First U.S. Sample Processed in Materials Science Research Rack to be Opened at Marshall

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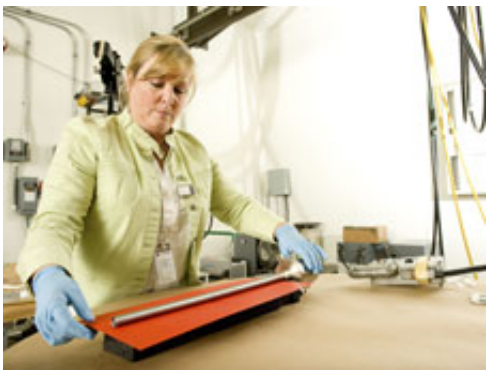

Rhonda Lash, a materials engineer with NASA, prepares the first U.S. sample cartridge for x-ray. The sample cartridge was processed in the Materials Science Research Rack aboard the International Space Station and returned to Marshall Space Flight Center for analysis and opening. Image Credit: NASA/MFSC/David Higginbotham

(PhysOrg.com) -- On Feb. 2, the first materials science sample supporting an U.S. investigator was processed in NASA's Materials Science Research Rack aboard the International Space Station.

The rack allows for the in-orbit study of a variety of materials - including metals, ceramics, semi-conductor crystals and glasses. The first sample was a small, solid rod of composite aluminum and silicon processed at high temperatures to produce an alloy.

Development of the research rack was a cooperative effort between the Marshall Space Flight Center and the European Space Agency.

Materials science is an integral part of developing new, safer, stronger, more durable materials for use throughout everyday life. The goal of studying materials processing in space is to develop a better understanding of the chemical and physical mechanisms involved, and how they differ in the microgravity environment of space.

"Because there is no buoyancy in space, materials can be developed that have a stronger or more regular structure, and understanding this structure can help to produce stronger materials on the Earth," said Dr. Frank Szofran, a microgravity materials science project manager and discipline scientist in Marshall's Materials and Processes Laboratory.

The sample was processed in the Materials Science Laboratory, a furnace system inside the Materials Science Research Rack that was developed and is operated by the European Space Agency. U.S. investigators have samples processed in the facility and collaborate with the larger European science team. The European teams are currently examining the first two samples brought home from the space station.

Professors David Poirier and Robert Erdman of the University of Arizona in Tucson, and professor Surendra Tewari of Cleveland State University in Ohio, are collaborating on this study. "The model-alloy under study by the U.S. investigators is closely related to alloys used to produce castings," said Poirier. "The main focus, however, is to study the role of zero gravity and to contrast the samples made under similar conditions on Earth.

"In addition, the space experiments are particularly relevant to the manufacture of high-temperature alloys that are in high-temperature gas-turbines used to power aircraft and to produce electric power," Poirier

added.

The U.S. materials science sample was returned to Earth by space shuttle Endeavour's crew during the STS-130 mission, which returned on Feb. 21. Upon return to Earth, the materials sample was delivered to the Marshall Center for initial examination and opening of the sample. The sample will be opened on March 16, then it will be taken to Cleveland State University for additional analysis.

The Materials Science Research Rack is a new facility that was added to the space station at the end of 2009. It is about the size of a large refrigerator, measuring 6 feet high, 3.5 feet wide and 40 inches deep. It weighs about 1 ton. The rack includes a furnace in which materials sample cartridges are processed at temperatures of up to 2,500 degrees Fahrenheit. Sample cartridges are inserted in the furnace one at a time by members of the space station crew for processing. Once a cartridge is in place, the experiment can be run by automated command initiated from the ground. Processed samples are returned to Earth as soon as possible for testing.

Provided by JPL/NASA