

Preview

1991 MRS Spring Meeting

Anaheim, California

April 29 - May 3

Meeting Chairs:

A. Kay Hays, Sandia National Laboratories

Ernesto E. Marinero, IBM Almaden Research Center

Carl V. Thompson, Massachusetts Institute of Technology

Scientists from around the world will create their own brand of magic at the Materials Research Society's upcoming Spring Meeting in Anaheim, California, the home of the original Disneyland. The interdisciplinary conference will offer attendees many new topics among the 23 concurrent symposia plus Symposium X talks on the Frontiers of Materials Research for the nonspecialist, and numerous stimulating events throughout the week.

Technical sessions at the meeting target amorphous silicon, electronics processing development, reliability issues, polymers, magnetic materials, optical materials, tribology, interfaces, environmental issues, molecular sieves, and thermoelectrics.

Materials and the Environment

Incorporated into this meeting is a completely new area—the environmental aspects of materials science. The Plenary speaker, Erich W. Bretthauer, assistant administrator for research and development for the U.S. Environmental Protection Agency, has been involved with regulation of radioactive waste and pollution monitoring. Environmentally conscious materials processing will be addressed in Symposium W. Since this field is still young, the symposium is small, but Meeting Chair Kay Hays expects high attendance because many industries need to learn more about the science to comply with growing environmental regulations. This added symposium reflects how environmental concern is transforming from an optional to an integral part of scientific development.

Polymers

Symposium L on polymer lifetimes also reflects environmental concerns in its discussions of the durability versus degradability of plastics and designing for specific applications such as marine, aerospace, or electronics. Polymers are also the topic of three other symposia: high temperature polymers for electronics (J), polymeric alloys (K), and polymers for integrated optics and information storage (M).

Reliability

Reliability is targeted generally in Symposia G and more specifically in Symposia H and I. Mechanical properties and electronics are linked together in Symposium H, which examines stress distributions and failure in materials ranging from semiconductors and superconductors to metallization and organic packaging. Symposium I cleans up with its focus on contamination of electrical circuits, an insidious problem as devices shrink in size.

Silicon

Silicon still emerges as a big winner at the conference with special attention in some of the largest symposia, including symposium A on amorphous silicon technology (also covering optical devices and solar cells) and Symposium B on silicon MBE. Ge-Si is spotlighted in several symposia, including B on silicon MBE, C on heteroepitaxy of dissimilar materials, and E on low-energy ion beam and plasma modification of materials.

Materials Processing

Symposia D through F focus on various aspects of materials processing and include atomic layer growth (a new symposium), low-energy ion beam and plasma processing, and rapid thermal processing.

Interfaces

Symposia P through S look at interfaces and reactions in superconductors, metal/metal systems, magnetic materials, and other thin films.

Tribology

Symposium O on molecular tribology takes a close look at lubrication and atomic interaction of sliding surfaces, particularly using scanning tunneling and atomic force microscopy.

Materials Education Panel

Midday on Wednesday a panel discussion on graduate materials education will address how U.S. graduate schools turn out good researchers, but question how this training translates into new products and manufacturing processes. The panel will consider questions such as: Do we need a higher ratio of MS to PhD degrees? Why do many of the most highly recognized engineering schools have almost no MS candidates? Should graduate education put more emphasis on processing and less on structure/properties? Should all engineering students be required to do work/study programs? Should classes contain courses on teamwork and project management?

Other Events and Services

Twenty-one short courses will be offered during the conference and the weekends before and after the conference from April 29 through May 3. Poster sessions will be held Tuesday and Thursday evenings, and a student mixer is scheduled for Monday evening.

A job placement bulletin board will be

available to help link up employers with applicants, and an extensive equipment exhibit will be set up Tuesday through Thursday at the Anaheim Convention Center.

Graduate student finalists will compete for awards, and a new award, the MRS Outstanding Young Investigator Award, will be presented for the first time.

For more details about the meeting program and registration, see the 1991 MRS Spring Meeting Preliminary Program, which is mailed to all MRS members. If you need a Preliminary Program, call the MRS Meetings Department (412)367-3003; fax (412)367-4373.

