Advanced Manufacturing Technology Center Established at Sandia

A Center for Advanced Manufacturing Technology has been established at Sandia National Laboratories to focus the range of its advanced technologies to support the manufacturing needs of U.S. industry and of the Department of Energy's (DOE) nuclear weapons complex. Heinz Schmitt has been appointed to lead the center. Also, DOE's Kansas City Plant, which manufactures non-nuclear components for nuclear weapons, recently completed a Flexible Manufacturing System Facility, which will be available as a source of advanced manufacturing technology development for U.S. businesses. The facility is a computer-controlled production unit that can machine up to 32 different parts on a given day and inspect them against demanding quality standards as they are manufactured.

Creation of the new centers supports the National Technology Initiative mission to increase cooperation between government and businesses and also demonstrates the reorganization and consolidation of the nuclear weapons complex. Al Narath, president of Sandia, said, "The large range of advanced technologies developed within Sandia's defense, energy, and environmental programs will now be better able to assist U.S. industry to improve its manufacturing processes and be more competitive in international markets."

Sandia has gained a strong foundation in engineering design and development through its oversight role to ensure high performance and reliability of the vast majority of U.S. nuclear weapons components. The strict standards required for weapons technology under extreme atmospheric conditions brings a rare expertise to the labs. Sandia's capabilities include advanced materials and processes, precision casting and machining, microelectronics, intelligent machines for hazardous and flexible operation, computer-aided design and engineering/computer-integrated manufacturing/concurrent engineering, sensors and controls, joining technologies, capacity and production planning, information technologies, environmentally conscious processes, and quality and reliability technologies.

The laboratory is already involved in over 40 cooperative research and development agreements (CRADAs) in advanced manufacturing with firms such as SEMATECH, General Motors, Ford, Chrysler, Olin, Cummins, Motorola, Honeywell, AT&T, National Semiconductor, National Center for Manufacturing Sciences, and Pratt and Whitney. Sandia also stresses the technical assistance of small businesses through regional outreach programs and university-based "teaching factories" for precision manufacturing and microelectronics.

The Sandia Advanced Manufacturing Technology Center will work with industry, government agencies, universities, and other government laboratories. For more information, contact Heinz Schmitt at (505) 845-9799, or Bill Alzheimer (director of manufacturing technologies at Sandia) at (505) 844-8035.

Scientists Produce Magnetic See-Through Material

A transparent magnetic material has been produced by scientists at Xerox Corporation's Webster Research Center. The crystalline material is identical chemically to gamma ferric oxide, used for decades as the magnetic coating for audio and video recording tape, according to Ronald Ziolo, Xerox senior scientist. But the crystals that make up the physical form of the new material are far smaller than the crystals that comprise the conventional magnetic material, he said.

In a July 10 *Science* article, Ziolo and collaborators showed the Fe_2O_3 crystals range in size from 2 to 10 nm. "Because the Fe_2O_3 crystal is so small, it loses its usual ferromagnetic property and becomes superparamagnetic, a state in which the crystals will stick to a magnet but not to each other," Ziolo said. In this new state, the nanocrystals have potential applications in color imaging, computer information storage, magnetic fluids, and even magnetic refrigeration.

"The transparency of the new materials is an added bonus, not usually found in magnetic material at room temperature," Ziolo said. "Why the nanocrystals are more transparent than the larger crystals of conventional Fe_2O_3 is not yet understood, but it appears to relate to the size of the particles."

Ziolo and collaborators at Cornell University grew the nanocrystals in beads of a resin used in water softeners because of its

https://doi.org/10.1557/S0883769400042007 Published online by Cambridge University Press

ion-exchange properties.

Although some transparent magnetic materials already exist, their magnetic properties are either too weak to be useful, or they only function at temperatures near absolute zero. The new material is a compromise between these extremes.

Mountziaris to Receive Norman Hackerman Young Award

T.J. Mountziaris, assistant professor of chemical engineering at SUNY-Buffalo, has been named the 1992 recipient of the Norman Hackerman Young Author Award in Solid State Science and Technology by the Electrochemical Society. His research focuses on reaction and transport studies of the chemical vapor deposition of III-V semiconductors, magnetic semiconductors, and diamond films.

Mountziaris holds a PhD in chemical engineering from Princeton University and has spent two years as a postdoctoral fellow in the Department of Chemical Engineering and Materials Science at the University of Minnesota.

The presentation of the scroll and cash award will take place during the 182nd Meeting of the Electrochemical Society in Toronto this fall.

Experts Conduct Seminar on Semiconductor Manufacturing Competitiveness

Managing and reducing defects is essential for achieving more competitive semiconductor manufacturing, according to three industry experts who spoke at a seminar, "Implementing Competitive Manufacturing," in Redwood City, California.

