NIST Announces First Advanced Technology Program Grants

The National Institute of Standards and Technology recently announced 11 initial grant recipients under the Commerce Department's Advanced Technology Program. Administered by NIST, the program is a new effort of the Commerce Department's Technology Administration. It assists individual businesses and consortia to carry out research and development on "precompetitive, generic technologies" for a broad range of potentially important commercial products, but does not support the development of actual products.

The awards, selected from 249 proposals, will provide about $9 million in first-year grants to initiate nearly $100 million in R&D programs over the next five years. More than half of the cost will be paid by sponsoring firms, Commerce Department officials said.

The Advanced Technology Program has $35.9 million available for FY 1991 awards, and the administration's FY 1992 budget request also stands at $35.9 million.

Another solicitation for proposals is planned in 1991. For more details about this year's recipients or about submitting proposals, write or call: Advanced Technology Program, B110 Technology Bldg., National Institute of Standards and Technology, Gaithersburg, MD 20899; phone (301) 975-3972.

Advanced Technology Program — Recipients and Funds Requested*

National Center for Manufacturing Sciences: Four consortium members (AT&T, Texas Instruments, Digital Equipment Corp., and Hamilton Standard Interconnect) will work with Sandia National Laboratories to develop new printed wiring board materials and production technology in a five-year project. First-year request $2,370,000; total request $13,783,000; matching funds $14,674,000.

Communication Intelligence Corporation's two-year research plan is to develop a natural handwriting recognition system for computers that does not require "training" the computer to recognize each user's handwriting. First year request $671,000; total request $1,264,000; cost-sharing funds $912,000.

Nonvolatile Electronics' three-year proposal is to develop a fast, dense, nonvolatile computer memory capable of unlimited read/write cycles based on magnetoresistive memory (MRAM) patented by Honeywell and planned for space and avionics uses. First-year request $599,000; total request $1,738,000; cost-sharing funds $869,000.

Advanced Display Manufacturers of America Research Consortium: Five-year venture by Optical Imaging Systems, Photonics Imaging, and Planar Systems and seven other companies will develop production and testing technologies for low-cost, flat-panel displays. First-year $7,305,000; total request $7,305,000; matching funds $7,604.000.

Saginaw Machine Systems will work with the University of Michigan in a two-year project to give machine-tool manufacturers an easily adaptable thermal-error correction technology that can enhance product accuracy four to five times at reasonable cost. First-year request $266,000; total request $540,000; cost-sharing funds $168,000.

National Storage Industry Consortium: Applied Magnetics, Bernoulli Optical Systems, Eastman Kodak, IBM, Maxoptix, and the Optical Data Storage Center (University of Arizona) propose a five-year endeavor to develop an integrated, short-wavelength laser source for optical recording. The $50,000 first-year request depends on further development of the consortium; total request $5,421,000; matching funds $9,200,000.

Light Age's 18-month proposal is to produce a broadly tunable deep UV and VUV solid-state laser source based on a marriage of tunable alexandrite lasers and recently developed techniques for shifting laser frequencies using nonlinear crystals. First-year request $627,000; total request $701,000; cost-sharing funds $254,000.

Microelectronics & Computer Technology Corporation, a joint venture, proposes a five-year plan to develop computer mass memory using holographic recording to store information in photorefractive crystals. MCC is said to have already developed and demonstrated the basic concept. First-year request $823,000; total request $10,331,000; matching funds $12,700,000.

AT&T Bell Laboratories' three-year proposal is to develop the technology needed to test, fabricate, assemble, and align aspherical x-ray mirrors in an imaging system with resolution limited only to the diffraction of the x-rays. An estimated 75% of the Advanced Technology Program funds will reportedly go to small-business subcontractors. First-year request $955,000; total request $2,000,000; cost-sharing funds $3,525,000.

Hampshire Instruments, Inc. and McDonnell Douglas Electronic Systems Co. propose a one-year joint venture to develop large-scale laser diode arrays to "pump" the crystalline laser host for point-source x-ray lithography. First-year request $1,090,000; total request $1,090,000; matching funds $1,094,000.

E.I. du Pont de Nemours & Co. will spend three years developing thin-film fabrication technologies for a thallium/lead high T_c superconductor patented by du Pont. The project also includes making demonstration electronic devices. First-year request $370,000; total request $1,590,000; cost-sharing funds $784,000.

*Dollar amounts represent funds requested by the proposer and not necessarily the final value of the grant.

Need to Set Priorities is Top Issue in OTA Report on Federally Funded Research

The need to set priorities is the top issue affecting federally funded scientific research, concludes a recently released report from the Office of Technology Assessment (OTA). The report, *Federally Funded Research: Decisions for a Decade,* was reviewed in a March 20 hearing of the House Subcommittee on Science, and sources expect that it will figure prominently in future science policy debates.

