E.L. Thomas Appointed to Morris Cohen Chair at MIT

Edwin L. Thomas, a teacher and researcher in polymer physics and engineering was appointed Morris Cohen Professor in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. He will also direct the department's program in polymer science and technology.

Thomas holds a BS in mechanical engineering from the University of Massachusetts and a PhD in materials science and engineering from Cornell University. He previously served on the faculties at the University of Minnesota and the University of Massachusetts, where he was head of the Polymer Science and Engineering Department from 1985 to 1988.

Institute professor emeritus and professor emeritus of materials science and engineering, Thomas has contributed to the understanding of the structure of matter and the ways various materials, particularly iron and steel, can be processed to provide improved structures and devices.

Thomas' research interests center on the application of electron microscopy and small angle x-ray problems, particularly morphology-mechanical property relationships in high-performance polymers. He has published extensively in the areas of polymer physics and engineering, and served a guest editor for the *MRS BULLETIN* for the 1987 November/December issue on polymers.

University/Industry Plasma Materials Processing Center Established

Drexel University's Materials Processing Research Center has established the Center for Plasma Processing Research (CEPMP) with support from the Commonwealth of Pennsylvania's Ben Franklin Partnership and from industrial and project sponsors.

Founded September 1, 1989, the Center is dedicated to conducting wide-ranging basic and applied research in plasma materials processing. Its main function is to form direct links to industry through a consortium where teams conduct research of common interest. Through the consortium, the university expects to increase its research and development activities in scope and relevance, maintain important technology transfer links, and enhance communication with industry.

Despite commercial potential, plasma technology continues to be limited in such areas as process economics, efficient electrical use, process control inadequacies, equipment performance, lack of process understanding, and lack of skilled personnel in plasma processing. CEPMP's goal is to provide a research focus to address these technology issues and limitations.

Research at CEPMP will span the following areas:

- Deposition—wear coating development, spray forming methods, refractory metal component fabrication, protective coatings for C-C and C-epoxy, and analytical modeling and knowledge-based control;
- Synthesis—in-flight reaction with metals to form deposited secondary phases; and
- Melting—melt refining, process modeling, and process development.

Firms supporting the Center's research include Air Products and Chemicals, Inc.; Alcoa Laboratories; Alloy Technology International, Inc.; Consarc; Electro-Plasma, Inc.; GE Aircraft Engine; GTE Sylvania; Howmet Corporation; and Sematech International, Inc.

For additional details, contact Prof. Ronald W. Smith, Drexel University, Department of Materials Engineering, Philadelphia, PA 19104; telephone (215) 895-1990 or 387-2552.

Syd Wilson Receives Dan Noble Fellow Award

Syd Wilson recently received Motorola's Dan Noble Fellow Award, which recognizes top technological leadership. The award, named in recognition of technological pioneer Dan Noble, is given to Motorola associates who constantly demonstrate outstanding technical leadership.

Wilson received his BS, MS, and PhD in physics from North Texas State University. He also performed experimental work for his PhD degree at the Surface Modification and Characterization Facility at Oak Ridge National Laboratory.

In nearly 11 years with Motorola, Wilson has earned eight patents and the Platinum Quill Award for receiving more than $10,000 in publication awards and for authoring 103 articles. He also edited the book, *Rapid Thermal Processing of Electronic Materials*. He is a recognized expert throughout the industry for his work in ion implantation and rapid thermal process-

ing, and is currently working on the multi-interconnect program for MOSAIC V/BiCMOS V. An active MRS member, Wilson is chair for the Book Subcommittee of the MRS Publications Committee.

Polymer Short Courses to be Cataloged

The Polymer Education Committee of the American Chemical Society is compiling a comprehensive catalog of polymer-related short courses sponsored by technical societies, universities, government agencies, or private instructors. The catalog is intended to direct individuals seeking further instruction in all aspects of polymer science and technology to courses appropriate to their educational needs. The catalog will also give instructors the opportunity to make information on their courses available to a broad range of interests.

To list a polymer short course or ask for further information, contact Cynthia Arnold, telephone (602) 730-2036, or Garth Wilkes, telephone (703) 321-5771.

J. Willis on Superconductor Assignment at Japan's ISTEC

Jeff Willis, a physicist at Los Alamos National Laboratory, left in March for a one-year assignment at the International Superconductivity Technology Center (ISTEC) in Tokyo. One of only five non-Japanese researchers at ISTEC, Willis is assigned to a division charged with characterizing and analyzing the fundamental properties of superconductors.

ISTEC, possibly the largest superconductivity research facility in the world, is a nonprofit foundation supported almost entirely by major Japanese companies. It accommodates 100 mostly Japanese researchers and was created at the urging of the Japanese Ministry of International Trade and Industry.

