Preview

1990 MRS Fall Meeting

Boston, Massachusetts
Events Scheduled
November 26 - December 1, 1990

Meeting Chairs:

Robert Hull, AT&T Bell Laboratories

Gregory J. McCarthy, North Dakota State University

Frans Spaepen, Harvard University

The 1990 Fall Meeting of the Materials Research Society will be held at the Boston Marriott and Westin Hotels, Boston, Massachusetts, with events spanning November 26 through December 1.

Program Chairs Robert Hull, Gregory McCarthy, and Frans Spaepen, who bring to the meeting considerable experience in symposium organization, have planned a roster of events that will foster interdisciplinarity and high scientific standards, and span a full range of materials.

Twenty-six symposia will address traditional strengths of the Materials Research Society and also present some new titles. Several topics feature a shift in emphasis that keeps pace with current research trends. Among the newer titles are "Mechanical Properties of Porous and Cellular Materials (Symposium I); "Long Wavelength Semiconductor Devices, Materials and Processes" (Symposium T); "Advanced Tomographic Imaging Methods for the Analysis of Materials" (Symposium U); and "Nanostructures: Fabrication and Physics" (Symposium Y). A number of joint sessions and three major poster sessions will offer participants extended opportunities for interaction with their colleagues.

Augmenting the opportunities for interaction are the equipment exhibit (a major show with 116 exhibitors) and a job placement center.

The short course program, a regular feature at MRS meetings, will offer a selection of 22 up-to-date specialty, review, and survey courses. (See p. 79 in this issue for a complete list, including seven new courses.)

NASA Astronaut Bonnie Dunbar will deliver the plenary address Wednesday evening, November 28 at the Boston Marriot Copley Place Hotel. She will also receive the Presidential Award of the Materials Research Society from MRS President Russell R. Chianelli in recognition of her contribution in raising public awareness of materials science. During the ceremony, Dunbar will return the MRS banner carried into space as part of Columbia's official flight kit.

Other special events include the Von Hippel Award presentation, Graduate Student Awards ceremony, and the inaugural presentation of the MRS Medal Award.

For details about the meeting program and registration, see the 1990 MRS Fall Meeting Preliminary Program, which is mailed to all MRS members. If you need a Preliminary Program, call MRS meetings registration at (412) 367-3003; FAX (412) 367-4373.

Symposia

Symposium A
Surface Chemistry and Beam-Solid Interactions

Monday-Thursday, November 26-29

Organizers: Harry Atwater, California Institute of Technology; Frances A. Houle, IBM Almaden Research Center; and Doug Lowndes, Oak Ridge National Laboratory.

Approximately 87 oral and 44 poster presentations will explore experimental and theoretical issues related to the modification of surfaces and thin films by energetic ion, photon, electron and fast molecular beams, including beam-induced chemical reactions and physical processes. Fundamental issues in physics, chemistry, and materials science of surface modification will be addressed, as well as applications in

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the deposition, etching, patterning and modification of thin films. Topics include: fundamentals of beam-solid interactions and surface chemistry; laser-induced deposition and etching; laser ablation; reactive ion etching; focused beam patterning; ion beam, ion-beam-assisted, and neutral beam deposition; beam-induced crystallization and epitaxial growth; ion beam mixing and metastable phase formation; transient thermal processing; and in situ photon, electron and ion beam diagnostic techniques for surface modification. A joint session on beam-induced phase transformations will be held with Symposium F. Invited speakers: A. Polman, F. Priolo, P.R. Okamoto, R.J. Madix, D. Eres, S.A. Barnett, Y.T. Cheng, I.P. Herman, P.D. Brewer.

Symposium B
Electronic, Optical and Device Properties of Layered Structures

Monday-Friday, November 26-30

Organizers: John Hayes, Bellcore; Mark S. Hybertsen, AT&T Bell Laboratories; and Eicke R. Weber, University of California, Berkeley.

Ninety-one presentations will emphasize complementary information obtained from various approaches on the properties of novel artificial structures. Both experimental and theoretical papers will cover optical probes, including nonlinear response, time-resolved studies and scattering; transport, including tunneling, inelastic processes, and magnetic field effects; device properties; structural characterization and special growth techniques (e.g., atomic layer, low temperature or patterned substrate epitaxy). Sessions will be organized around the following types of structures: vertical transport structures, strained layer structures, delta doping and graded structures, structures based on novel growth techniques, semiconductor with metal or superconductor interfaces, structures including II-VI materials, and heterojunction devices. A joint plenary session, "Fundamental Issues and Quantum Size Effects in Semiconductor Structures," is planned with Symposia T and Y. This topic will be addressed by the following invited speakers: N.K. Dutta, A.C. Gossard, R. Landauer, and E.D. Wolf. Other invited speakers: G. Patton, W. Walukiewicz, E.F. Schubert, A.E. White, C.J. Palmstrom, L. J. Sham, P.England, Y.M. d'Aubigne, R.D. Feldman, H. Amano, E. Colas, M. Kaminska.

Symposium C
Evolution of Thin Film and Surface Microstructure

Monday-Friday, November 26-30

Organizers: Carl V. Thompson, Massachusetts Institute of Technology; Jeffrey Y. Tsao, Sandia National Laboratories; and David J. Srolovitz, University of Michigan.