Symposia

Symposium A—Amorphous Silicon Technology - 1991

Tuesday-Friday, April 30-May 3

Chairs: Arun Madan, MV-Systems, Inc.; Y. Hamakawa, Osaka University; Malcolm J. Thompson, Xerox PARC; P.C. Taylor, University of Utah; P.G. LeComber, University of Dundee.

This symposium will be devoted to materials issues related to applications of amorphous silicon-based alloys. Papers will cover structure, electronic and optical properties, defects, interfaces, contacts, growth, heterostructures, nonequilibrium behavior, and stability. Applications will include solar cells, electrophotography, switching electronic and optical memories, image sensors, scanners, thin-film transistors, vidicons, large-area displays, portable computers, and new types of devices. Presentations will focus on the electronic density of states and its relationship to technological figures of merit for each application, fundamental and materials limitations, yield, reproducibility, reliability, and stability.

Oral Presentations: 60

Poster Presentations: (Tuesday and Thursday) 95

Invited speakers: S. Mashima, G. Moddel, W. Paul, M. Ohnishi, A. Yokota, T. Tsuji, J.R. Abelson, J. Schmitt, H. Shirai, and T. Yoshida.

Symposium B—Silicon Molecular Beam Epitaxy

Monday-Friday, April 29-May 3

Chairs: John C. Bean, AT&T Bell Laboratories; Evan H.C. Parker, University of Warwick;

Subramanian S. Iyer, IBM T.J. Watson Research Center; Yasuhiro Shiraki, University of Tokyo; Erich Kasper, Daimler-Benz Research Center; Kang L. Wang, University of California, Los Angeles.

This symposium will be the fourth in a series dealing with low-temperature epitaxy of silicon and materials epitaxial to silicon. The symposium focuses on materials grown by MBE and gas source MBE, but also covers novel approaches with rapid thermal CVD and reduced-pressure CVD. The majority of the presentations will focus on GeSi, but CoSi₂, Sn and SiC are among other materials planned for this symposium. Papers cover metal silicide/Si heterostructures, epitaxial dielectric/Si heterostructures, atomic ordering, ballistic transport, modeling and theory of epitaxial growth, bandstructure and transport properties, doping, and stability. Novel physical properties and innovative growth techniques will be discussed. Materials are characterized using RHEED oscillations, TEM, x-ray, strain measurements, deep luminescence, STEM, XPS, and Raman spectroscopy.

Oral Presentations: 97

Invited speakers: M. Pepper, D.J. Graves-stein, R. Kubiak, D.C. Houghton, R. Zachai, M. Arienzo, F. Schäffler, K. Nakagawa, G. Abstreiter, H. Hirayama, M. Hirose, D-L. Kwong, and M.G. Lagally.

Symposium C—Heteroepitaxy of Dissimilar Materials

Monday-Thursday, April 29-May 2

Chairs: James P. Harbison, Bellcore; Andrew Zangwill, Georgia Institute of Technology; Robin F.C. Farrow, IBM Almaden Research

Center; Paul S. Peercy, Sandia National Laboratories.

This symposium will address the basic issues involved in the heteroepitaxy of fundamentally dissimilar materials. Topics to be covered include interface structure and chemistry, thermodynamic considerations (e.g., island vs. layer-by-layer growth, thin-film phase diagrams, interfacial secondary phases, etc.), epitaxial metastability, strain effects, *in-situ* and *ex-situ* characterization, and kinetic issues (e.g., initial nucleation of layers). The intent is to include a wide variety of material systems, such as structurally dissimilar combinations of metals, insulators, semiconductors, high T_c superconductors, and others.

Oral Presentations: 90

Invited speakers: R. Gunshor, V. Jaccarino, B.T. Jonker, C.Lee, T. Sands, B. Tonner, R. Tromp, R. Tung, D.A. Baugh, O.L. Alerhand, A. Roytburd, D. Srivestava, and J.S. Nelson.

Symposium D—Atomic Layer Growth and Processing

Monday-Wednesday, April 29-May 1

Chairs: Thomas F. Kuech, IBM T.J. Watson Research Center; Yoshinobu Aoyagi, Riken; P.D. Dapkus, University of Southern California.

