

MICROGRAVITY SCIENCES AND PROCESSES (A2)  
Facilities and Operations of Microgravity Experiments (5)

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THE MATERIALS SCIENCE LABORATORY - A RESEARCH FACILITY ON BOARD THE  
INTERNATIONAL SPACE STATION

**Abstract**

The Materials Science Laboratory (MSL) is a multi-user facility that supports processing and investigation of metals, alloys, semiconductors and ceramics under weightlessness in a temperature range up to 1800C. MSL was built under a contract of the European Space Agency and is currently operated as part of NASA's Materials Science Research Rack in the US-Laboratory of the International Space Station. MSL supports various research fields by means of dedicated Furnace Inserts which are exchanged on orbit over the ten years lifetime of the facility. MSL provides a very precise process control, several built-in diagnostics features, and the capability to add experiment specific diagnostics. The design provides for easy on-orbit maintenance as well as future technical upgrades. An overview on the MSL design is given with particular emphasis on current and potential future scientific capabilities.