This symposium addresses the evolution of the microstructure of thin films and surfaces during the growth of epitaxial and non-epitaxial thin films. Approximately 87 oral and 69 poster presentations will discuss the use of newly developed experimental, theoretical, and simulation tools to elucidate the fundamental kinetic and thermodynamic aspects of the formation of thin film microstructure and its coupling to surface microstructure/morphology. Topics include: nucleation at interfaces; island coarsening; surface structure and phase transitions and their effect on film growth; epitaxial growth and ledge mechanisms; defect formation during epitaxial growth; stress effects on thin-film microstructures; phase separation during thin-film growth; grain structure and grain growth in polycrystalline films; and modification of microstructural evolution using ion, electron, and photon beams. A joint session on diffraction and microscopy during epitaxy will be held with Symposium J. Invited speakers: J.W. Cahn, S.P. Marsh, H.J. Frost, M. Atzmon, H.A. Atwater, E. Vlieg, K. Yagi, M.G. Lagally, P.I. Cohen, D.J. Eaglesham, J. Singh, B.W. Dodson.

Symposium D
Electronic Packaging Materials Science

Monday-Thursday, November 26-29

Organizers: Edwin D. Lillie, Microelectronics & Computer Technology Corporation; Ralph J. Jaccodine, Fairchild Laboratory, Lehigh University; Paul Ho, IBM T.J. Watson Research Center; and Kenneth Jackson, University of Arizona.

This symposium will highlight the materials science aspects of increasing circuit density and lowering cost and their implications for methods for protection of ICs, thermal management, thermomechanical modeling of materials systems, large area substrate fabrication techniques, novel assembly methods, and materials aspects of reliability. Approximately 70 oral and 11 poster papers will consider the following areas: protection of chips; materials for optoelectronics packaging; joining materials and their processing; polymers and polymer processing for high-density packaging; ceramics and glass-ceramics for packaging applications; science of interfaces; measurement of material properties and thermomechanical modeling; and metallization techniques. Invited speakers: K-S. Kim, D.M. Shinozaki, S. Numata, G. Blonder, J. Lipson, R.M. Latanision, G. Chandra, A.S. Voloshin, L. Manzione, J.A. Carpenter Jr., R.J. Farris, R.R. Tummala, B.C. Johnson, J. Economy, P-J. Wang, E. Rymaszewski, S.S. Wong, C. Yu, Y-H. Pao, S. Knecht.

Symposium E
Chemical Perspectives of Microelectronic Materials

Monday-Wednesday, November 26-28

Organizers: Lawrence H. Dubois, AT&T Bell Laboratories; Leonard V. Interrante, Rensselaer Polytechnic Institute; Mihal E. Gross, AT&T Bell Laboratories; and Klavs F. Jensen, Massachusetts Institute of Technology.

This symposium will highlight interdisciplinary research on microelectronic materials with an emphasis on the fundamental chemistry involved in materials preparation and processing. Sixty-seven oral and 47 poster papers will span synthetic and mechanistic studies, gas phase and surface interactions, and preparation and application of novel chemical precursors. Topics include: synthesis and evaluation of new precursors for microelectronic materials; synthesis of new materials for microelectronics; mechanisms of deposition and etching; fundamental chemical interactions at surfaces and interfaces; new diagnostic techniques for studying deposition and etching processes; new chemical microfabrication techniques; and modeling for understanding chemical mechanisms, kinetics and transport processes. Invited speakers: J.S. Foord, J.A. Stroscio, M.L. Yu, R.A Jones, W.L. Gladfelter, J.W. Mitchell, J.E. Crowell, J.M. Jasinski, R.A. Gottscho.

Symposium F
Kinetics of Phase Transformations

Monday-Thursday, November 26-29

Organizers: Michael O. Thompson, Cornell University; Michael J. Aziz, Harvard University; and G. Brian Stephenson, IBM T.J. Watson Research Center.

This symposium will address the fundamental aspects of the kinetics of phase transformations which are characteristic of bulk materials. The emphasis will be on results obtained using newly developed time-resolved experimental techniques, as well as advances in theory and simulation. Approximately 66 oral and 21 poster presentations will focus on: nucleation, spino-

dal processes, and late-stage coarsening; crystal growth kinetics; kinetics of ordering and phase separation; interface stability during phase transformations; interface structure, mobility, morphology; phase transformations during irradiation; time-resolved measurements; computer simulation of kinetic processes; effects of excess enthalpy and high defect density; kinetics of solid phase amorphization; and kinetics in colloidal crystals, block copolymers, and other engineered systems. A joint session with Symposium A will cover the kinetics of phase transformations induced by ion beams. Invited speakers: F. Priolo, P.R. Okamoto, P.W. Voorhees, K.F. Ludwig Jr., L. Greer, D. Turnbull, M.H. Grabow.

Symposium G
Clusters and Cluster-Assembled Materials

Monday-Thursday, November 26-29

Organizers: Robert S. Averback, University of Illinois; David L. Nelson, Office of Naval Research; and J. Bernholc, North Carolina State University.