This new symposium will address both fundamental and technological aspects of atomic layer growth and processing. Mechanistic studies, materials characterization, surface science studies, and device aspects of this new area of materials preparation will be highlighted. Talks in this symposium will cover silicon, III-V, II-VI, and high T_c superconducting materials.

Oral Presentations: 48

Invited speakers: D. Aspnes, S. Bedair, Q. Chen, R. Creighton, T. Fukui, J. Greene, Y. Horike, Y. Horikoshi, M. Kawai, B. Maa, T. Meguro, M. Yu, M. Ozeki, and M. Kona-gai.

Symposium E—Low Energy Ion Beam and Plasma Modification of Materials

Tuesday-Thursday, April 30-May 2

Chairs: James M.E. Harper, IBM T.J. Watson Research Center; Kiyoshi Miyake, Hitachi Ltd.; John R. McNeil, University of New Mexico; Steven M. Gorbak, Oak Ridge National Laboratory.

This symposium will address materials modification by low-energy ion and plasma treatment. Modification during thin-film deposition will be highlighted, including comparison of ion beam and microwave plasma techniques. Papers will relate materials properties to changes in structure and composition caused by exposure to beam ions and other plasma products (neutrals, radicals, excited species) with energies typically less than 10 keV. Topics will focus on ion and plasma bombardment during deposition, including epitaxial growth, theoretical and simulation studies of low-energy ion-surface interactions, low-energy ion beam deposition, deposition and etching using microwave ion and plasma sources, bombardment effects on optical, magnetic and superconducting properties, tailoring of metal-polymer and metal-ceramic interfaces, and ion-induced material reactions and phase transformations. There will be a joint session with Symposium P on processing of high T_c superconductor thin films and interfaces.

Oral Presentations: 57

Poster Presentations: (Tuesday) 10

Invited speakers: M. Kitabatake, L. Berry, J. Kwo, A. Tsukamoto, M. Senda, S. Mollis, U. Gibson, A. Kingon, Y. Osaka, N. Kondo, J. Biersock, S. Samukawa, and A.F. Hebard.

Symposium F: Rapid Thermal and Integrated Processing

Tuesday-Friday, April 30-May 3

Chairs: Martin L. Green, AT&T Bell Laboratories; Jeff Gelpy, Peak Systems; Jim Wortman, North Carolina State University; Rajendra Singh, University of Oklahoma.

This symposium will emphasize the materials science of semiconductors processed by integrated techniques. Si, as well as compound semiconductor technolo-

gies, will be included. Papers will cover integrated (cluster, multistep) processing including *in-situ* cleaning, deposition, dry etching and inspection; rapid thermal chemical vapor deposition; novel processing; rapid thermal annealing/film formation; temperature measurement, characterization, electrical measurements, equipment and process control.

Oral Presentations: 83

Invited speakers: M. Moslehi, D. Kwong, A. Katz, T. Hori, K. Maex, M. Öztürk, and R. Kakoschke.

Symposium G—Materials Reliability Issues in Microelectronics

Tuesday-Friday, April 30-May 3

Chairs: J.R. Lloyd, Digital Equipment Corporation; P.S. Ho, IBM T.J. Watson Research Center; C.T. Sah, University of Florida; F. Yost, Sandia National Laboratories.

This symposium will cover fundamental concepts of materials properties underlying the reliability of integrated circuits. Specific topics include stress-induced damage formation; corrosion; electromigration; hot carrier effects; metallization; and device, oxide, and dielectric reliability. Discussions will emphasize the relationship between processing and reliability, reliability testing, and physical failure models. A joint session is scheduled on Wednesday with Symposium H, Mechanical Behavior of Materials and Structures in Microelectronics, covering stress and packaging and stress effects on reliability.

Oral Presentations: 73

Invited speakers: I.A. Blech, C. Ross, W. L. Smith, R.B. Comizzoli, P.B. Ghatge, H. Huntington, R. Sorbello, R.E. Hummel, C-Y. Li, K. Miyozaki, and V.R. Raju.

Symposium H—Mechanical Behavior of Materials and Structures in Microelectronics

Tuesday-Friday, April 30-May 3

Chairs: Ephraim Suhir, AT&T Bell Laboratories; Masahiro Jono, Osaka University; C.G.M. van Kessel, Philips Center for Manufacturing Technology; Robert C. Cammarata, Johns Hopkins University; Deborah D.L. Chung, SUNY-Buffalo.

