bachmann, and D.W. Bauerle.

### Symposium C—Atomic-Scale Structure of Interfaces

**Monday-Wednesday, Nov. 27-29**

Chairs: R.D. Bringans, Xerox Palo Alto Research Center; R.M. Feenstra, IBM T.J. Watson Research Center; J.M. Gibson, AT&T Bell Laboratories.

This symposium will be arranged according to the nature of the problems involved in atomic-scale structure determination rather than by technique. Approximately 61 oral and 35 poster papers will be presented in sessions on: measurement of lattice displacement at interfaces (techniques such as TEM, MEIS and x-ray standing wave interferometry); buried interface examination (includes TEM and x-ray diffraction); theory of interface structure; defects at interfaces (steps, dislocations, etc.); kinetics of interface formation (island growth and nucleation, STM, *in situ* EM, molecular dynamics); very thin interfacial layers and liquid/solid interfaces including STM and x-ray diffraction. Invited speakers include D.K. Biegelsen, R.M. Tromp, J.E. Northrup, E. Bauer, R.C. Pond, K. Akimoto, W.J. Kaiser, R.J. Hamers, G.H. Gilmer, and D.J. Eaglesham.

### Symposium D—Layered Structures-Heteroepitaxy, Superlattices, Strain and Metastability

**Monday-Friday, Nov. 27-Dec. 1**

Chairs: Leo J. Schowalter, Rensselaer Polytechnic Institute; Fred H. Pollak, Brooklyn College of SUNY; Brian W. Dodson, Sandia National Laboratories; Jack E. Cunningham, AT&T Bell Laboratories.

This symposium will include the traditional topics of layered structures and will focus on III-V heteroepitaxial growth dynamics, optical characterization tech-

niques, and superlattices of both crystalline and noncrystalline solids. In addition, issues of strain control and stability of the layered structures, which must be addressed for any practical devices, will be a major topic of this symposium. Approximately 104 oral and 48 poster papers will cover growth dynamics of III-V semiconductors; heteroepitaxy of metals, insulators, and semiconductors (e.g., SiGe/Si, GaAs/Si, Silicides/Si, fluorides, oxides, epitaxial metals on III-V's); structural metastability and relaxation in layered structures; electronic metastability and relaxation in layered structures; metallic superlattices; amorphous/noncrystalline superlattices; optical characterization (including modulation spectroscopy and Raman scattering); and band-structure engineering. Invited speakers include J.P. Harbison, P.S. Peercy, J.Y. Tsao, S.S. Iyer, R. Hull, C.P. Flynn, U.K. Mishra, F. Capasso, P.I. Cohen, P.D. Persans, J. Kakalios, T.P. Pearsall, and O.J. Glembocki.

### Symposium E—Properties of II-VI Semiconductors: Bulk Crystals, Epitaxial Films, Quantum Well Structures, and Dilute Magnetic Systems

**Monday-Friday, Nov. 27-Dec. 1**

Chairs: Jan F. Schetzina, North Carolina State University; Fil J. Bartoli Jr., Naval Research Laboratory; Herb F. Schaake, Texas Instruments.

This symposium will span a wide variety of topics including synthesis of II-VI materials (bulk crystals, thin films, and layered structures); properties studies (electrical, optical, photoelectric, structural, mechanical); defects (theory and measurement); controlled substitutional doping; and applications of II-VI semiconductors. Approximately 91 oral papers will cover bulk crystal growth of wide-gap and narrow-gap materials; epitaxial growth of thin films; growth of wide band gap superlattices; diluted magnetic (semimagnetic) materials; Hg-based quantum wells and superlattices; controlled substitutional doping; defects and compensation phenomena; microstructural characterization techniques; nonlinear optics; and novel applications and device structures. Sessions will consist of invited and contributed papers. Invited speakers include S. Sen, S. McDevitt, A.V. Nurmikko, Y. Marfaing, M. Tamargo, H. Kukimoto, J.M. DePuydt, T.C. McGill, T. Yao, M. Konagai, T. Taguchi, N.C. Giles, J. Arias, Y.