Breakthrough discoveries in methods to produce clusters of almost any material, and the development of techniques for (l) depositing size-selected, clean, well-characterized clusters onto surfaces or (2) compacting these clusters into three-dimensional structures have created extraordinary opportunities for synthesizing novel materials. This symposium will emphasize metal, semiconductor, and ceramic materials. Experimental and theoretical papers (79 oral and 33 poster) will consider the following areas: theory of clusters and cluster-derived materials; clusters on surfaces; characterization of clusters and cluster-assembled structures; cluster beam deposition; synthesis of clusters and nanocrystalline materials; and structure and properties of clusters and nanocrystalline materials. Invited speakers: W.A. Goddard III, P. Jena, R.L. Whetten, D.M. Cox,; J. Berhnolc, J.H. Parks, R. Reifenberger, J.H. Weaver, I. Yamada, R.E. Smalley, L.A. Bloomfield, H. Gleiter, G.D. Stucky, H. Hahn, A.P. Alivisatos, H-P. Cheng.

Symposium H
Materials Issues in Applications of Ceramic Superconductors

Monday-Friday, November 26-30

Organizers: Allen M. Goldman, University of Minnesota; Julia M. Phillips, AT&T Bell Laboratories; Kenneth W. Lay, GE Corporate R&D Center; and Anthony C. Schaffhauser, Oak Ridge National Laboratory.

This symposium will bring together scientists and engineers engaged in basic and applied aspects of high-temperature superconductivity. The focus will be on original research treating the underlying fundamental issues and engineering considerations governing the application of HTS to various technological problems. Approximately 116 oral and 195 poster papers will report on: materials issues in infrared applications; materials issues in high frequency and switching; applications; materials issues in magnetic sensing; and electrical transport in magnetic fields. A plenary session will address the status of experimental and theoretical understanding of HTS. An evening panel session will consider the similarities and differences between ceramic and "conventional" superconductors, as well as the properties of ceramic superconductors at low temperature. Invited speakers: J.W. Halley, A.P. Malozemoff, K. Kitazawa, P.L. Richards, P.W. Kruse, W.J. Gallagher, J. Clarke, S. Jin, R.B. van Dover, C.W. Chu, K. Sato, R.A. Buhrman, T. Van Duzer, A.M. Kadin, T. Kawai, L. Schultz, D.K. Fork.

Symposium I
Mechanical Properties of Porous and Cellular Materials

Monday-Tuesday, November 26-27

Organizers: Lorna J. Gibson, Massachusetts Institute of Technology; David Green, Pennsylvania State University; and Karl Sieradzki, Johns Hopkins University.

The behavior of cellular solids with similar cell structures can be described using simple ideas from strength of materials combined with dimensional arguments. But disordered or heterogeneous solids, with nonuniformities or fluctuations in their structure, require statistical approaches to understand their fracture processes. Recent work, primarily in the statistical physics and solid state communities, has added significantly to understanding the mechanical properties of such materials. This symposium will bring together experimentalists and theoreticians who will present 31 papers on: processing, microstructural characterization, elasticity, failure, computer simulations of elastic and failure behavior, damage mechanics, mechanical properties of elastic networks near percolation, mechanical instabilities in hole growth processes during ductile fracture, and selection of porous or cellular materials in engineering applications. A joint session on scaling approaches of mechanics in disordered solids will be held with Symposium W. Invited speakers: M.F. Ashby, D.J. Srolovitz, S.C. Cowin, J.H. Aubert, A.J. Sherman, P.M. Duxbury, Y.H. Ohashi, H.R. Brown.

Symposium J
Advances in Surface and Thin Film Diffraction

Tuesday-Thursday, November 27-29

Organizers: Philip I. Cohen, University of Minnesota; David J. Eaglesham, AT&T Bell Laboratories; and Ting C. Huang, IBM Almaden Research Center.

This symposium will focus on the extraction of structural information from dynamical scattering and on techniques for measuring kinematical diffraction. Approximately 49 oral and 12 poster presentations will consider: structural information from dynamical diffraction (CBED, TED, RHEED, and LEED); kinematical scattering from thin films and surfaces; x-ray, atom, and electron diffraction studies of epitaxy; studies of disordered surfaces and step dynamics; novel diffraction techniques applicable to surfaces and films; and characterization of interfaces and superlattices. A joint session on diffraction techniques applied to epitaxial growth will be held with Symposium C. Invited speakers: S.Y. Tong, A. Ichimiya, J.C.H. Spence, J.M. Gibson, B.J. Hinch, D.L. Mailänder, E. Vlieg, K. Yagi, W. Parrish, C.C. Ahn, W.N. Unertl, A. Swan, A. Bourret.

Symposium K
Defects in Materials

Monday-Thursday, November 26-29

Organizers: Paul D. Bristowe, Massachusetts Institute of Technology; J. Ernest Epperson, Argonne National Laboratory; J.E. Griffith, AT&T Bell Laboratories; and Z. Liliental-Weber, Lawrence Berkeley Laboratory.