This symposium will focus on methods and approaches of engineering mechanics and materials science to evaluate the mechanical behavior and performance of microelectronic materials and packages. Topics include analytical modeling of the mechanical and thermal behavior of electronic materials and packages, computer-aided analyses, experimental techniques

and approaches, stress-strain and fracture behavior, mechanical behavior of organic materials (thin films and interfaces, adhesively bonded joints, metallizations, heterostructures, high-temperature superconductors), and solder and interconnects. A joint session is planned on Wednesday with Symposium G, Materials Reliability Issues in Microelectronics, on stress and packaging and stress effects on reliability.

Oral Presentations: 82

Invited speakers: B.S. Berry, L.B. Freund, W.W. Gerberich, D. Grabbe, P. Hall, C.Y. Li, S.M. Prokes, C.P. Wong, T.-W. Wu, A.S. Jordan, I.A. Blech, K. Miyazaki, J.M. Hu, A. Bar-Cohen, S. Vaynman, A. Zubelwicz, E. Suhir, M. Jono, A. Chadnovsky, R.G. Ross, Jr., R.L. Selgunik, and J.V. Reddy.

Symposium I—Contamination Control in Microelectronics

Monday, April 29

Chairs: Stephen Gilbert, University of Arizona; Allen Bowling, Texas Instruments.

This symposium will provide a multidisciplinary forum for communication across traditional boundaries. Papers will discuss contamination of surfaces; measurement of particles in various processing ambients; vacuum, plasma, wet etch chemicals, etc.; contamination in plasma and vacuum; contamination and surface morphology; and characterization techniques.

Oral Presentations: 22

Invited speakers: T. Williams, B.Y.H. Liu, D. Ensor, V. Menon, R. Pertosomy, and I. Kawanabe.

Symposium J—Materials Science of High Temperature Polymers for Microelectronics

Monday-Thursday, April 29-May 2

Chairs: Do Y. Yoon, IBM Almaden Research Center; David T. Grubb, Cornell University; Itaru Mita, Dow Corning Japan Ltd.

This symposium will discuss recent advances and challenging problems in the chemistry, physics, surface/interface science, and processing of these polymers. Topics include chemical synthesis and characterization of new polymers; chemistry and characterization of curing, imaging, and surface modifications; melt processible polymers; structure, morphology, and physical properties of solid films; surfaces; interfaces; adhesion; and novel processing methods and applications.

Symposium K—Polymeric Alloys

Monday-Wednesday, April 29-May 1

Chairs: Kenneth S. Schweizer, Sandia National Laboratories; Jeffrey T. Koberstein, University of Connecticut; Thomas P. Russell, IBM Almaden Research Center.

This symposium will be concerned with miscible and phase-separated alloys, with special attention to the molecular factors which determine phase behavior. The structural, thermodynamic, spectroscopic, and time-dependent bulk properties (e.g., phase separation kinetics, diffusion, and rheology) of alloys consisting of binary blends and copolymers of various architectures will be discussed. In addition, the interfacial and surface aspects of polymer alloys will be addressed. A unifying theme will be an attempt to understand at a microscopic level the influence of chemical structure, chain architecture, molecular weight, and composition in determining the observed structural, dynamical, and phase behavior of polymeric alloys.

Oral Presentations: 40

Symposium L—Polymer Lifetimes Monday-Tuesday, April 29-30

Chairs: Brian C. Benicewicz, Los Alamos National Laboratory; Andrew Garton, University of Connecticut.

The public perception of plastics has changed from "cheap junk" that will fail almost immediately to immensely stable materials that will clutter our environment for thousands of years. Neither perception is correct. Polymer chemistry and engineering have developed to where a material can be tailored to its application, for example, withstanding a hostile spacecraft environment, providing high voltage insulation for 40 years, or a single use followed by biodegradation. This symposium will address the issue of polymer lifetime from a fundamental viewpoint, with emphasis on several specific material areas. Topics will include the fundamentals of polymer lifetime prediction, stability of aerospace materials, polymers in marine environments, stability of electrical insulation, electronic packaging, and conducting polymers, and controlled degradation and design criteria.