Nemirovsky, S.K. Ghandhi, S.Y. Auyang, C.A. Hoffman, and J.K. Furdyna.

### Symposium F—Diamond, Boron Nitride, Silicon Carbide and Related Wide Bandgap Semiconductors

**Tuesday-Friday, Nov. 28-Dec. 1**

Chairs: Jeffrey T. Glass, North Carolina State University; Russell Messier, Materials Research Laboratory, Pennsylvania State University; Naoji Fujimori, Sumitomo Electric Industries.

For the first time a single symposium will bring together diamond, boron nitride and silicon carbide thin films with semiconducting properties to concentrate on their potential as semiconductors. Approximately 76 oral and 32 poster papers will address: film growth (experiment and theory); doping (*in situ* and ion implantation); electronic properties; thermal properties; device fabrication and characterization; film characterization (surface morphology, defects, etc.); electrical contracts; device modeling and design, and electronic applications. Invited speakers include A.T. Collins, T.R. Anthony, M.W. Geis, W.E. Pickett, N. Fujimori, H. Matsunami, R.F. Davis, B. Molnar, J.I. Pankove, O. Mishima, and Y. Kumashiro.

### Symposium G—Impurities, Defects and Diffusion in Semiconductors: Bulk and Layered Structures

**Monday-Friday, Nov. 27-Dec. 1**

Chairs: J. Bernholc, North Carolina State University; E.E. Haller, Lawrence Berkeley Laboratory; D.J. Wolford, IBM T.J. Watson Research Center.

This symposium will bring together experimentalists and theorists working on defect problems from throughout the various semiconductor systems. Approximately 96 oral and 91 poster papers will report on recent developments in the following areas: electronic structure of shallow and deep-level impurities, impurity complexes, native defects, and atomically ordered alloys; self-diffusion and diffusion of shallow and deep-level impurities and native defects; defect and impurity reactions and thermochemistry, stoichiometry, and alloy-ordering phenomena; interdiffusion and segregation in compounds and layered structures; and hydrogen-related phenomena and impurity passivation in semiconductors. Invited speakers include L.M. Smith, M. Thewalt, Th. Wichert, G.D. Watkins, G.L. Chiarotti, T.L. Estle, B. Pajot, and S.T. Pantelides.

**Symposium H—Materials Issues in Microcrystalline Semiconductors**

**Wednesday-Friday, Nov. 29-Dec. 1**

Chairs: Philippe M. Fauchet, Princeton University; Kazunobu Tanaka, Electrotechnical Laboratory; Chuang Chuang Tsai, Xerox Palo Alto Research Center.

This symposium will focus on fundamental issues involving growth, processing, structural, electronic, and optical properties of microcrystalline semiconductors. Optoelectronic and photovoltaic applications will also be covered. Approximately 50 oral and 15 poster presentations will cover the following areas: growth and processing; structural, electronic and optical characterization; defects, relative roles of intergrain and intragrain phenomena; effect of hydrogen; dopant incorporation; quantum size effects; group IV materials (Si, Ge, and C); semiconductor-doped glasses and colloidal suspensions (CdSe, CdS, etc.); alloys or composites; theoretical models and computer simulations; and optoelectronic and photovoltaic devices. Invited speakers include A. Matsuda, S. Veprek, L. Brus, P.D. Persans, S. Wagner, M. Stutzmann, L. Shimizu, S. Furukawa, Y. Matsumoto, and T. Matsuyama.

**Symposium I—Characterization of Plasma-Enhanced CVD Processes**

**Monday-Tuesday, Nov. 27-28**

Chairs: Gerald Lucovsky, North Carolina State University; Dennis W. Hess, University of California Berkeley; Dale E. Ibbotson, AT&T Bell Laboratories.