Acknowledging that he will be working with scientists recognized worldwide as his technological rivals, Willis pointed out that one of ISTEC's objectives is to promote international exchange in superconductivity. "ISTEC was set up for basic research, not product development where the really intense proprietary competition is expected," he said.

Willis currently holds a joint appointment with the Exploratory Research and Development Center (ERDC) and the Condensed Matter and Thermal Physics Group at Los Alamos. The ERDC encompasses one of three superconductivity pilot centers established at national laboratories by the U.S. Department of Energy.

V. McCrary Named "Most Promising Engineer"

Victor McCrary, a researcher at AT&T Bell Laboratories, was named "Most Promising Engineer of the Year" by *U.S. Black Engineer Magazine*. McCrary, along with 17 other outstanding scientists and engineers, was formally honored during the magazine's recent annual awards conference in Baltimore, Maryland.

McCrary, whose research deals with semiconductor lasers, hold a BA in chemistry from Catholic University of America and a PhD in physical chemistry from Howard University.

U.S. Black Engineer annually selects outstanding individuals whose contributions best exemplify innovation, hard work, and achievement in the many fields of engineering. Recipients are selected by members of industry, academia, medial, and the engineering community, and are sponsored by the Council of Engineering Deans of the Historically Black Colleges and Universities, the Career Communications Group, Inc., and Mobil Corporation. For more information about the Black Engineer of the Year Awards, call B. Osorio at (310) 244-7101.

AT&T Signs Semiconductor Resist Agreements with Olin and Sematech

AT&T Bell Laboratories, Murray Hill, New Jersey, has signed separate agreements with Olin Corporation and Sematech to develop materials that will be fundamental to the fabrication of new generations of integrated circuits. The agreement between Olin and AT&T concentrates on semiconductor resist, which has a current annual market of $225 million worldwide, and calls for Olin to manufacture and sell AT&T-developed materials. The agreement with Sematech is one of Sematech's programs to revive the U.S. semiconductor industry.

AT&T Bell Laboratories has invented a "deep UV resist" that is sensitive to the ultraviolet spectrum and that can produce highly complex chips with lines as small as 0.3 micrometers. "The deep UV resist is the future in semiconductor manufacturing, and will produce semiconductors that compete win the global market in terms of performance and price," said Robert Noyce, Sematech's president and chief executive officer.

Emcore Gets SBIR Funding for III-V/II-VI Solar Cell Research

Emcore Corporation was awarded Phase I research funding under the National Science Foundation's Small Business Innovation Research program for research on novel II—VI solar cell structures.

Emcore intends to use metalorganic chemical vapor deposition technology to develop a novel p-i-n ZnTe/CdTe/GaAs II-VI solar cell. The structure will combine III-V and II-VI solar cell technology, leading toward the development of superlattice multijunction solar cells. The Process Technology Group will conduct the research using a vertical rotating disk reactor.

Lake Shore Acquires Electromagnetic Technology from Varian

Lake Shore Cryotronics, Westerville, Ohio, recently announced the acquisition of the design and technology for the four-inch variable gap laboratory electromagnets previously produced by Varian NMR Instruments. Used primarily in laboratory environments, the magnets are especially suitable for applications such as magnetization measurements, Hall effect studies, magnetic resonance demonstrations, and hysteresis loop determinations. The magnets will be redesigned with coil sets that incorporate the latest aluminum tape winding techniques so they will be lighter in weight.

Anthony and Heuer Elected to NAE

Among the 80 engineers and seven foreign associates recently elected to membership in the U.S. National Academy of Engineering are two members of the Materials Research Society:

Thomas R. Anthony, a physicist with General Electric Corporate Research and Development Center, Schenectady, New York, was cited "for outstanding application of diffusion phenomenology to the development and fabrication of materials and devices."

Arthur H. Heuer, Kyocera Professor of Ceramics, Case Western Reserve University, Cleveland, Ohio, was cited "for pioneering studies in transformation-toughened ceramics and the application of electron microscopy to engineering ceramics and for contributions to education in ceramics."

Election to the Academy is considered among the highest professional distinctions accorded to an engineer. Academy membership honors those who have made "important contributions to engineering theory and practice, including significant contributions to the literature of engineering theory and practice," or those who have demonstrated "unusual accomplishment in new and developing fields of technology."

NAE is a private organization established in 1964. It shares in the responsibility given the National Academy of Sciences under a congressional charter granted in 1863 to advise the federal government on questions of science and technology. This collaboration is implemented primarily through the National Research Council.