This symposium will cover the structure and properties of all types of defects in all classes of materials. Recent progress concerning both theoretical and experimental aspects of the subject will be included, as will investigations of point, line, or planar defects (including surfaces) in metals, polymers, ceramics, glasses, electronic materials, and composites. Eighty-three oral and 123 poster presentations will discuss: microstructural and chemical characterization (TEM, X-ray and neutron diffraction, ion scattering, STM, LEED, Auger, SIMS, and REM); electrical, optical and magnetic characterization (EBIC, DLTS, cathodolumnescence, NMR, and STM); theoretical characterization (MD, Monte Carlo, EAM, total energy methods, continuum methods, thermodynamics, and kinetics); and new developments in such areas as defects in oxide supercon-

ductors and polymers, interfaces between dissimilar materials, and applications of quantum molecular dynamics. Invited speakers: C.G. Windsor, R.W. Siegel, J.D. Joannopoulos, G.H. Gilmer, J. Peisl, S.D. Hudson, T.N. Theis, S. Iijima, R.J. Hamers, A. Ourmazd, M.A. Kirk.

Symposium L
Solid State Ionics

Monday-Friday, November 26-30

Organizers: Gholam-Abbas Nazri, GM Research Laboratories; Robert A. Huggins, Stanford University; Duward F. Shriver, Northwestern University; and Minko Balkanski, Universit– Pierre et Marie Curie.

This symposium will focus on synthesis, characterization, and properties of solid state ionics and will cover experimental, theoretical, and applied aspects. The experimental section will include static and dynamic electrochemical techniques, *in situ* x-ray diffraction and EXAFS, solid state NMR, FTIR, and Raman spectroscopy, ultrasonic attenuation, electron and ion spectroscopy (AES, XPS, ISS, and SIMS), and electron microscopy (TEM and STEM). The theoretical section will include molecular dynamics, lattice dynamics, and Monte-Carlo calculations, as well as the application of reversible and irreversible thermodynamics. The application section will deal with energy conversion devices, catalysis, electrochromic devices, sensors, and thin film devices. Approximately 108 oral presentations are planned. Invited speakers: J. Schoonman, S.D. Jones, S.J. Visco, F.K. Shokoohi, M. Shabrang, P. Vashishta, W. Dieterich, K. Funke, J.C. Wang, R.F. Wallis, S.E. Sigaryov, M. Ratner, P.S. Nicholson, A. Doi, J. Maier, B.C.H. Steele, I. Riess, H.L. Tuller, S.Crouch-Baker, L. Borjesson, R. West, J.H. Kennedy, A.P. Owens, N.J. Dudney, J.B. Bates, B. Scrosati, G.C. Farrington, R.G. Linford, L.M. Torell, C. Korzeniewski, S.G. Greenbaum, Y. Chabre, P. Hagenmuller, C. Delmas, K. West. J. Rouxel, J.B. Goodenough, D.W. Murphy, M. Menétrier, C. Levy-Clement, M.S. Whittingham, C. Julien, M.G. Kanatzidis, T. Takahashi.

Symposium M
Dynamics in Small Confining Systems

Monday-Thursday, November 26-29

Organizers: J.M. Drake, Exxon Research and Engineering Company; R. Kopelman, University of Michigan; and J. Klafter, Tel Aviv University.

This symposium will focus on the chemical and physical aspects of dynamics in small finite systems (nanosystems) such as porous glasses, zeolites, micelles, microemulsions, polymer membranes, and proteins. Approximately 58 oral and 26 poster papers will deal with: molecular transport of gases and liquids; reaction dynamics and energy transfer; phase transitions and phase separations; numerical modeling and computational techniques; NMR techniques (pulsed field gradient NMR, etc.); optical techniques (transient grating, exciton annihilation, fluorescence depolarization, etc.); dynamical light scattering; and dielectric relaxation and acoustic attenuation. Invited speakers: P.G. de Gennes, J. Israelachvili, P. Levitz, D.D. Awschalom, W.I. Goldburg, J. R. Banavar, J. Machta, R.O. Pohl, M.H.W. Chan, L.M. Schwartz, W.P. Halperin, H.T. Davis, D.J. Diestler, B. Abeles, M.S. Wrighton, A. Blumen, S. Redner, S. Havlin, S.K. Sinha, E. Clément, S. Bhattacharya.

Symposium N
Covalent Ceramics

Wednesday-Friday, November 28-30

Organizers: Gary S. Fischman, New York State College of Ceramics, Alfred University; Terry Aselage, Sandia National Laboratories; and Richard M. Spriggs, New York State College of Ceramics, Alfred University.

This symposium will bring together scientists and engineers who are interested in materials that exhibit highly covalent properties, such as non-oxide compounds in the III, IV, and V columns or transition metal non-oxides. The subjects will include aspects of physical and chemical properties through materials processing technologies. Approximately 43 oral presentations will address: defects, structures, and models; structure-property relationships; powder (crystal) synthesis; electronic properties; covalent glasses; sintering; and thin films and hard covalent coatings. Invited speaker: W.S. Williams.

Symposium O
Fiber-Reinforced Cementitious Materials

Monday-Wednesday, November 26-28

Organizers: Sidney Mindess, University of British Columbia; and Jan P. Skalny, W.R. Grace and Company.