This symposium will bring together scientists and technologists to discuss plasma-enhanced deposition of materials, with emphasis on developing a framework to relate plasma-produced gas phase and surface phenomena to the nature of the materials produced. Approximately 36 invited and contributed papers will discuss: processing, structure/morphology, diagnostics, ion-surface chemistry, electrical/optical properties, epitaxial growth, modeling, gas/surface/film chemistry, new materials/applications, and discharges. Invited speakers include A. Garscadden, J-P. Boeuf, J.M. Jasinski, M.L. Mandich, A.S. Harrus, D.L. Smith, S. Dzioba, J.E. Greene, T.M. Mayer, R.A. Rudder, P.K. Bachmann, and M. Hirose.

**Symposium J—Neutron Scattering for Materials Science**

**Monday-Thursday, Nov. 27-30**

Chairs: Stephen M. Shapiro, Brookhaven National Laboratory; Simon C. Moss, University of Houston; James D. Jorgensen, Argonne National Laboratory.

**Calendar of Events\***

	Sunday Nov. 26	Monday Nov. 27	Tuesday Nov. 28	Wednesday Nov. 29	Thursday Nov. 30	Friday Dec. 1	Saturday Dec. 2
Meeting Registration	4:00 p.m.- 9:00 p.m.	7:00 a.m.- 7:00 p.m.	7:30 a.m.- 5:00 p.m.	7:30 a.m.- 5:00 p.m.	7:30 a.m.- 5:00 p.m.	7:30 a.m.- 12 noon	
Technical Symposia	Details in Final Program and Meeting Guide						
Short Courses & Registration	Details in Short Course Brochure						
Manuscript Centers	7:30 a.m.-5:30 p.m.						
Equipment Exhibit			12 noon- 7:00 p.m.	9:30 a.m.- 5:00 p.m.	9:30 a.m.- 2:00 p.m.		
Reception			5:00- 7:00 p.m.				
Poster Sessions			7:00 p.m.- 10:00 p.m.	8:00 p.m.- 10:00 p.m.	7:00 p.m.- 10:00 p.m.		
Plenary Address Robert N. Noyce		6:00 p.m.					
Von Hippel Award Presentation and Lecture, Graduate Student Awards				6:00 p.m. Reception Following			
Graduate Student Mixer			5:00- 6:30 p.m.				
Job Placement Center			9:00 a.m.-5:00 p.m.				
*Final times and events may differ. Complete details and times will be listed in the Final Program and Meeting Guide distributed at the meeting.							

This symposium will elucidate the importance of neutron scattering in characterizing materials. It will consist of tutorial lectures on neutron scattering, including such topics as Rietveld powder analysis, triple axis spectrometry, quasielastic scattering and diffusion, small angle scattering and surface scattering. Approximately 79 invited and contributed papers will emphasize recent results in a wide variety of fields, covering such topics as: high T<sub>c</sub> materials; phase transformations; neutron depth profiling; structure and dynamics of glasses and liquids; surfaces and interfaces; porous media; intercalation compounds and lower dimensional systems; polymer structures; residual stress analysis; and magnetic studies of alloys and multilayers. Invited speakers include J.D. Axe, R. Pynn, J.B. Hayter, B. Farnoux, W. Petry, W.I. David, J. Feisel, R.G. Downing, A.D. Krawitz, J.S. Huang, and D.L. Price.

**Symposium K—Advanced Electronic Packaging Materials**

**Monday-Wednesday, Nov. 27-29**

Chairs: A. Barfknecht, Lawrence Livermore National Laboratory; Che-Yu Li, Cor-

nell University; J. Partridge, IBM T.J. Watson Research Center; C. Julian Chen, IBM T.J. Watson Research Center.

