Carnegie Mellon Awarded NSF Funds for Magnetic Data Storage Research Center

Carnegie Mellon University, Pittsburgh, Pennsylvania, was recently awarded funding by the National Science Foundation to establish a center for research on magnetic and magneto-optical recording technologies used for data storage in future high performance computer systems, high definition television, and audio and video recording.

The Data Storage Systems Center, one of 19 NSF Engineering Research Centers and the second such facility to be awarded to Carnegie Mellon, will be funded at $1.97 million the first year. Funding over the next five years could reach as much as $14.6 million, with Carnegie Mellon contributing an additional $1.7 million in capital eqiupment funds over the same period.

The Center will incorporate Carnegie Mellon's industrially funded Magnetics Technology Center (MTC), which was established in 1983. Researchers at the MTC, which is funded at more than $3 million annually, now work with 16 companies sponsoring research on magnetics.

According to the Center's director, electrical and computer engineering professor Mark H. Kryder, the NSF support will bring about a long-term, focused research program not possible with industrial funding alone. "Though a lot has been written recently about the semiconductor business going to Japan and threatening the U.S. computer industry, the data storage business is equally as critical," he said. According to Kryder, the data storage business generated $40 in sales in 1987 and represents and even larger segment of the computer industry than semiconductors.

The Center's initial goal is to produce disk drives by 1994 with storage densities more than 25 times greater than those operating today. The specific goal is to achieve storage of over 10 gigabytes of information on a 3.5-inch disk drive. Longer term goals include advances of another factor of 25 beyond the initial target.

According to Carnegie Mellon Provost Angel G. Jordan, the Center will also fill an important educational need. The current output of students with master's and doctor's degrees in the field is less than 25% of U.S. industrial requirements, said Jordan. The Center, which will ultimately have 28 faculty, 65 graduate students, and another 26 scientists and postdoctoral research, will provide the necessary training ground, he said.

The Center will also reflect the strength of the university's interdisciplinary approach to research. Seven department will contribute expertise to the new Center, including Electrical and Computer Engineering, Mechanical Engineering, Computer Science, Physics, Chemistry, Chemical Engineering, and Metallurgical Engineering and Materials Science.

Few U.S. universities are doing research in data storage. In addition to Carnegie Mellon, only the University of California at San Diego, University of Santa Clara, University of Minnesota, and University of Arizona have announced centers for work in this area. In Japan, said Director Kryder, magnetics research at universities is as widespread as research on semiconductors is in the United States.

BRITE/EURAM II Program Announced

The budget for a new BRITE/EURAM program was announced following a European Community Council meeting in Brussels, December 15, 1989. The program is aimed at encouraging international collaborative research and development in industrial technologies and advanced materials among European industrial, government and university sectors.

The new program follows BRITE/EURAM I, which unified two separate efforts—Basic Research on Industrial Technologies for Europe and European Research on Advanced Materials. The unified effort attracted more than 8,400 participating groups and funded nearly 2,000 research proposals.

Calls for proposals will continue for BRITE/EURAM I through mid-1990 and in 1991, with budgets of 125 million ECU each year. BRITE/EURAM II will run in parallel, starting the first call for proposals in 1991. During 1990 the European Community Council will determine the major research areas to be supported and announce the program toward the end of the year. The budget, 577 million ECU, has already been decided and, compared with the 450 million ECU earmarked for BRITE/EURAM I, shows a solid increase in the European interest in materials research. I.W.B.

Quasicrystals Confirmed

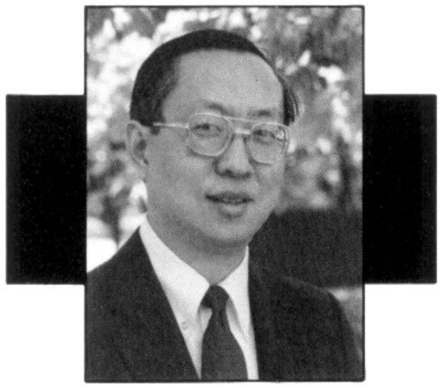
Researchers at AT&T Bell Laboratories have confirmed the existence of quasicrystals by obtaining the first images and accurate measurements of the atomic structure of the novel, synthetic metal compounds. The breakthrough hinged on advances in materials processing, which yielded high-quality crystals for the first time.

Using a scanning tunneling microscope, Russell Becker, with colleagues Refik Kortan, Fred Thiel and Ho Sou Chen, was able to observe individual surface-level atoms in quasicrystals and compare them to high-resolution x-ray diffraction studies of the bulk materials. "These images and measurements verify that pentagonally arranged clusters of atoms can fit together to form perfect quasicrystals," said Becker.

The team's latest quasicrystal compounds, made of aluminum, cobalt and copper, are lightweight, extremely strong, hard as quartz, resistant to surface wear, and maintain a constant electrical resistance over a wide range of temperature variation. "The electrical conduction mechanism is not understood," said Kortan, "but now that the atomic structure is known and high-quality samples are available, we are eager to perform additional experiments and construct new theories."

Initial research indicates that quasicrystals may be useful as fuse links and high-quality electrical resistors. And the construction industry is investigating the use of quasicrystalline aluminum-lithium alloys for lightweight and tough construction materials, abrasive products, and longer lasting ball bearings.