Fusion Experiments Scheduled at Max Planck Institute in Garching

ASDEX-Upgrade, West Germany's largest experiment in controlled nuclear fusion, is scheduled to begin this year at the Max Planck Institute for Plasma Physics in Garching. ASDEX-Upgrade, which continues the research on diverters begun by the earlier ASDEX experiment, will cost approximately DM200 million and is an integral part of the European Fusion Research Program.

Nine meters high and weighing 700 tons, the ASDEX-Upgrade device is primarily designed for research into the effects of and possible solutions to the interplay between the reaction plasma and the reactor walls. It will hold plasma rings with a radius of 1.7 meters and a volume of 13 cm^3. The plasma, 250 times thinner than the density of normal air, will be heated to 25 million degrees Celsius for the experiments.

Report Identifies Bioseparation Technologies with Commercial Potential

The worldwide market for separation media and devices is expected to increase from its current level of approximately $1 billion to $2.4 billion over the next five years, concludes a report by Technology Catalysts.

The report, *Novel Bioseparation Technologies*, provides insight into new bioseparation technologies that can potentially satisfy the critical requirements for large-scale manufacturing processes. The worldwide survey of over 130 product developer companies and 50 university and government research laboratories identifies the following emerging technologies with

commercial potential:

- A large-scale isoelectric focusing system which can process two-liter volumes using proprietary ampholytes which increase resolution;
- Composite membranes, consisting of a soft hydrogel film on a rigid proous support, which can be used for microfiltration and ultrafiltration simultaneously;
- Formed-in-place membranes prepared with layers of inorganic gels or organic polymers on a porous stainless steel substrate;
- Supported-fluid membranes with a proprietary organic phase and carrier complex for the selective and continuous extraction of organic acids from fermentation broth;
- An electromembrane-ultrafiltration process which increases membrane flux by as much as 90% and reduces fouling of commercially available membranes when tested in fermentation broths;
- Macroporous polystyrene divinylbenzene media for real-time "perfusion" chromatographic separation of proteins and peptides;
- A recombinant engineered Protein G affinity chromatography column which binds to all subclasses of IgG and can be used in fast-flow liquid chromatography mode; and
- A membrane-mediated solvent extraction process to recover antibiotics from fermentation broth.

For information, contact P. Weitz, Technology Catalysts, Inc., Falls Church, Virginia; telephone (703) 237-9600; fax (703) 237-7967.

Shock Processing Makes High T_c Superconductors Carry More Current

Researchers at Lawrence Livermore National Laboratory (LLNL) report that shock processing experiments increased the current carrying capacity of high temperature superconductors up to seven times more than previously demonstrated. The experiments involve shooting projectiles at small quantities of high T_c superconductors. The resulting shock waves permanently change the material's structure to permit the greater flow of electricity.

The shock process has been applied only to very small quantities of bulk powders composed of microscopic crystallites. LLNL researchers believe the process can easily be scaled upward, however. Furthermore, they say the changes appear irreversible and maintain that the material's superconducting properties will not likely be harmed in manufacturing.

Superconducting powder is compacted by means of a plastic projectile fired from a gas gun, compressing the powder to 100,000 times normal atmospheric pressure. The shock wave lasts one microsecond and produces a much more orderly and smooth arrangement of crystallites, enhancing the electrical flow.

Even more significant is the creation of flux pinning sites, which have so far increased sevenfold the amount of electricity the material can carry while still exhibiting superconducting properties. The defects remain even after the material is baked at temperatures greater than 900°C.

The laboratory has filed patent applications, and research leader Bill Nellis is making plans to share his group's discoveries with U.S. firms.

Ultrahigh Vacuum CVD Doubles Speed of SiGe Transistors

Ultrahigh vacuum/chemical vapor deposition has made it possible for IBM researchers to create a silicon-based transistor that operates nearly twice as fast as the previous record. The experimental silicon-germanium transistors, known as Heterojunction Bipolar Transistors (HBTs), operate at a maximum frequency of 75 billion cycles per second.

Earlier attempts to produce HBTs with SiGe alloys failed because the larger size of the Ge atom relative to that of the Si atom makes it difficult to properly mix the two materials. With ultrahigh vacuum CVD, deposition occurs at lower temperatures and in a far cleaner environment than existing growth techniques. Low temperature deposition keeps the larger Ge atoms in place, while the ultrahigh vacuum conditions eliminate the incorporation of contaminants.

APS Names Fellows, MRS Represented

The American Physical Society recently announced newly elected Fellows. The honor of Fellowship is reserved for APS members "who have contributed to the advancement of physics by independent, original research, or who have rendered some other special service to the cause of science." Among the newly elected Fellows are 21 members of the Materials Research Society:

- Division of Chemical Physics

George Castro, "for the discovery of several significant optical and electronic processes in organic solids."