This symposium will provide a forum to report fundamental materials sciences findings on more mature new materials and to address new issues related to packaging design and reliability. A series of invited talks will provide overviews on several new materials and on packaging design and reliability. Approximately 50 oral and 10 poster presentations will address: fundamental materials science of advanced packaging materials and structures (e.g., the defect structure in aluminum nitride and the stability of multi-layered metallizations); packaging design related to advanced materials and structures including thermal, mechanical and electrical designs; and materials sciences of reliability issues related to high performance packages and new packaging systems (e.g., stress-induced voiding in Al-based metallizations, thermal fatigue of solder joints under large displacement, optoelectronic packages, and new testing and inspection techniques). Invited speakers include D.E. Eastman, S.D. Prough, J.P. Krusius, K. Kimbara, J.F. MacDowell, J.D.

Crow, J.G. Fujimoto, M.M. Oprysko, T.L. Koch, P.R. Prucnal, K.S. Abbott, H. Hiramoto, R.E. Newnham, G. Arjavalingam, J. Kim, G.R. Miller, and M. Krishnan.

### Symposium L—Chemical Vapor Deposition of Refractory Metals and Ceramics

**Wednesday-Friday, Nov. 29-Dec. 1**

Chairs: Theodore M. Besmann, Oak Ridge National Laboratory; Bernard M. Gallois, Stevens Institute of Technology.

The scientific issues to be addressed in this symposium include understanding high growth rates, controlling nucleation and renucleation, determining flow dynamics in higher pressure CVD systems, understanding multiphase growth, and controlling internal stresses in thick coatings. Approximately 66 presentations, including a series of overview talks as well as contributed and poster papers will focus on: fundamentals and modeling (kinetics and thermodynamics, fluid flow, heat and mass transfer); *in situ* diagnostics and process monitoring particularly by optical methods; gas phase and surface chemistry (rate and structure controlling reactions, surface poisoning, preferred growth planes); microstructure-process relationships (crystallinity, growth morphologies, multiphase systems, whisker and filament growth); microstructure-mechanical property relationships (hardness, fracture toughness adherence, tribology); and large-scale applications/novel technologies (chemical vapor infiltration, selectivity, organometallic precursors). Invited speakers include C. Bernard, R. Madar, K.E. Spear, K.F. Jensen, R.F. Davis, H. Hintermann, P.D. Shalek, and G.S. Girolami.

### Symposium M—High Temperature Superconductors: Fundamental Properties and Novel Materials Processing

**Monday-Friday, Nov. 27-Dec. 1**

Chairs: Jagdish Narayan, North Carolina State University; Paul Chu, Texas Center for Superconductivity; Lynn Schneemeyer, AT&T Bell Laboratories; David Christen, Oak Ridge National Laboratory.

This symposium will bring together scientists and engineers engaged in basic and applied aspects of high temperature superconductivity. The emphasis will be on original research in the fundamental properties and processing parameters that relate to this new and potentially important class of superconducting materials. Approximately 115 oral and 248 poster papers will address: novel materials systems and processing; intrinsic properties, grain

boundary and surface effects; microstructure and properties correlations, dissipative effects and flux pinning; and atomic-scale characterization techniques. Invited speakers include P.W. Anderson, M.L. Cohen, A.W. Sleight, C.N.R. Rao, R.K. Singh, O.Y. Ying, P.H. Hor, B.C. Giessen, J. Kwo, T. Geballe, C. Chailout, J.D. Jorgensen, S. Pei, D.G. Hinks, B. Dabrowski, D.R. Richards, A.W. Mitchell, D.T. Marx, S.K. Sinha, J.M. Newsam, D. Vaknin, A.J. Jacobson, M. Tinkham, P.H. Kes, Y. Iye, S.J. Pennycook, R. Feigelson, K. Wasa, D.S. Ginley, L.H. Greene, J-M. Triscone, and P. Mankiewich.

### Symposium N—Tailored Interfaces in Composite Materials

**Monday-Wednesday, Nov. 27-29**

Chairs: Carlo G. Pantano, Pennsylvania State University; Eric J.H. Chen, E.I. du Pont de Nemours & Co.