Chang to Direct Materials Research Center



R.P.H. Chang, professor of materials science and engineering, has been named director of the Materials Research Center at Northwestern University, Evanston, Illinois. He will serve as administrator for the University's main center for basic and applied research on advanced materials, including metals, polymers, ceramics, electronics, and other solid state materials.

The 30-year-old Center fosters collaborative projects among researchers in the Robert R. McCormick School of Engineering and Applied Science and the Departments of Chemistry and Physics and Astronomy in the College of Arts and Sciences. The Center is conducting research in five major areas: internal interfaces and nanostructured materials, high temperature superconductivity, nonlinear optical polymers, charge transports and structure, and the science of new steels.

Chang joined the faculty at Northwestern University in 1986 after 15 years at AT&T Bell Laboratories. His current research interests include the study of diamond films, high temperature superconductivity oxide films, and materials processing for integrated optoelectronic devices.

Chang has served the Materials Research Society in numerous capacities as a symposium organizer, meeting chair, committee member, and councillor. He was president of the Society in 1989 and played an important role in organizing co-sponsored MRS meetings in Japan and

China. He was recently elected chairman of the new International Materials Research Committee, formed to spur more cooperation in materials research worldwide.

Advanced Materials Conference to Consider Business Plans and Perspectives

On March 27 and 28, 1990, *The Wilson Reports* will conduct a conference on "Advanced Materials: Plans and Perspectives of the Business Community." Seventeen prominent leaders in the materials industry will describe their perspectives of markets, research, budgets, profits, international competition and industry growth in addition to their plans for future activities.

Conference presentations will span the economic and technical outlook for various advanced materials, recent industry research and marketing developments, views on how to cope with the competitive situation in the Far East and European Community, and the growing role of government policies in determining international competitiveness.

For information contact The Wilson Reports, Suite 500, 1900 L Street NW, Washington, DC 20036; telephone (202) 835-1571.

Kurtz Named Penn State Lab Director

Steward K. Kurtz, professor of electrical engineering and Murata Professor of Materials Research, has been appointed director of the Materials Research Laboratory at Pennsylvania State University.

Kurtz came to Penn State in 1987 after an extensive research career at Bell Laboratories, the Philips Company, and Bristol Myers. He played a key role in the early discovery and development of materials used in laser systems, optical communications, and compact disk systems

Kurtz considers high temperature ceramics, fiber-reinforced composites, ferroelectric thin films on semiconductors, molecular-scale electronic composites, synthetic diamond films, biomedical materials and chemically bonded ceramics among the most promising materials for the future. His goal is to enhance Penn State's reputation in materials through greater coordination and integration of research efforts already being conducted in many parts of the University.

Silica Aerogels Could Capture Cosmic Particles

Lower density silica aerogels developed by researchers at Lawrence Livermore National Laboratory may help NASA capture and analyze cosmic dust particles, including micrometeoroids and very fine debris found in the tail of comets. A method developed by the researchers produces silica aerogels with densities as low as 5 mg/cm^3. Previously the lowest densities for silica aerogels were about 10 times higher.

The Livermore research team, led by Lawrence Hrubesh, used a new manufacturing process, the condensed silica method developed by team member Thomas Tillotson, to develop the new generation of ultralow density aerogels.

A condensed silica solution is used to make gels of selected densities by simple dilution and use of a chemically basic catalyst like ammonia to complete the reaction. According to the researchers, careful selection of the diluting liquid is the key to achieving the lowest densities.

The solutions are poured into molds where gelation and aging occur at 25°C. While other methods can take weeks, the time to gelation using the new method is only a few days for the lowest densities.

According to Hrubesh, the ultralow density aerogels are ideally suited to NASA's proposed experiments. The material's density is so slight that particles would be captured instead of burned up, and the material can be made extremely pure and free of carbon, one of the key elements NASA scientists will look for. Finally, the material's high transparency to visible light means that the microscopic particles can be easily located in the aerogel medium and perhaps analyzed without removal.

Experiments at NASA laboratories have already demonstrated successful particle capture by low density aerogels. Experiments to capture dust particles are planned as part of future Shuttle missions and as part of a proposed unmanned comet fly-by mission.

Fastest PNP Silicon Transistor Reported

A recently demonstrated experimental PNP transistor runs twice as fast as previously reported devices, according to the IBM researchers who made it. During operation, digital circuits built with the PNP transistors switched on and off 25 billion times per second, more than three times as fast as previous generations of PNP circuits, they said.

To date, the major obstacle to achieving a high performance bipolar technology has been the lower speed of PNP devices compared with the high speed NPN devices and the difficulty of combining both devices on one chip. The high performance PNP devices were made using existing silicon device fabrication methods, which may facilitate the production of both devices on one chip in a complete complementary bipolar process.

Hulm Named to U.S.-Japan Advisory Panel

John Kenneth Hulm, chief scientist emeritus of the Westinghouse Electric Corporation, was appointed to the U.S.-Japan Joint High Level Advisory Panel by the President's assistant for science and technology, D. Allan Bromley.

Advisory panel members include 20 distinguished U.S. and Japanese scientists and engineers from industry and academia. The panel, formed under a cooperative agreement on research and development signed in 1988, provides advice to both governments on their science and technology relationship.

A member of the National Academy of Sciences and an international authority on superconductivity, Hulm retired as chief scientist from the Westinghouse Science and Technology Center two years ago but maintains a consulting relationship. □