Finding that "there will always be more opportunities than can be supported, more qualified researchers competing than can be sustained, and more institutions seeking to expand than the prime sponsor—the federal government—can fund," the report identifies four major issues:

■ **Setting Priorities in Support of Research.** Priority setting criteria are not explicit and vary widely throughout the federal government, especially affecting the President's budget and the congressional decision process, says the report. The report notes the lack of a mechanism to evaluate the total federal research portfolio. The principal criteria for selection, "scientific merit" and "mission relevance," should be expanded, says the report, by adding the development of human resources and the building of regional and institutional capacity. The report also recommends transparent priority setting mechanisms that cut across research fields and agencies (especially for megaprojects like the SSC and the Space Station), and strengthening priority setting at both the congressional and executive levels.

■ **Understanding Research Expenditures.** Evaluating whether or not the cost of

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doing research is outpacing increases in federal research funding is "all but impossible," according to the report. Successful research and better instrumentation breed more research and competition for results, driving up the demand for funding, says the report. Recommendations are to encourage greater cost accountability, eliminate confusion around allowable indirect costs, and provide better estimates of future expenditures.

■ **Adapting Education and Human Resources to Meet Changing Needs.** The report identifies three central issues: (1) motivating students in science and engineering (K-12 and undergraduate) and preparing graduate students for career paths in *or* outside research; (2) increasing and sustaining the diversity of people (especially women and minorities) and institutions in the research system; (3) acknowledging larger team research and block grants while also encouraging opportunities for nonprincipal investigators.

■ **Refining Data Collection and Analysis to Improve Research Decisionmaking.** While data on science and engineering funding allocations, degrees granted, and work force characteristics are extensive, the report finds that other indicators are scarce, especially concerning the research work force, the research process, and outcome measures. The OTA report recommends collecting additional information for different levels of decisionmaking, concentrating on areas of policy relevance for Congress and the executive branch.

Copies of *Federally Funded Research: Decisions for a Decade* can be purchased from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325; phone (202) 783-3238. A summary (stock number 052-003-01232-4) is also available for $2.50 from the GPO.

Council on Competitiveness Reports on Technology Priorities

The Council on Competitiveness released the following scores in one of the latest assessments of U.S. technology: Of 93 critical technologies analyzed by a blue-ribbon panel, the United States was found to be trailing in 33 of them, many originally developed in the United States. But the report also found that the United States holds a five-year lead in another 30 technologies and is even the world's best in the remaining 30 critical technologies.

The Council's report, *Gaining New Ground: Technology Priorities for America's Future,* is the result of a two-year examination of nine major technology-intensive industries: aerospace, chemicals, computers and software, construction, pharmaceuticals, electronics, machine tools, automobiles, and telecommunications. These U.S. industries together account for more than $1 trillion in sales.

The report differs from previous studies since it focuses on critical generic technologies rather than on the special interests of individual firms or sectors. Besides identifying technologies that will drive the U.S. economy in the coming decade, the report documents the erosion of the U.S. lead and makes recommendations to regain it.

The report concludes that national policies and priorities do not adequately address the current commercial technology challenge. To reverse trends, it recommends that the President make technological leadership a national priority and also outlines a series of actions for government, industry, and universities.

The Council on Competitiveness is a coalition of chief executives from businesses, organized labor, and higher education whose goal is to improve the ability of U.S. industry and its workers to compete in world markets.

Gaining New Ground: Technology Priorities for America's Future is available for $20 per copy from: Council on Competitiveness, 900 17th Street NW, Suite 1050, Washington, DC 20006; phone (202) 785-3990.

National Panel Identifies 22 Critical Technologies

In its first biennial report, the National Critical Technologies Panel describes 22 technologies "considered essential for the United States to develop in the interests of long-term security and economic prosperity." Prepared by the White House's Office of Science and Technology Policy in response to a 1990 Defense Authorization Act (P.L. 101-189) mandate, the report will be updated every two years.

Many of the technologies the panel selected as critical have already been cited by the Council on Competitiveness and the departments of Commerce and Defense. (Page 5 of the panel's report compares its list of critical technologies with the Commerce Department's list of "emerging technologies" and the Defense Department's "critical technologies plan.") The panel notes, however, that its list includes surface transportation, energy, and environmental technologies, and that it provides greater emphasis of materials and manufacturing technologies that underlie and enable technology innovations across the entire economy.

Five of the critical technologies listd in the report are process technologies.* The importance of product realization and manufacturing issues is also noted in the other 17 technology areas. The report discusses each technology separately regarding scope, basis for selection, and international trends.