This symposium will emphasize basic understanding of the chemistry, structure, morphology and mechanics of interfaces in all types of composites—polymer matrix, metal matrix, ceramic matrix, and glass matrix—and also the application of this knowledge to tailor the interface through coatings, matrix modification, or process. Approximately 56 oral and 19 poster presentations will discuss: modeling of the interface structure, thermochemistry or mechanical response of interfaces; thermochemistry, polymerization, condensation, bonding, etc. and transport phenomena at interfaces; the effects of interphases and coatings on any or all of the above; mechanical and chemical failure criteria at interfaces; relationship between the interface properties and global properties of the composite; characterization of the interfacial chemistry, structure and forces; and mechanical properties of coatings and interphases in composites. Invited speakers include J.F. Mandell, A.T. DiBenedetto, N. Sung, M.R. Piggott, L.T. Drzal, M. Tirrell, H.T. Hahn, R.A. Lowden, and T.A. Michalske.

### Symposium O—Polymer-Based Molecular Composites

**Monday-Thursday, Nov. 27-30**

Chairs: Dale W. Schaefer, Sandia National Laboratories; James E. Mark, University of Cincinnati.

This symposium will emphasize the manipulation of structure through synthetic protocol and the relationship between properties and submicron structure. Approximately 81 invited and contributed papers will cover the following topics: synthetic approaches to tailored struc-

tures; polymer chemistry and physics at interfaces; microemulsion polymerization; miscibility and blends; liquid crystalline polymers; rigid rod/random coil systems; toughened ceramics; genetically engineered proteins as materials; novel two-phase systems; structure property relationships; electro-optic properties; block copolymers, ionomers, and IPNs; and physical techniques. Invited speakers include H. Schmidt, G.L. Wilkes, F. Candau, C.M. Paleos, D.J. Meier, R.S. Stein, S.J. Krause, W.J. MacKnight, R.M. Briber, H.L. Frisch, A. Eisenberg, R. Kopelman, L.R. Gilliom, T. Kajiyama, P.F. Green, and T. Kurauchi.

### Symposium P—Optical Fiber Materials and Processing

**Monday-Wednesday, Nov. 27-29**

Chairs: James W. Fleming, AT&T Bell Laboratories; George H. Sigel, Rutgers University; S. Takahashi, NTT Opto-Electronics Laboratory; P.W. France, British Telecom Research Laboratory.

This symposium will consider high silica and new multicomponent oxide glasses, halide and chalcogenide glasses, polymers, hollow core lightguides, new and specialty optical fiber coating materials, and crystalline fiber materials. Emphasis will be on new methods of preparation and characterization, new material systems, composition-property relationships, and process effects on properties. Among the 51 presentations are a series of overview and tutorial talks by invited speakers as well as contributed papers. Topics include: high silica optical fiber materials and processing; infrared optical fiber materials and processing; polymer optical fiber materials and processing; crystalline optical fiber materials and processing; optically active materials for fiber applications; materials and processing for integrated optics; and materials and processing of optical fiber coatings. Invited speakers include S.R. Nagel, A.J. Hurd, I. Thomas, R. Huff, P.J. Lemaire, P.W. France, T. Yamamoto, N. Takato, R. Stolen, and E. Snitzer.

### Symposium Q—Electrical, Optical, and Magnetic Properties of Organic Solid State Materials

**Monday-Friday, Nov. 27-Dec. 1**

Chairs: Long Y. Chiang, Exxon Research & Engineering Company; Paul Chaikin, Princeton University; Dwaine Cowan, Johns Hopkins University.

This symposium will focus on the materials research associated with electronic, optical and magnetic properties of organics with an emphasis on the chemistry and

physics involved in materials synthesis and processing, physical properties study, material application and theoretical understandings. The symposium will also highlight the recent R&D aimed to synthesize organic molecular and polymeric ferromagnets. Presentations will include approximately 111 oral and 17 poster papers. Topics include: organic ferromagnets; synthetic organic metals and organic superconductors; spin density waves of organic charge-transfer complexes; organic conducting conjugated polymers; and nonlinear optical organics. Invited speakers include D.O. Cowan, A.J. Heeger, A.F. Garito, Z. Yoshida, A.G. MacDiarmid, A.J. Epstein, G. Saito, V.N. Laukhin, M. Tokumoto, E.B. Yagubskii, A.M. Kini, A.J. Epstein, J.B. Torrance, F. Wudl, H. Iwamura, K. Itoh, J. Zyss, D.S. Donald, E.W. Conwell, G. Gruner, P. Garoche, J.S. Brooks, P.D. Townsend, and D.J. Sandman.

