

Awards for Optical Science and Engineering Span Many Disciplines

The National Science Foundation (NSF) has announced 18 awards totaling \$13.5 million under a one-time, multidisciplinary initiative in optical science and engineering. These three-year awards were selected from 76 proposals and 627 pre-proposals.

Highlights of the awards include the following:

- **Using lasers to explore molecules:** A project led by Columbia University in collaboration with researchers from industry and government laboratories seeks to use ultrashort-pulse laser sources to produce far-infrared radiation that can probe the spectra of molecules on surfaces and thin films. Because it is difficult to probe such small amounts of materials by other means, these techniques may lead to new analytical tools for investigating technologically significant materials systems, such as polymer and ferroelectric thin films used in advanced electronic devices.
- **X-ray microscope:** A University of Maryland-led project will develop an x-ray microscope based on the ability to generate coherent radiation in the x-ray spectral region from laser-excited plasmas. The instrument will be capable of resolving biological and other objects as small as 10 nm in dimension, and will be able to follow the motion of these objects on an ultrashort time scale.
- **Biological motors:** A project led by the University of California—San Diego uses optical methods to probe individual molecules or ions in order to explore their internal structure and interaction with the environment and to detect and manipulate tiny molecular “motor” proteins that may be important to cell functioning, including transport in the cell.
- **Imaging living tissue:** In a Princeton University-led project, researchers are investigating the use of laser-polarized gases to enhance magnetic resonance imaging (MRI) of biological materials. Collaborating researchers from Princeton and Duke Universities recently used the technique to make the first MRI images of the gas space of a human lung. A related project led by Brigham and Women’s

Hospital and Smithsonian Astrophysical Observatory is exploring the technique’s potential to characterize the integrity of liquid membranes to measure blood flow to tissue, both with potential for medical diagnosis. The group is also applying the technique to understand pore connectivity in reservoir rocks.

■ **Controlling chemical reactions with light:** A University of Connecticut-led project is exploring the use of light pulses to control chemical reactions—both the rate of reaction and the products that result. The techniques of laser manipulation, which have proven fruitful in creating suspensions of atoms, will also be extended to molecules and molecular ions. The researchers expect to uncover novel chemical processes and physical behavior at ultracold temperatures at which the particles barely move.

NSF to Invest \$50 M in SBIR Program in 1997

The National Science Foundation (NSF) will invest over \$50 million in the NSF Small Business Innovation Research Program (SBIR) in 1997, which is a 50% increase in award amounts since 1994. The program helps fund firms with 500 or fewer employees to perform cutting-edge research addressing critical science and engineering needs.

SBIR was initiated at NSF in 1977. It expanded as a federal program to 11 principal research and development agencies in 1982. Kesh Narayanan, director of NSF’s Industrial Innovation Programs, said that the program spans all disciplines. NSF has funded high-risk research concepts that otherwise could not have been pursued, Narayanan said.

Materials research-related companies previously funded by SBIR include Brewer Science, Inc. (Rolla, MO), which developed thin antireflective coatings that are important for enhancing high-speed processing and increasing memory density of electronic circuits. Brewer has also developed color filters and coatings technology which are important to the flat-panel-display industry. The company has more than 20 patents and collaborations which can be traced to start-up funding provided under the NSF SBIR program.

Another company, Browning Engi-

neering (Hanover, NH) has explored innovative ideas for bonding high-density refractory layers of materials into a stainless steel surface used for aircraft engines. The technology is the dominant method for increasing the high temperature, abrasion, and stiffness resistance of most jet engine compressor blades.

Federal Support Declines for University R&D Facilities

A study reported in the National Science Foundation’s publication *Scientific and Engineering Facilities at Universities and Colleges, 1996* found that federal contributions to science and engineering (S&E) facility construction declined in constant dollars from \$541 million in 1990–1991 to \$207 million in 1994–1995. In this same period, funding from state governments and contributions from the institutions themselves remained steady, but private-sector support declined.

“This large decline in federal support for construction should be watched over the coming years to see if it is a trend,” said Ann Lanier, the report’s project director.

The NSF report includes the following findings:

- At least half the research institutions reported inadequate amounts of research space in biological sciences, physical sciences, engineering, agricultural sciences, and medical sciences.
- In 1996, 18% of S&E research space at research institutions needed major renovation or replacement.
- Expenditures for repair or renovation increased from \$905 million in 1992–1993 to \$1.1 billion in 1994–1995, an increase of 17% in constant dollars. These projects were primarily funded through institutional funds.
- In fiscal years 1994–1995, research colleges and universities began S&E research construction projects costing \$2.8 billion, representing a continued decline in the construction of S&E research space. That figure was \$3.0 billion in 1992–1993, and \$3.4 billion in 1990–1991.
- Academic institutions in 1996 deferred \$7.4 billion in S&E research construction and repair projects due to lack of funds.

This report is available on the NSF Website at <http://www.nsf.gov/sbe/srs/stats.htm>. □

NASA RESEARCH ANNOUNCEMENT (NRA) 96-HEDS-3 FOR MICRO GRAVITY FUNDAMENTAL PHYSICS

The National Aeronautics and Space Administration (NASA) announces a solicitation for scientific research proposals. Proposals may be for ground-based research investigations or space flight experiments designed for spacecraft such as the Space Shuttle or the International Space Station.

Letters of intent due: January 27, 1997 — Proposals due: March 25, 1997

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