The 126-page *Report of the National Critical Technologies Panel* can be purchased from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325; phone (202) 783-3238. □

Critical Technologies — National Critical Technologies Panel

Materials: Materials synthesis and processing,* electronic and photonic materials, ceramics, composites, high-performance metals and alloys.

Manufacturing: Flexible computer-integrated manufacturing,* intelligent processing equipment,* micro- and nanofabrication,* systems management technologies.*

Information and Communications: Software, microelectronics and optoelectronics, high-performance computing and networking, high-definition imaging and displays, sensors and signal processing, data storage and peripherals, computer simulation and modeling.

Biotechnology and Life Sciences: Applied molecular biology, medical technology.

Aeronautics and Surface Transportation: Aeronautics, surface transportation technologies.

Energy and Environment: Energy technologies, pollution minimization, remediation and waste management.

*Process technologies

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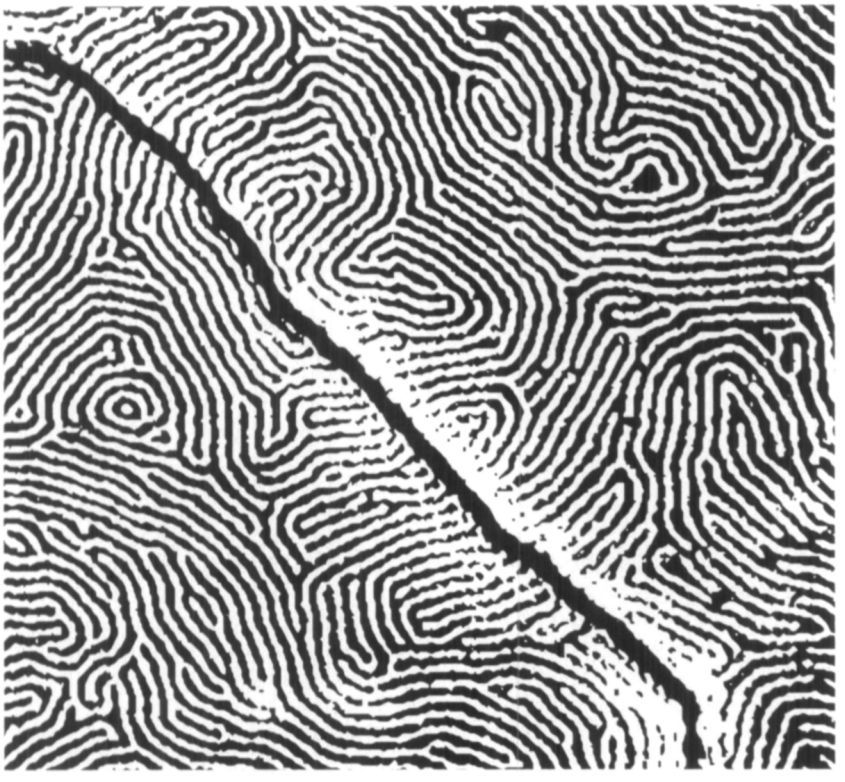
Figures appearing in the EDITOR'S CHOICE are those arising from materials research which strike the editor's fancy as being aesthetically appealing and eye-catching. No further criteria are applied and none should be assumed. When taken out of context, such figures often evoke images beyond and unrelated to the original meaning. Submissions of candidate figures are welcome and should include a complete source citation, a photocopy of the report in which it appears (or will appear), and a reproduction-quality original drawing or photograph of the figure in question.



A fingerprint as clear as this would be a detective's dream. On top of that, the telltale scar would lead straight to the guilty party. Well, the culprit in this issue's EDITOR'S CHOICE is a block copolymer, precipitated on a microscope slide in a drop of solvent that subsequently evaporated. The original electron micrograph was manipulated by digitizing, filtering out long and short wavelengths, and finally setting all regions darker than a selected midtone to black and those lighter to white. The "scar" is a fracture intentionally caused by shearing the slide. To achieve this pattern, the solvent was one in which the monomers of each of the polymer species repelled each other as well as those of the other species. The micrograph, from C. Henkee and E.L. Thomas of the University of Massachusetts (Amherst), was digitized with the help of Min Lin and Mac Lindsay of Exxon Corporate Research. It can be seen in a colorized rendition in an article by T.A. Witten of the University of Chicago (*Physics Today,* July 1990, p. 21) which discusses the science of the phase separation. On further reflection, it seems likely, notwithstanding the clarify and uniqueness of the evidence, that our culprit would have eluded capture. You see, simple scaling dictates that the culprit would stand approximately 100 micrometers tall based on the 40-nanometer spacing of the "fingerprint" ridges.

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