### Symposium R—Materials Synthesis Utilizing Biological Processes

**Tuesday-Thursday, Nov. 28-30**

Chairs: Peter C. Rieke, Battelle Pacific Northwest Laboratory; Mark Alper, Lawrence Berkeley Laboratory; Paul D. Calvert, Arizona Materials Laboratories.

This symposium will bring together biologists, chemists and materials scientists in an attempt to assess the state of the field, report on recent results and explore the potential for this new area of materials science. Approximately 54 papers will address such key questions as:

- How do organisms process soluble products into highly structured materials?
- How can organisms be used directly in the synthesis of materials?
- How can biological processes be used *in vitro* in the synthesis of materials?
- What new materials may be made by using, modifying or mimicking biological processes?

Topics will span: biological and biomimetic inorganic materials; synthesis and characterization of polymers and other organic materials produced by biological systems *in vivo* or *in vitro*; and structural, optical, magnetic, and electrical properties and applications. Invited speakers include R.P. Blakemore, H.C. Slavkin, A.I. Caplan, E.D. Eanes, and J.G. Sivak.

### Symposium S—Multi-Functional Materials

**Wednesday-Friday, Nov. 29-Dec. 1**

Chairs: Donald R. Ulrich, U.S. Air Force; Alan J. Buckley, Hoechst Celanese Research Company; Frank E. Karasz, University of Massachusetts; George

Gallagher-Daggitt, Ministry of Defence, U.K.

The objective of multifunctionality in materials is to combine several functions into a single material system, or into composite and hybrid material systems. These functions are the design of physical, mechanical and thermal properties into a material concurrent with a combination of solid state properties to include electro-optical and nonlinear optical response, pyroelectricity, piezoelectricity, photoconductivity, electrical conductivity, semiconductivity, ferromagnetism, ferroelectricity, and superconductivity. Approximately 45 invited and contributed presentations will cover: nano-designing of multifunctional materials; theory and modeling; devices—options and issues; functional group ordering and orderable phenomena; inorganic-organic systems and sol-gel microcomposites; polymer blends, alloys, block copolymers, guest-host structures, and molecular composites; liquid crystalline polymer systems; hierarchical structuring; multilayered structures; and ceramic-polymer metal hybrid systems. Invited speakers include I.A. Aksay, R. Roy, L.L. Hench, R. Lytel, H.K. Hall Jr., P.N. Prasad, D. Davidov, H.A. Goldberg, M.R. Worboys, J.D. Mackenzie, R.E. Newnham, R.F. Kovar, N.J. Phillips, G. Williams, G.S. Attard, N. Ogata, G.R. Davies, A.H. Windle, E.L. Thomas, and M.P. Mingos.

### Symposium T—Fractal Aspects of Materials

**Tuesday-Friday, Nov. 28-Dec. 1**

Chairs: J.H. Kaufman, IBM Almaden Research Center; James E. Martin, Sandia National Laboratories; P.W. Schmidt, University of Missouri, Columbia.

Approximately 67 oral and 33 poster papers will span all materials science areas involving fractals, including such topics as scattering, fractal measures, gelation, critical phenomena, reaction kinetics, fracture, scaling phenomena in disordered systems and other related themes. Invited speakers include C.M. Knobler, F. Family, W. Klein, C. Tricot, G.M. Dimino, J. Feder, C.C. Barton, P. Pfeifer, P. Meakin, M.E. Cates, M. Rubinstein, C. Evertsz, and T. Vicsek.