Gerhard Parker, senior vice president of Intel, estimated that integrated circuit (IC) manufacturers will spend $20 million for each additional defect per wafer. Parker also described the growing complexity of IC devices, the increasing die sizes required for future profitability, the reduced defect levels allowable, the need to control the rising costs of capital expenditures, and the increasing role of governmental regulations.

Boris Lipkin, senior engineering manager at IBM's East Fishkill, New York facility, shared his experiences managing the first fully robotic wafer transport and storage system that controls the environment surrounding the wafers through the use of mini- and micro-environments and robotic mechanisms. Early yield indicators are promising, Lipkin reported, but are not yet conclusive.

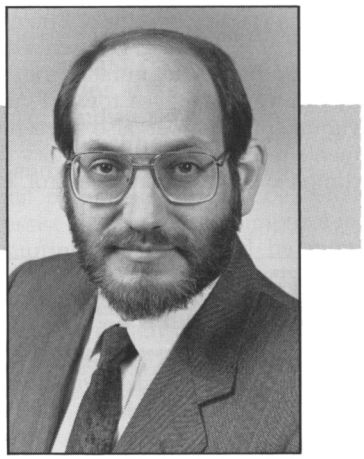
James Harper, director of Strategic Integration at SEMATECH, described several semiconductor manufacturing trends, including a move toward mini-environments. Harper also presented elements required in future factory designs: complete environmental control, environmentally clean manufacturing, equipment standardization, simple device structures and computer-controlled no-fluctuation processes. Harper envisioned a paradigm shift in the late 1990s from current lab designs centered around people to labs designed around the wafer.

https://doi.org/10.1557/S0883769400042007 Published online by Cambridge University Press

Kaufmann Accepts Editorship of Annual Review of Materials Science

Elton N. Kaufmann, associate director of the Strategic Planning Group in the Office of the Director at Argonne National Laboratory, has agreed to become editor of *Annual Review of Materials Science* (ARMS) effective January 1, 1993 through December 31, 1997. ARMS is a publication of Annual Reviews Inc. (ARI).

Kaufmann plans to build on the legacy begun by Robert Huggins, who has been editor of ARMS since 1971. "The imprint of Bob's broad knowledge of our field and his scholarly approach will continue to serve *Annual Review* well," he said. "We want ARMS to stay on top of the most recent developments while still offering balanced reviews of reference value to specialists, of introductory value to researchers changing fields, and of tutorial value to students and



their professors. This is a tall order and an exciting challenge."

Kaufmann has actively served the materials community and has pursued various editorial interests. Prior to joining Argonne in 1989 as Director of its Pilot Center for the Commercialization of Superconductivity, Kaufmann held positions at Lawrence Livermore National Laboratory and at AT&T Bell Laboratories. He was Principal Editor of the journal *Hyperfine Interactions*, associate editor for *Materials Letters*, and is a member of the editorial board of *Radiation Effects*.

As chair of the *MRS Bulletin* Editorial Boards since 1986, Kaufmann spearheaded a major thrust to expand and upgrade the news coverage and technical content of the *MRS Bulletin*. Kaufmann is a former president and councillor of the Materials Research Society and is a fellow of the American Physical Society.

Kaufmann also said he was pleased that MRS Second Vice President John Bravman will join ARMS as a member of its Editorial Committee. Bravman, professor of materials science and engineering at Stanford University, is also a member of the Technical Editorial Board of the *MRS Bulletin*.

Computer Code Models High-Energy Events

A large (250,000 lines) computer code developed at Sandia National Laboratories is gaining use throughout industry and government for modeling a wide range of high-energy, high-velocity phenomena. The code, called CTH, is a portable, high-performance computer code that models and generates images of two- and three-dimensional phenomena arising from rapid release of large amounts of kinetic, chemical, nuclear, or other types of energy. The energy release can melt or vaporize solids, generate strong shock waves, and fragment materials. Events can include meteorite impacts, spacecraft collisions with orbital debris, explosive contact between molten metal and water, acceleration of hypervelocity projectiles, explosive forging, and defense applications such as armor/projectile interactions and nuclear weapon safety.

CTH is used at more than 80 industry, university, and government sites. At least 101 licenses have been issued. Gene Hertel, project manager of the Sandia team that developed the code, said it is used by virtually all of the Army, Navy, and Air Force laboratories and major defense contractors.

CTH can be used on any equipment from massively parallel supercomputers to high-end personal computers, is written in modern portable programming languages (ANSI, FORTRAN, and C), is often faster than earlier codes, and supplies a complete visualization environment that generates color-shaded images of the data.

https://doi.org/10.1557/S0883769400042007 Published online by Cambridge University Press

https://doi.org/10.1557/S0883769400042007 Published online by Cambridge University Press