This symposium will address the development of improved and new fibers, the introduction of novel processing techniques, and the role of fibers in the production of high-performance, durable concrete. The relationships between the properties of the individual components, processing techniques, and the properties of the composite will form the main focus, with special emphasis on the underlying science and measurement techniques. Forty-four oral presentations will treat: fundamentals controlling the properties of fiber composites; novel fibers and fiber composites; advances in processing techniques; and experimental techniques to evaluate performance and degradation. Invited speakers: S.P. Shah, R.W. Rice, A. Bentur, P. Stroeven.

Symposium P
Scientific Basis for Nuclear Waste Management XIV

Monday-Thursday, November 26-29

Organizers: T. Abrajano Jr., Argonne National Laboratory; and Lawrence H. Johnson, Whiteshell Nuclear Research Establishment.

Approximately 85 oral and 42 poster presentations will focus on critical scientific issues related to the disposal of high-, intermediate-, and low-level radioactive wastes. Topics include: spent fuel characteristics and degradation mechanisms; glass and ceramic waste form characteristics and degradation mechanisms; cementitious waste form characteristics and degradation mechanisms; corrosion mechanisms of container materials; properties of backfill and buffer materials; materials performance in integrated systems; and radionuclide speciation, sorption and transport field studies of radionuclide migration. Internationally known invited speakers who will summarize the key scientific issues in these areas include: W.L., Bourcier, J.K. Bates, Z.E. Peterman, R.B. Wanty, E.W. McDaniel, F.P. Glasser, H. Nitsche, R.S. Forsyth, F.L. Parker, K.W. Dormuth, R.D. McCright, E.Y. Vernaz.

Symposium Q
High Temperature Ordered Intermetallic Alloys

Tuesday-Friday, November 27-30

Organizers: Lyman Johnson, General Electric Company; David P. Pope, University of Pennsylvania; and James O. Stiegler, Oak Ridge National Laboratory.

Approximately 75 oral and 127 poster presentations will discuss processing issues (rapid solidification, single crystals, powder processing, composites, thermomechanical treatments, and joining); structural characterization (phase stability, defect structures, dislocation structures, and grain boundaries); mechanical and physical properties; and performance characteristics. Both monolithic and multi-

phase intermetallics, as well as composites based on intermetallic matrix alloys, will be considered. Invited speakers: A.J. Freeman, V. Vitek, P.M. Hazzledine, T. Takasugi, R.L. Fleischer, D.M. Dimiduk, M.H. Yoo, J.C. Williams, Y-W. Kim, N.S. Stoloff.

Symposium R1
Optical and Electrical Properties of Polymers

Monday-Wednesday, November 26-28

Organizers: John A. Emerson, AT&T Bell Laboratories; and John M. Torkelson, Northwestern University.

This symposium will feature 47 presentations on progress and recent developments in optical and electrical properties of polymers. It will run consecutively with Symposium R2. Topics include: linear and nonlinear optical effects; conducting polymers; low dielectric polymers; birefringence and dichroism properties of polymers; rheo-optical effects; magnetic polymers; and piezoelectric and pyroelectric polymers. Invited speakers: M.G. Kuzyk, K.D. Singer, A. Blumstein.

Symposium R2
Structure, Relaxation and Physical Aging of Glassy Polymers

Wednesday-Friday, November 28-30

Organizers: R. Joon Roe, University of Cincinnati; James M. O'Reilly, Eastman Kodak Company; and John Torkelson, Northwestern University.

This symposium, which will run consecutively with Symposium R1, will address the nature of the glassy state and glass transition of polymers and the associated problem of physical aging of glassy polymers. Experimental, theoretical, and molecular-modeling studies will all be discussed, with emphasis on the use of more modern techniques of investigation. Approximately 49 papers will consider: structural changes accompanying physical aging; free volume distribution (studied by techniques such as positron annihilation and photoisomerization of probe molecules and by Monte Carlo or molecular dynamics simulation of amorphous polymer); molecular modeling of glassy polymers; diffusion of gases through glassy polymers; theory of glass transition and glassy state; glass transition phenomenon of unusual or specialty polymers; plasticization and antiplasticization; phenomenology of physical aging; rejuvenation of physically aged polymers by application of stress, etc.; glass transition and physical aging of polymer blends; and application of various techniques (NMR, SANS, SAXS, light scattering, IR, etc.) to study glassy polymers and comparison of the results obtained by different techniques. Invited speakers: C.A. Angell, I.M. Hodge, W.M. Prest Jr., H.W. Spiess, A.A. Jones, J. Jäckle, U.W. Suter, Y.C. Jean, G.P. Johari, J.K. Gillham.

Symposium S
Synthesis and Properties of New Catalysts: Utilization of Novel Materials Components and Synthetic Techniques

Monday-Thursday, November 26-29

Organizers: Edward W. Corcoran Jr., Exxon Research and Engineering Company; Marc J. Ledoux, Université Louis Pasteur Strasbourg; and Jack R. Knox, Knox Consulting Company.