### Symposium U—Scientific Basis for Nuclear Waste Management XIII

**Monday-Thursday, Nov. 27-30**

Chairs: Virginia M. Oversby, Lawrence Livermore National Laboratory; Paul W. Brown, Materials Research Laboratory, Pennsylvania State University.

This symposium will focus on the science underlying materials issues related to

radioactive waste disposal. Sessions will cover waste forms, engineered materials, repository, safety analysis and performance assessment, and radionuclide migration—including sorption and speciation studies. Approximately 61 oral and 44 poster presentations are planned. Topics include spent fuel characterization and degradation mechanisms; glass waste form characterization and dissolution mechanisms; properties and performance of cementitious waste forms; use of natural materials as analogs for waste form performance; corrosion mechanisms of container materials; properties and performance of buffer and backfill materials; speciation and migration of radionuclides; *in situ* testing of waste package materials; validation studies; and performance assessment and safety analysis modeling studies. Invited speakers include F.P. Glasser, I.G. Richardson, A. Navrotsky, G. Choppin, and J. Feder.

### Symposium V—Macromolecular Liquids

**Monday-Friday, Nov. 27-Dec. 1**

Chairs: Cyrus R. Safinya, Exxon Research & Engineering Company; Samuel Safran, Exxon Research & Engineering Company; Philip A. Pincus, University of California/Santa Barbara.

This symposium initiates a new program on the interdisciplinary subject of macromolecular liquids which includes a broad range of material systems of high scientific and technological interest. These are partially ordered or disordered phases where the individual molecular species have organized themselves on length scales larger than simple fluids, typically between 10 Angstroms and several microns. The specific systems (which include membranes, microemulsions, micelles, liquid crystals, colloidal, suspensions, and polymers) have a major impact on a broad spectrum of technological industries such as pharmaceuticals, soap and detergents, displays, chemicals and petroleum, and plastics. Approximately 88 oral and 13 poster presentations will span polymers; micelles, monolayers, and microemulsions; liquid crystals and membranes; colloids; and gels. Invited speakers include W.W. Graessley, L. Leibler, S.J. Candau, G.B. Benedek, P.S. Pershan, D. Roux, Y. Talmon, D.S. Pearson, S.T. Milner, R. Bruinsma, G.H. Fredrickson, H.N.W. Lekkerkerker, D.A. Weitz, W.B. Russel, J.W. Goodwin, H.H. Winter, J. Bock, N.A. Clark, F. Candau, F.E. Filisko, M.W. Kim, D. Andelman, S. Garoff, T.A. Witten, M. Kardar, S. Leibler, G.S. Grest, R.B. Meyer, and M. Robbins.

## Symposium X Research Presentations to be Broadcast Nationally Via Satellite

Five of the most exciting new developments in materials research being reported at the 1989 MRS Fall Meeting will be broadcast live to a national audience. The session will be interactive, with viewers from remote locations able to participate during the question-and-answer periods. The session will be broadcast via PBS and NTU for universities and industry on Monday, November 27, beginning at 12:00 noon (Eastern Time) as part of Symposium X, "Frontiers in Materials Science."

"This broadcast is an exciting new opportunity for MRS to facilitate the dissemination of critical materials research as broadly as possible," explained Symposium X Chair Rustum Roy (Pennsylvania State University). He noted that MRS is already well known for its pioneering efforts in numerous other scientific communications areas, namely, in establishing multiple topic meetings and employing extensive poster session formats to encourage interaction across the many materials research disciplines.

The broadcast of Symposium X, he emphasized, is a natural outgrowth of the MRS philosophy of exploring innovative ways to enable researchers to gain access to the most recent research results.

"Although other organizations and professional societies have previously used video or broadcast media for educational purposes, the MRS Fall Meeting will be the site of the first use of an electronic/satellite medium to transmit current research information normally done in a technical meeting," he said.

"This is an exciting first step that one can expect will eventually lead to making an entire scientific meeting available both nationally and internationally via satellite," he explained. "Time and distance will then no longer be obstacles in the worldwide communication of materials research information."

