Research Update

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NSF Awards Grants for Instrument Development

The National Science Foundation (NSF) has announced that it has awarded eight grants totaling $722,878 in a special effort to encourage research leading to the development of new instruments for performing interdisciplinary research. The grants were made by the NSF's Office of Interdisciplinary Research (OIR) in the Directorate for Engineering in order to address critical scientific, engineering and societal problems through cooperative inquiry among researchers in engineering and the sciences.

The NSF-supported projects are expected to produce a proof of concept or a prototype of the desired instrument. The research will be conducted in high-technology, problem-focused areas, and will involve team members from a variety of engineering and scientific disciplines. These research efforts fall into four categories: lightwave technology, hazardous-waste management, microsensors for biotechnology, and bioprocessing.

Research-Grant Projects

In one NSF-funded project, an interdisciplinary team that includes an electrical engineer, a physicist and a laser physicist at Colorado State University will collaborate on research to produce a noncontact diagnostic instrument to analyze thin films used in the microelectronics industry. They will use the analytical technique coherent Raman spectroscopy. The instrument they develop will be used in the fast-growing silicon-on-insulator industry. It will comprise two laser beams, one of which would be tunable to probe microelectronic structures.

Another project will involve a team of investigators at CUNY City College who will conduct research to develop an ultrashort supercontinuum laser source. The potential applications of such a lightwave instrument are in laser spectroscopy, photosynthesis, vision process, semiconductor devices, material structures and atmospheric science.

At the University of Wisconsin, an environmental engineer, a chemical engineer and a chemist will conduct research to develop an instrument for use in the economic conversion of organic-waste materials to innocuous carbon dioxide. Ultimately, the instrument would have the capability of becoming a prototype apparatus to be field employed in the economical clean up of organic waste.

A research team that includes a civil engineer and a chemist at Tufts University will develop and test a prototype field-portable instrument for laser-fluorescent analysis of groundwater contaminants using fiber optics. The application of such a detector to future field studies will allow researchers to solve questions involving both the fate and transport of aromatic organic ground-water contaminants.

For a project at the Massachusetts Institute of Technology, a civil engineer and a geophysicist will collaborate on research to exploit the potential application of guided seismic waves for barrier evaluation at hazardous-waste sites. Evaluation of subsurface conditions is extremely important in the design and monitoring of hazardous-waste disposal sites; especially important is the integrity and stability of subsurface barriers.

An interdisciplinary research team at the University of Tennessee will attempt to develop unique fiber-optic-based sensors to measure chemicals in living systems. Initial studies, aimed at optimizing the procedures for preparing and using fluoroimmuno sensors, will employ a commercially available immunochemical system.