

# THE DEVELOPMENT OF MICRO CHEMICAL AND THERMAL SYSTEMS FOR APPLICATIONS IN NEAR-EARTH SPACE

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## ABSTRACT

Micro Chemical and Thermal Systems (MicroCATS), has the potential of providing compact process hardware for space resource processing and other applications in near-Earth space. As a relatively recent offshoot of microminiaturization, MicroCATS technology has been shown to enhance some unit operations, such as heat exchange, chemical reactions and chemical separations. In general, researchers have shown that microfabricated units can display high processing rates, sometimes more than an order of magnitude higher (per unit hardware volume) than can be obtained using process technology that is manufactured using conventional fabrication techniques.

Possible space applications include heating, cooling and power generation, insitu propellant production, oxygen generation/regeneration for human consumption, the recovery and processing of regolith volatiles, and thermal energy recuperation in various heat-intensive systems. Possible locations for use include satellites, the International Space Station, the surface of Mars and the Moon, and near-Earth asteroids and comets.

This presentation will discuss the development of MicroCATS technology including background information such as how it works, application areas, current development status and prospects for the future.

## ROBERT S WEGENG

Mr. Wegeng is a Chief Engineer at the Department of Energy's Pacific Northwest National Laboratory in Richland, Washington, and is one of the lead developers of MicroCATS technology since its original conception in 1990. He is co-holder of seven patents on the technology, and two R&D 100 Awards for its development. He is also the principal investigator for a NASA-funded project that seeks to develop MicroCATS for propellant production, using indigenous materials on the surface of Mars.