Oral Presentations: 23

Invited speakers: R.J. Densley, P.P. Klemchuk, J. K. Nelson, K. Gonsalvez, A.G. MacDiarmid, R.B. Seymour, W.H. Stormes Jr., and S.L. Koontz.

Symposium M—Polymeric Materials for Integrated Optics and Information Storage Tuesday-Wednesday, April 29-May 1

Chairs: Timothy W. Weidman, AT&T Bell

Laboratories; Gregory Wallraff, IBM Almaden Research Center; Christopher R. Moylan, IBM Almaden Research Center; Roger A. Lessard, Laval University.

This symposium will highlight recent advances in the synthesis and properties of novel applications of polymeric materials that interact with light in ways useful either for optoelectronics or data storage. Specific topics include polymeric waveguides, polymer components of optoelectronic devices, novel organic nonlinear optical materials, holography and holographic storage, polymeric optical storage media, reversible photochemistry in polymeric systems for erasable storage, and hole-burning polymeric systems. On Wednesday, sessions focusing on polymeric waveguides and active polymer materials will be held jointly with Symposium N, Materials for Optical Information Processing.

Oral Presentations: 36

Invited Speakers: R. Twieg, W.E. Moerner, P.M. Rentzepis, A. Fujishima, M. Irie, R. Matsushima, G.I. Stegeman, L.A. Hornak, G.F. Lipscomb, J.D. Suralen, R.N. DeMartino, and J.B. Halpern.

Symposium N—Materials for Optical Information Processing Wednesday-Friday, May 1-3

Chairs: Cardinal Warde, Massachusetts Institute of Technology; James Stamatoff, Hoechst-Celanese Corporation; Wen I. Wang, Columbia University.

This symposium will discuss key materials systems for optical information processing including photorefractive materials, liquid crystals, organic polymers and crystals, and III-V and II-VI compound semiconductors. Topics to be covered include modeling of nonlinearities of organics, synthesis of electrooptical units and polymers with high electrooptical coefficients, increased windows of transparency, and improved thermal stability. In the areas of heterostructure materials and devices, papers will address growth of lattice-matched ad strained III-V and II-VI heterostructures by MBE and MOCVD, and optoelectronic devices in heterostructures, including devices, quantum-well lasers, photodetectors and modulators, tunneling, and materials technologies for integration and high speed applications. Papers will also discuss liquid crystals and photorefractive crystals. Sessions focusing on polymeric waveguides and active polymer materials will be held jointly with Symposium M, Polymeric Materials for Integrated Optics and Information Storage.

Oral Presentations: 60

Invited Speakers: G.I. Stegeman, L.A. Hornak, G.F. Lipscomb, J.D. Swalen, R.N. DeMartino, J.B. Halpern, J.P. Harbison, L. Chirovsky, C.S. Hong, M.C. Wu, M.T. Asom, J.W. Doane, A. Tanguay, J. Feinberg, and R.V. Bhargava.

Symposium O—Molecular Tribology Monday-Tuesday, April 29-30

Chairs: J.N. Israelachvili, University of California, Santa Barbara; K. Komvopoulos, University of California, Berkeley; G. Bryan Street, IBM Almaden Research Center.

This symposium will feature the materials science and technology of thin film interfaces as they relate to the tribology and tribochemistry of interfaces. Papers will cover state-of-the-art techniques for the characterization of wear at interfaces, e.g., STM, AFM, and the surface force apparatus, and mechanical measurements of thin films. Other topics include durable thin film coatings and lubricants, fundamental wear mechanisms of lubricated and un-lubricated thin film interfaces, lubricant monolayers, and technological applications such as magnetic recording. Of particular value is that this symposium will highlight the importance of surface chemistry and mechanical properties, which are generally studied in distinct camps.

Oral Presentations: 32

Invited Speakers: U. Landman, S. Granick, G.H. Frederickson, M.O. Robbins, D.T. Quinta, J.M. Sivertsen, M. Salmeron, and C.M. Mote.