The MRS Fall Meeting broadcast will include the following presentations:

- "New Steels by Design," G.B. Olson, Northwestern University, Evanston, IL.
- "Diamond Schottky Diodes Based on Growth of Thick ( $>100\mu$ ) B-Doped Homoepitaxial Films," G. Gildenblat, S.A. Grot, C.W. Hatfield, C.R. Wronski, A.R. Badzian, T. Badzian, and R. Messier, Pennsylvania State University, University Park, PA.
- "Materials Synthesis Utilizing Biological Processes," Mark Bednarski, Center for Advanced Materials, Lawrence Berkeley Laboratories, Berkeley, CA.
- "Liquid Crystalline Materials for Polymers With Anisotropic Ultrastructures," G.S. Attard, University of Southampton, UK.
- "Pulsed UV-Laser Processing for Ultra-High-Speed Device Technology," Thomas W. Sigmon, Stanford University, Stanford, CA; Kurt H. Weiner, Lawrence Livermore National Laboratory, Livermore, CA; and Paul G. Carey, Siemens, Munich, FRG.

Symposium X sessions on Tuesday through Friday, focusing on topics of a tutorial nature, will not be broadcast.

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phasis on the use of modern materials characterization tools to understand structure, properties and reactions during utilization or disposal. A joint session will be held with Symposium Y: Specialty Cements with Advanced Properties. Invited speakers include G.J. McCarthy, R.F. Feldman, R.H. Mills, and P.L. Pratt.

## Symposium X—Frontiers of Materials Research

### Monday-Thursday, Nov. 27-30

Chair: Rustum Roy, Materials Research Laboratory, Pennsylvania State University.

This traditional luncheon-time series consists of authoritative review papers of a tutorial nature designed for the nonspecialist. The reviewers at this meeting will bring the audience up to date on the following topics: "New Steels by Design" (G.B. Olson); "Diamond Schottky Diodes Based on Growth of Thick ( $>100\mu$ ) B-Doped Homoepitaxial Films" (Pennsylvania State University); "Materials Synthesis Utilizing Biological Processes" (M. Bednarski); "Liquid Crystalline Materials for Polymer with Anisotropic Ultrastructures" (G.S. Attard); and "Super High T<sub>c</sub> Thin Films" (R.K. Singh). Besides being made available in the *Journal of Materials Education*, Symposium X will be broadcast live via satellite to selected industrial laboratories by the Public Broadcasting System on Monday, November 27, 1989.

## Symposium Y—Specialty Cements with Advanced Properties

### Monday-Wednesday, Nov. 27-29

Chairs: Barry E. Scheetz, Materials Research Laboratory, Pennsylvania State University; Ivan Odler, Tech Universitat; Hamlin Jennings, Northwestern University; Albert Landers, Armstrong World Ind.

This symposium will cover a wide range of cementitious systems used in a variety of applications. Approximately 31 invited and contributed papers will deal with chemistry, processing, microstructure rheology, durability, properties, and applications of specialty cements. Authors will emphasize the nonstructural aspects of these cementitious materials and their ability to perform unique functions. A joint session will be held with Symposium W: Fly Ash and Coal Conversion By-Products. Invited speakers include L.C. Chow, S. Wise, J.F. Macdowell, and W.D. Kirkpatrick.



## Symposium W—Fly Ash and Coal Conversion By-Products Characterization, Utilization and Disposal VI

### Wednesday-Friday, Nov. 29-Dec. 1

Chairs: F.P. Glasser, University of Aberdeen; Robert L. Day, University of Calgary.

This symposium is the eighth in a series dealing with characterization, utilization

and disposal of fly ash and other by-products of coal combustion and conversion (bottom ash, boiler slag, gasification ash, etc.). Among the 26 papers at this year's symposium are presentations on residues from advanced SO<sub>2</sub> control, resource recovery, ash beneficiation, engineering applications, and groundwater quality at ash disposal sites. A continuing feature of the symposium has been the em-

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