This symposium will discuss recent developments in the synthesis and identification of new classes and types of catalytic materials. Approximately 77 papers will consider: new, crystalline, microporous materials (including phosphate-based molecular sieves; molecular sieves containing nontraditional components; and oxides, hydroxides, clays, and layered compounds); novel metal nitrides, phosphides, carbides, oxides; amorphous metal systems; and new routes for preparing catalysts and catalyst supports utilizing microgravity crystal growth, organometallic precursors, chemical vapor deposition, and other novel synthesis schemes. Invited speakers: J.M. Thomas, P.A. Stevens, A. Baiker, J.S. Bradley, E.M. Flanigen, E.G. Derouane, S.I. Zones, M.J. Ledoux, S.T. Oyama, K. Klier, R.R. Chianelli, A. Sacco Jr., K.S. Suslick.

Symposium T
Long-Wavelength Semiconductor Devices, Materials and Processes

Monday-Thursday, November 26-29

Organizers: Avishay Katz, AT&T Bell Laboratories; Robert M. Biefeld, Sandia National Laboratories; R.J. Malik, AT&T Bell Laboratories; and Robert L. Gunshor, Purdue University.

This symposium will provide an overview of devices, materials, and materials processes having application for long-wavelength detectors and sources for fiber optics communication systems and thermal imaging. Discussions will center on advanced III-V and II-VI material processes for applications at wavelengths above 1 μm. Approximately 53 oral and 48 poster presentations will explore: epitaxial growth of narrow gap semiconductors; strain layer superlattices and multiple quantum well configurations involving III-V, II-VI, II-VI/III-V, and IV-VI heterostructures; device fabrication processes, such as metallization, etching, and passivation; microstructural and electrical characterization techniques; stress-induced and other device degradation mechanisms; correlation between materials properties and device performance; novel applications and device structures; optical properties of materials and structures; bulk crystal growth and narrow gap materials; advanced technologies for material growth and processing; and reliability statistics and analysis of degradation mechanisms. The keynote speaker for the symposium is Arthur C. Gossard, University of California, Santa Barbara. A joint plenary session on fundamental issues and quantum size effects in semiconductor structures will be held with Symposia B and Y. This topic will be addressed by N.K. Dutta, R. Landauer, and E.D. Wolf. Other invited speakers: R. Reynolds, A. Sher, J. Schetzina, R.D. Feldman, S.R. Kurtz, D.L. Smith, D.L. Partin, H. Zogg, G. Fuxi, T.C. McGill, L.R. Dawson, W.C. Dautremont-Smith, S.J. Pearton, J.S. Williams, M. Heyen, O. Ueda, B.F. Levine, B. Jalali.

Symposium U
Advanced Tomographic Imaging Methods for the Analysis of Materials

Wednesday-Friday, November 28-30

Organizers: Jerome L. Ackerman, NMR Center, Massachusetts General Hospital; and William A. Ellingson; Argonne National Laboratory.

Approximately 37 oral contributions will span all aspects of magnetic resonance, computed tomography, and holography (including theoretical papers) in which materials science applications are important. General topics include: magnetic resonance imaging; x-ray (including synchrotron radiation), neutron, and isotope computed tomography; and ultrasound, electron microscopy, thermal and laser CT. Invited speakers: L. Garrido, J.L. Koenig, W.A. Edelstein, R.A. Komoroski, A.N. Garroway, J.H. Kinney, H.W. Deckman, A.J. Devaney, C.M. Sehgal, E.A. Rhodes.

Symposium V
Materials Synthesis Based on Biological Processes

Tuesday-Thursday, November 27-29

Organizers: Mark Alper, Center for Advanced Materials, Lawrence Berkeley Laboratory; Peter C. Rieke, Batelle Pacific Northwest Laboratory; Richard Frankel, California Polytechnic State University;

Paul D. Calvert, Arizona Materials Laboratory; and David A. Tirrell, University of Massachusetts.

Living organisms produce a wide variety of materials required for their survival and propagation. These include structures, fibers, lubricants, adhesives, and materials with memory, optical, and electronics properties. This symposium will bring together materials scientists, biologists, and chemists to focus on structure/property/function relationships in these materials and on methods for using biological processes to synthesize new materials with useful and important applications, including: polymeric materials, mineralized and non-mineralized biological structures (and the control of the crystallization process), composites of biological and synthetic materials, particle growth in microorganisms, self-assembling biological and synthetic systems, and magnetic biological materials. Topics related to the manipulation of genes and enzymes in the synthesis of novel materials will also be considered. Approximately 47 presentations are scheduled. Invited speakers: G. Whitesides, M. Callstrom, M. Bednarski, C.J. Morrow, J.F. Kirsch, G.D. Fasman, S.P. Ho, S. Darst, M.S. Shoichet, M.J. Dougherty, S.G. Sligar, H. Bayley, D.A. Bazylinski, B.R. Heywood, D.R. Winge, R.R. Birge, D. Gust, P. Calvert, M.A. Crenshaw.

Symposium W
Scaling in Disordered Materials

Tuesday-Friday, November 27-30

Organizers: James P. Stokes, Exxon Research and Engineering Company; Mark O. Robbins, Johns Hopkins University; and Tom A. Witten, University of Chicago.