Symposium P—Interfaces in High Temperature Superconducting Systems Tuesday-Friday, April 30-May 3

Chairs: David A. Rudman, NIST; Subhash L. Shinde, IBM T.J. Watson Research Center; George Wagner, Westinghouse R&D Center; John Van der Sande, Massachusetts Institute of Technology.

This symposium will review the state of understanding of superconductor interfaces, both through detailed characterization of the interfaces and through studies on the effects of interfaces on superconducting properties. Interfaces include naturally occurring microstructural features such as grain boundaries, twin boundaries, and interphase boundaries, as well as artificially fabricated boundaries, including interfaces in composites, substrate-superconductor interfaces and heterostructures. This symposium will cover processing and properties of composites

and thin films, characterization of grain boundaries, interfaces, and defects, growth of thin films and multilayers, bulk processing, devices and electrical properties.

Oral Presentations: 74

Poster Presentations: (Thursday) 74

Invited speakers: J. Talvacchio, R. Koch, S. Babcock, D. Larbalestier, R. Ramesh, J. Weaver, D. Cooke, R. Gross, P. Chaudhari, C.B. Eom, C.T. Rogers, M.F. Chisholm, Y. Zhu, J. Kuo, A. Tsukamoto, A.F. Hebard, I.D. Raistrick, M.G. Norton, and O. Eibl.

Symposium Q—Structure/Property Relationships for Metal/Metal Interfaces

Monday-Wednesday, April 29-May 1

Chairs: A.D. Romig, Sandia National Laboratories; D.E. Fowler, IBM Almaden Research Center; P.D. Bristowe, Massachusetts Institute of Technology.

This symposium will deal with the science of metal/metal interfaces, focusing on the relationship between structure, chemistry and properties, including mechanical, electronic, and magnetic properties. Papers will cover grain boundaries, solid interphase boundaries, solid-liquid interfaces, epitaxial growth interfaces, and solid-vacuum interfaces, atomic and electronic structure of interfaces, interfacial defects, allomorphic nature of interfaces, and atomic structure of monolayers on single-crystal substrates. Discussions of thermodynamics and kinetics of interfaces will address interfacial diffusion and mobility, grain growth, morphological stability, stress at interfaces, reactions, precipitation, segregation and transformations at interfaces. Properties discussed will be elasticity and plasticity at interfaces, embrittlement and fracture of interfaces, electronic and optical behavior, and magnetic properties.

Oral Presentations: 43

Poster Presentations: (Tuesday): 24

Invited speakers: U. Dahmen, D.D. Chambliss, W.F. Egelhoff, P. Shewmon, E. Sowa, J.R. Michael, M.E. Glicksman, A.F. Jankowski, C.M. Falco, M.J. Mayo, I.K. Schuller, J.L. Bassani, E.C. Sowa, and U. Dahmen.

Symposium R—Phase Transformation Kinetics in Thin Films

Monday-Wednesday, April 29-May 1

Chairs: Martin Chen, IBM Almaden Research Center; Michael Thompson, Cornell University; Ricardo Schwarz, Los Alamos

National Laboratory; Matthew Libera, Stevens Institute of Technology.

This symposium will address thin-film-specific phase transformation kinetics, ranging from studies of the fundamental mechanisms to recent novel applications. Papers will address solid state amorphization and thin film crystallization (nucleation and growth), kinetics in thin films (theoretical and experimental), the influence of stress and microstructure on phase transformation kinetics, interfacial reactions, novel experimental techniques to probe interfacial and thin film kinetics, generation of new thin film ferroelectrics, and thin films for phase-change optical recording.

Oral Presentations: 53

Poster Presentations: (Tuesday) 16

Invited Speakers: K-N. Tu, F. Spaepen, D. Wolf, W.L. Johnson, and K. Rubin.

Symposium S—Magnetic Thin Films, Multilayers, and Surfaces

Monday-Thursday, April 29-May 2

Chairs: Herbert Hopster, University of California, Irvine; Stuart S.P. Parkin, IBM Almaden Research Center; Gary Prinz, Naval Research Laboratory; Jean-Pierre Renard, Université Paris-Sud; Teruya Shinjo, Kyoto University; Werner Zinn, IFF-KFA.

