

NASA/Marshall Prepares Materials Experiments for International Space Station

While astronauts assemble and activate the first portion of the International Space Station, scientists working with NASA's Marshall Space Flight Center are preparing experiments. Although the U.S. Laboratory Module will not be attached until the year 2000, research on board the space station is expected to start by the end of 1999.

The Materials Science Research Facility (MSRF), which NASA/Marshall will develop and integrate, is a modular facility comprising three autonomous Materials Science Research Racks (MSRR) for research in the microgravity environment on the space station. It will house materials processing furnaces and common systems required to operate the furnaces. Each research rack, about 1 m wide, will host on-orbit replaceable experiment modules, module inserts, investigation-unique apparatus, and other equipment to conduct a wide variety of scientific investigations.

The research facility will accommodate the planned and evolving cadre of peer-reviewed science investigations. The facility will provide the apparatus for satisfying near-term and long-range materials science discipline goals and objectives to be accomplished in the U.S. Laboratory.

Frank Szofran, MSRF project scientist at NASA/Marshall, said, "It will handle a wide range of research in electronic crystals and advanced alloys."

Although the racks can be replaced in orbit, NASA envisions keeping the racks in place as long as possible and exchanging experiment systems within the racks.

MSRR-1, scheduled for launch in October 2002, will host several modules developed by NASA and the European Space Agency (ESA), one of the major space station partners. The left side of the rack will be filled with experiments provided by NASA's Space Product Development Program which is working with industry to develop commercial applications in space processing. The Space Product Development Experiment Module (SPD EM) being developed by the Consortium for Materials Development in Space at the University of Alabama in Huntsville will accommodate multiple furnace modules, including both transparent and opaque furnaces.

The right side will be filled with research equipment provided by NASA and ESA, which is also building its own laboratory, the Columbus Orbital Facility. NASA and ESA are each working on two module inserts for the first MSRR. These

will take turns using the rack.

The full range of experiments and their schedules are being developed by NASA and its partners. They deliberately avoided locking the experiments in place because science usually moves at an unpredictable rate, and discoveries can redirect the plans.

Many of the microgravity experiments planned for the space station began in the Middeck Glovebox, a small enclosure carried aboard the Space Shuttle and Russia's Mir space station. In the glovebox, astronauts were able to conduct experiments that had been determined as highly promising, but did not warrant a full facility of their own. Aboard the International Space Station, a larger, more capable Microgravity Science Glovebox (MSG) will be installed soon after the Lab module is launched. The glovebox will have openings 40 cm wide to accommodate experiments as large as a carry-on bag, and enough room for astronauts to work around the apparatus.

Services provided by the new glovebox will include electrical power, air conditioning (to clean the air and cool equipment), pressurized nitrogen, a vacuum vent, color video, connections to the space station's own network, and—through communications satellites and the Internet—to scientists at universities and government laboratories.

Don Gillies, the materials science discipline scientist, said, "The MSG is so much more powerful than the original gloveboxes that scientists used and so more complete science can be done."

DOE Offers Student Fellowships to Develop Technologies for Future Automobiles

The U.S. Department of Energy will provide fellowships to graduate students participating in automotive engineering programs at nine universities. The fellowships are open to students selected for the department's Graduate Automotive Technology Education (GATE) program. Fellows will help research technologies critical to the design and production of future automobiles.

"Through the GATE program, the department hopes to attract bright, talented students who can accelerate the progress and development of vehicles that reduce emissions and significantly improve energy efficiency," said Secretary of Energy Bill Richardson.

The GATE Centers of Automotive Research include:

- *fuel cells*: University of California—Davis and Virginia Tech;
- *hybrid drivetrains*: University of Maryland,

University of Tennessee, Ohio State University, West Virginia University, and the University of California—Davis;

■ *lightweight materials*: University of Michigan—Dearborn;

■ *direct-injection engines*: Michigan Technological University; and

■ *advanced energy storage*: Pennsylvania State University;

Each Center is receiving \$200,000 from DOE to develop an interdisciplinary curriculum for graduate study, and \$100,000 per year for fellowships. The fellowships will support five or more students at each university per year.

Students interested in applying for the fellowships may contact Christine McGhee, Argonne National Laboratory, at 630-252-3175 or at e-mail cmcghee@anl.gov. The DOE's fellowship application deadline varies for each university; however, most applications are expected to be due by March 1999.

For more information about the GATE program, contact Shelley Launey at 202-586-1573 or visit the GATE website at <http://www.ipd.anl.gov/gate/>.

Nominations Being Accepted for Charles Stark Draper Prize

The National Academy of Engineering (NAE) is seeking nominations for the 1999 Charles Stark Draper Prize, the most prestigious award for engineering achievement. The Draper Prize in 1999 will carry a \$500,000 honorarium.

To receive the Draper Prize, the recipient's achievement must be a proven innovation that contributes to human welfare and freedom. The prize may be presented to one person or to a group of individuals who contributed to a specific achievement or a body of work extending over a period of years. Individuals from all nations are eligible.

Nomination forms are available from the NAE (<http://www.nas.edu>) and must be postmarked by **February 26, 1999**. The award recipient(s) will be selected by a committee appointed by the NAE and chaired by Mary L. Good, managing member, Venture Capital Investors LLC in Little Rock and former under secretary of technology, U.S. Department of Commerce. The award recipient will be announced during the NAE's annual meeting in October 1999.

The first Draper Prize was awarded in 1989 to Jack S. Kilby and Robert N. Noyce for their invention of the integrated circuit. Since then, recipients of the prize have included the inventors of the turbojet engine. Established as a biennial award, the prize will now be presented annually. □