Disorderly structure and dynamics frequently reveal striking scaling behavior, including fractal geometry and power-law fluctuations. This symposium will focus on application of scaling concepts to materials. Approximately 65 oral and 33 poster papers will investigate: nonequilibrium growth (solidification, fluid invasion, deposition, and aggregation); catastrophic failure (fracture and dielectric breakdown); scaling of dynamical processes (earthquakes, granular flow, turbulence, and friction); structural probes of fractal geometry (scattering, adsorption, STM, AFM, and electron microscopy); and random polyatomic structure (polymers, membranes, gels, and surfactant assemblies). A joint session on fracture will be held with Symposium I. Invited speakers: B.B. Mandelbrot, E. Ben-Jacob, J.G. Amar, P.M. Duxbury, Y.H. Ohashi, H.R. Brown, C. Tang, G.A. Held, S.R. Nagel, J.M. Carlson, D.S. Fisher, S. Bhattacharya, H. Suhl, R.M. Westervelt, P.G. Degennes, J. Liu, S. Orzag, A.H. Thompson, G. Viliani, E. Duval.

Symposium X
Frontiers of Materials Research

Monday-Thursday, November 26-29

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

This series of lunch-time lectures will consist of two 40-minute didactic reviews, each day given by a leader in the field. The reviews are designed to provide materials researchers with authoritative overviews in a field outside their specializations. Speakers include: Paul Hagenmuller, University of Bordeaux; David Geohegan, Oak Ridge National Laboratory; Rustom Roy, Pennsylvania State University; Michael Ashby, University of Cambridge, Hugh Brown, IBM Almaden Research Center; A.L. Greer, University of Cambridge.

Symposium Y
Nanostructures: Fabrication and Physics

Monday-Wednesday, November 26-28

Organizers: T.P. Smith III, IBM T.J. Watson Research Center; Steven D. Berger, AT&T Bell Laboratories; Dieter Kern, IBM T.J. Watson Research Center; and Harold Craighead, Cornell University.

The tremendous progress in materials preparation, lithography, and pattern transfer over the last years has opened up totally new areas of research in the mesoscopic regime. This is the first symposium held by MRS on the fabrication and physics of nanostructures. Emphasis will be placed on progress and recent developments in fabrication techniques, as well as the physics and applications of novel structures. Approximately 45 papers will highlight: electron, x-ray, and ion beam lithography; STM fabrication and measurements on small structures; optical properties of nanostructures; electronic and magnetic properties of nanostructures; nonsemiconductor structures; physical limits of materials and processes; and *in situ* processing. A joint plenary session on fundamental issues and quantum size effects in semiconductor structures will be held with Symposia B and T. This topic will be addressed by A.C. Gossard, N.K. Dutta, R. Landauer, and E.D. Wolf. Other invited speakers: L.R. Harriott, S. Beaumont, A. Scherer, D. Eigler, K. Vahala, E.H. Anderson, R.J. Haug, H. Furuya. MRS

National Positron Facility

Panel Discussion to be Held Tuesday Evening, November 27 at the 1990 MRS Fall Meeting

Discussion will assess the desirability of having a National Positron Facility by airing the views of potential users. Panelists will briefly outline the capabilities of the positron method and project the positron beam properties that could be obtained at Brookhaven, Oak Ridge, or other possible sites. Interested scientists are invited to give 5-minute presentations on proposals for new science that would be feasible given the availability of 10^{10} slow positrons per second. For further information contact A.P. Mills Jr., AT&T Bell Laboratories, Murray Hill, NJ 07974; telephone (201) 582-4162.

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1990 Fall Meeting

November 25-December 1, 1990

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Short Course Program
SEVEN NEW COURSE TOPICS

Selected Short Courses covering the latest developments in materials science and technology will be offered in conjunction with the 1990 Fall Meeting of the Materials Research Society. These up-to-date courses are at the forefront of science and technology and complement Fall Meeting symposium topics. SPECIALTY, REVIEW, AND SURVEY courses are designed to meet needs of professional scientists, engineers, technical staff, and managers who want to know the latest techniques in characterization and fabrication of materials. CLASS SIZES ARE LIMITED: Early telephone preregistrations are encouraged.

PREREGISTRATION TUITION

ADVANCED MATERIALS

M-04 Optoelectronic Materials, Processes, and Devices
Instructor: Mool C. Gupta
Friday and Saturday, November 30-December 1 ..... $510

M-05 Fabrication, Characterization, and Applications of High-Temperature Superconducting Materials
Instructors: Terry P. Orlando and Robert E. Schwall
Sunday and Monday, November 25-26 ..... $510

M-10 An Introduction to High Temperature Ordered Intermetallic Alloys
NEW Instructor: Norman S. Stoloff
Monday, November 26 ..... $345

PREPARATION AND FABRICATION OF MATERIALS

P-02 Molecular Beam Epitaxy
Instructor: Gary Wicks
Tuesday and Wednesday, November 27-28 ..... $510

P-03 Vapor Phase Epitaxy
Instructors: Herbert H. Cox and P. Dan Dapkus
Friday and Saturday, November 30-December 1 ..... $510