This symposium will emphasize magnetic thin film growth, exchange coupling in multilayers, rare earth thin films, magnetoresistance in Fe/Cr superlattices, equilibrium and nonequilibrium spin transport, magnetic nanostructures, multilayers, spin-polarized spectroscopies, theory of interlayer exchange coupling, and magnetic anisotropy.

Oral Presentations: 70

Poster Presentations: (Thursday)

Invited Speakers: L. Falicov, R. Allenspach, C.C. Kao, R. Wiesendanger, M. Salamon, E. Bauer, P. Bruno, D. Awschalom, J.F. Smyth, F. Fujii, S. Demokritoff, H. Hasegawa, G. Mathon, P. Johnson, G. Schutz, A. Fert, and S. Tsunashima.

Symposium T—Magnetic Materials: Microstructure and Properties

Tuesday-Thursday, April 30-May 2

Chairs: Yutaka Sugita, Hitachi Laboratory; Bruce M. Clemens, Stanford University; David E. Laughlin, Carnegie Mellon University; Kazuhiro Ouchi, Tohoku University; Takao Suzuki, IBM Almaden Research Center.

This symposium will explore the relationship between microstructure and magnetic properties in all magnetic materials. Topics will include permanent magnetic

materials, magnetic recording materials, magneto-optic recording materials, soft magnetic materials, paramagnetic and sensor materials, magnetic multilayers, micromagnetics, hysteresis, domains, amorphous materials, developments in processing techniques, and advances in characterization techniques.

Oral Presentations: 49

Invited speakers: T. Yogi, F. Pinkerton, K. Yoshida, K. Hayashi, R.C. Giles, D. Weller, G. Bayreuther, M. Abe, M.S. Altman, I.R. McFadyen, M. Komuro, Y. Yoshizawa, M. Takahashi, S. Hirose, R. Ramesh, and K. Mohri.

Symposium

U—Synthesis/Characterization and Novel Applications of Molecular Sieve Materials

Wednesday-Friday, May 1-3

Chairs: Robert L. Bedard, UOP; Mark E. Davis, Virginia Polytechnic Institute; Victor A. Maroni, Argonne National Laboratory; Thomas Bein, University of New Mexico; Juan Garces, Dow Chemical Company; Galen D. Stucky, University of California at Santa Barbara.

This symposium will address nontraditional, and, in some cases, unique applications of molecular sieve materials as well as novel synthesis and characterization methods. Specific emphasis will be on synthesis and characterization of new framework compositions and structures; novel optical, electrical, and sensor materials; molecular sieves as membranes and thin films; molecular sieve catalysis; and synthesis of zeolites, AlPO₄S, and layered materials.

Oral Presentations: 49

Invited speakers: A. Clearfield, R.C. Haushalter, M. Kanatzidis, T.E. Mallouk, G.A. Ozin, T.J. Pinnavia, S.L. Suib, J.A. Switzer, J.K. Thomas, D. Huybrechts, Y. Onu, A. Corma, W.F. Holderich, H. Kessler, and M.J. Annen.

Symposium V—Modern Perspectives on Thermoelectrics and Related Materials

Wednesday-Thursday, May 1-2

Chairs: David D. Allred, Brigham Young University; Glen Slack, General Electric CRND; Cronin Vining, Jet Propulsion Laboratory.

This symposium will focus on the materials aspects of existing and developing thermoelectric technology. Papers will focus on refractory semiconductor preparation and thermoelectric properties; Si-Ge thermoelectric materials; thermoelectric

properties of degenerate and heavily doped semiconductors; phonon, thermal, and electrical transport in semiconductors; applications of advanced characterization techniques; novel preparation and processing techniques; contacts/junctions and stability; modeling of thermoelectric and degenerate semiconductors; novel applications of thermoelectric materials; thermodynamics of thermoelectrics and junctions; and powder pressed semiconductors.

Oral Presentations: 27

Invited speakers: R. Pohl, F. Rosi, G. Stapfer, H. T. Hall, P. Klemens, N.B. Elsner, and T. Aselage.

Symposium W—Environmentally Conscious Materials Processing

Tuesday-Wednesday, April 30-May 1

Chairs: Janine C. Sekutowski, AT&T Bell Laboratories; Suzanne H. Weissman, Sandia National Laboratories; Michael R. Overcash, North Carolina State University.