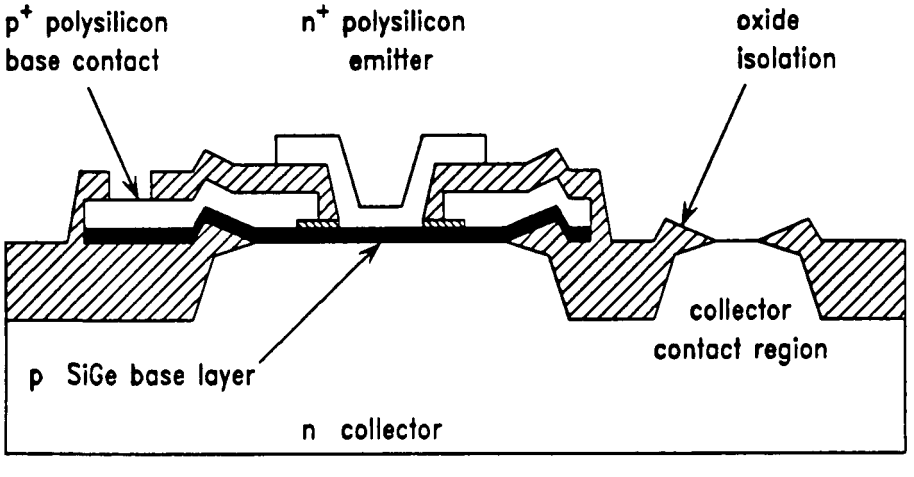
Eric Mazur, "for original and precise experimental investigations of transport properties in gases, of surface excitations, and of vibrational excitations in molecules."

- Division of Condensed Matter Physics

Aloysius J. Arko, "for research on the electronic properties of novel materials, in particular his Fermi-surface studies in strongly correlated metals."

James D. Chadi, "for theoretical contributions to the understanding of semiconductor surface reconstructions and defect-related structural metastabilities."

Ho Sou Chen, "for providing critical insights into the nature of metastable solid phases, in particular the structure and relaxation of metallic glasses, phase transi-



Schematic cross section of the SiGe-based HBT. Electrons travel from the emitter through the base into the collector. The ultrathin base layer and the use of SiGe material enable the electrons to traverse the base region in a shorter time, resulting in the record performance for these materials.

tions in amorphous systems, and the thermodynamics of the quasicrystalline phase."

Chia-Ling Chien, "for contributions to the understanding of the magnetic properties of metallic glasses, magnetic superlattices, granular solids, and superconductors."

James L. Erskine, "for contributions to understanding of magnetic materials and for spectroscopic studies of solid surfaces."

J. Murray Gibson, "for uses of electron microscopy to elucidate the relation between atomic structure and physical properties in condensed matter systems."

Hermann G. Grimmeiss, "for experimental investigations of impurities in semiconductors through the innovative use of a wide range of techniques."

James D. Jorgensen, "for the determination of crystal structures from high resolution-neutron-diffraction data."

Uzi Landman, "for applications of numerical simulation modeling of both the static structure and nonequilibrium dynamics of solid surfaces, interfaces, and small clusters."

Paul Meakin, "for the application of computer experiments to diffusion-limited aggregation, for the introduction of alternative fractal aggregates, and for the understanding of related harmonic multifractal measures."

James L. Merz, "for research leading to the understanding of the optical properties of compound semiconductor materials and optoelectronic devices."

Pierre M. Petroff, "for developing novel spectroscopic methods to characterize the structure and electronic properties of defects, interfaces, and superlattices of semiconductors."

Warren E. Pickett, "for developments in the theoretical understanding of electronic and magnetic properties of crystalline solids, both metals and insulators."

Daniel T. Pierce, "for studies of electron-spin-polarization phenomena at surfaces and for the development of electron-polarization sources."

Frans A. Spaepen, "for contributions to the understanding of isoconfigurational atomic transport in metallic glasses and of crystal-melt interfaces."

■ Division of Fluid Dynamics

John J. Kim, "for significant expansion of our understanding of turbulent flows through the development of convergent methods for direct numerical simulation, the application to wall-bounded flows, and the subsequent interpretation using innovative concepts."

■ Forum

Rustum Roy: "As director of the Penn State Science Technology and Society Program, and in many other ways, he has considerably improved our understanding of the interaction between science, technology, and society."

■ Division of High Polymer Physics

W. Wade Adams, "in recognition of important research on the ultrastructure and properties of polymers."

■ Division of Nuclear Physics

Stephen J. Wallace, "for fundamental contributions to multiple-scattering theory and to the foundations of relativistic nuclear physics, notably in the development of the relativistic treatment of proton-nucleus scattering." □