P-14 Film Formation, Adhesion, Surface Preparation, and Characterization of Thin Film Structures
Instructor: Donald M. Mattox
Friday and Saturday, November 30-December 1 ..... $535

P-20 Growth of Long-Wavelength Detector Materials
NEW Instructors: L. Ralph Dawson, Sorab K. Ghandi, Sanghamitra Sen, and Tse Tung
Thursday, Friday and Saturday, November 29-December 1 ..... $775

F-01 Film and Coating Deposition Techniques
Instructor: Donald M. Mattox
Tuesday and Wednesday, November 27-28 ..... $535

F-02 Plasma Etching for Microelectronic Fabrication
Instructor: G. Kenneth Herb
Thursday, November 29 ..... $345

F-03 Fundamentals and Applications of Ion Beam Processes
Instructor: James K. Hirvonen
Sunday and Monday, November 25-26 ..... $510

F-04 Microelectronic Packaging: Materials, Processing, and Reliability
Instructor: Shankara K. Prasad
Thursday, Friday and Saturday, November 29-December 1 ..... $775

F-11 Materials and Processes for Microfeature Fabrication
NEW Instructor: Gary N. Taylor
Monday, November 26 ..... $345

F-12 Spin-On Dielectrics for State-of-the-Art VLSI Applications
NEW Instructors: Nadia Lifshitz and Gerald Smolinsky
Monday, November 26 ..... $345

TECHNIQUES

T-09 Low Temperature Testing of Superconductors and Semiconductors
NEW Instructor: Robert E. Schwall
Tuesday, November 27 ..... $345

CHARACTERIZATION OF MATERIALS

C-01 Modern Materials Analysis Techniques
Instructors: James A. Borders, Kenneth H. Eckelmeyer, and Suzanne H. Weissman
Monday, Tuesday and Wednesday November 26-28 ..... $775

C-03 Surface and Thin Film Analysis
Instructors: Leonard C. Feldman and James W. Mayer
Friday and Saturday, November 30-December 1 ..... $580

C-09 Fractals: Concepts and Applications in Materials Science and Engineering
Instructors: James E. Martin and Alan J. Hurd
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C-14 Fundamentals and Applications of Scanning Tunneling Microscopy
Instructor: Robert J. Hamers
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C-17 Scanning, Transmission and Analytical Electron Microscopy
Instructors: Alton D. Romig, Jr., and David C. Joy
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C-18 TEM Specimen Preparation in the Physical Sciences
NEW Instructor: Ronald M. Anderson
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C-20 Optical Characterization of III-V Semiconductor Epitaxial Layers
Instructor: Gary W. Wicks
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C-22 Thin Film Epitaxy, Interdiffusion, and Phase Transformation
NEW Instructors: Leonard C. Feldman, James W. Mayer, and King-Ning Tu
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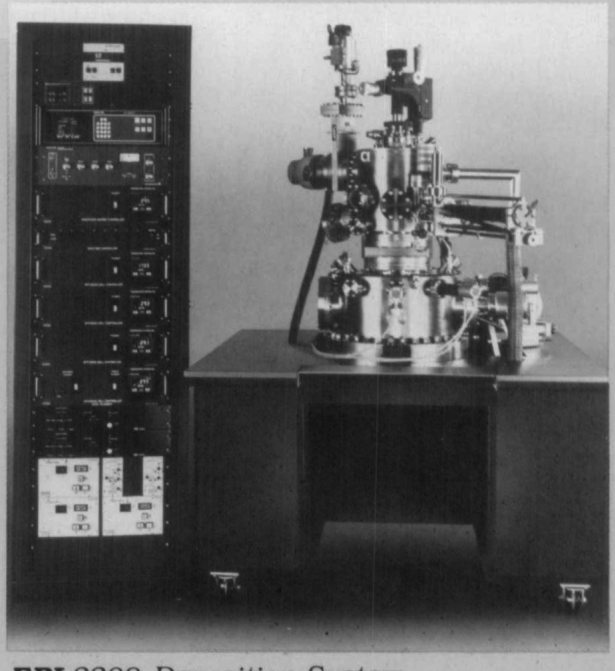

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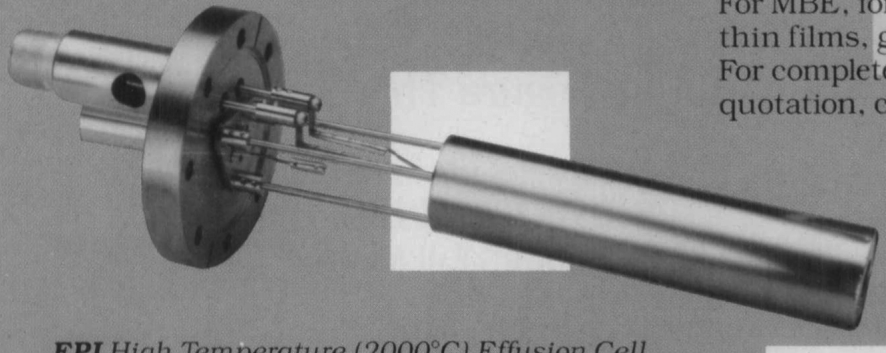

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