Heightened public awareness and increasingly strict federal, state and local regulations are mandating minimization of environmental and occupational hazards associated with materials processing. Substitution with benign materials and processes, engineering controls, and recycling are all being emphasized to reduce these hazards. This symposium will highlight advances in environmentally conscious materials processing, such as waste minimization programs, policies, and goals, pollution prevention programs, replacements for hazardous materials and processes, alternative cleaning solvents and processes, recovery and recycling, and process and waste stream monitoring.

Oral Presentations: 23

Invited speakers: J. Mitchell, D. Doughty, L. Ross, D. Genser, K. Perri, D. Allen, and D.L. Pounder.

Symposium X—Frontiers of Materials Research

Monday-Friday, April 29-May 3

Chairs: A.K. Hays, Sandia National Laboratories; E.E. Marinero, IBM Almaden Research Center; C.V. Thompson, Massachusetts Institute of Technology.

This symposium is the Society's principal vehicle to maintain the interdisciplinary and integrative nature of its mission within the materials community. Leaders in various specialties represented by the topical symposia at the meeting present didactic reviews designed for ma-

terials researchers who are not specialists in the field. Topics in this symposium will span replacement and regeneration of tissues and organs, nanofabrication, mineral origins of life, proteins, STM, and bandgap

engineering of III-V semiconductors. Special features will be a presentation by the inaugural MRS Young Investigator awardee, and a panel discussion on materials science education. **MRS**

Active Materials and Adaptive Structures

November 5–7, 1991
Radisson Mark Plaza Hotel
Alexandria, VA

Sponsored by:

ADPA—American Defense Preparedness Association
AIAA—American Institute of Aeronautics and Astronautics
ASME—American Society of Mechanical Engineering
SPIE—The International Society for Optical Engineering

General Chairperson: Gareth J. Knowles, Grumman Corporation

This meeting focuses on civil and military applications of developments in active materials (including smart sensors and actuators), smart structures (including embedded avionics, micromotors, distributed processing, and artificial intelligence) and controlled structures technology. The goal of the meeting is to bring together those professionals concerned with interrelated technologies and multidisciplinary activities integral to the development of smart vehicles.

Unclassified papers are solicited that address applications issues arising from technology integration and total systems approaches, as well as developments in critical supporting technologies.

MATERIALS: • Composite Structures • Composite Materials with Active Constituents

SENSORS: • Passive Sensors (Health Monitoring, Vibration, Cure Cycle) • Active Sensors (Cracking and Embrittlement, Delamination, Relative Motion)

STRUCTURES AND CONTROL: • Finite-Element Analysis and Design Optimization • Passive Damping (Viscoelastic, Piezoceramic, Thermoelastic) • Active Damping and Control • Passive/Active Damping

DATA ANALYSIS, NETWORK ARCHITECTURE AND ARTIFICIAL INTELLIGENCE: • Signal Conditioning • Distributed Networks • Processing and Distribution

Tutorial Workshops

Tutorial workshops are scheduled on November 4, 1991. Tentatively they will include:

Viscoelastic Damping Technology and Applications (Anatrol Corp.)

Fiber-Optic Sensors for Integrated Design (R. Claus, VPI&SU)

Control for Smart Materials and Structures (D. J. Inman, SUNY at Buffalo and H. T. Banks, USC)

Piezoceramics and Active Damping (A. J. Bronowicki, TRW Space & Technology Group)

Materials Issues in Sensors and Actuators (Materials Research Lab, Penn State Univ.)

Papers are invited addressing basic issues in materials, sensor, processing and actuation technologies. Authors of accepted papers are expected to attend the Conference to present their work. An extended abstract of at least 600 words must be received no later than **April 13, 1991** by:

Invited Sessions Chairperson: Peter Dean
Lockheed Aeronautical Systems Company
Dept. 70-13, Bldg. Unit 50, Plant 2
P.O. Box 551, Burbank, CA 91520
Tel: 805/295-4755

Invited Sessions Co-Chairperson: Prof. Craig Rogers
Dept. of Mechanical Engineering
VPI&SU, Blacksburg, VA 24061
Tel: 703/231-7194
E-Mail: rogersc@vtvm1.cc.vt.edu