NASA SBIR/STTR Technologies

Sample Acquisition for Materials in Planetary Exploration

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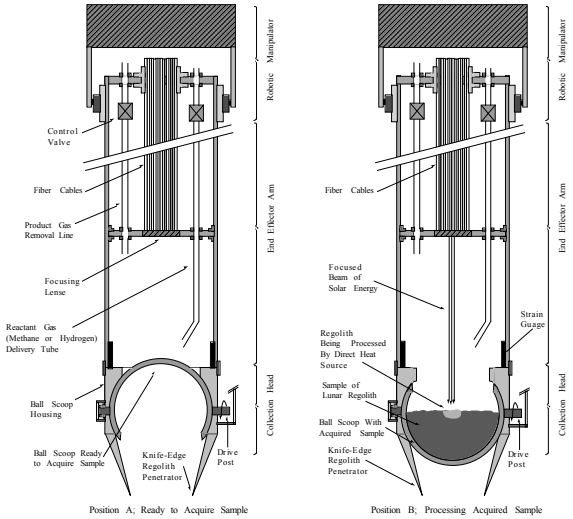
Identification and Significance of Innovation

ORBITEC proposes to analyze, design and develop a device called SAMPLE for lunar autonomous surface sampling and processing applications. Immediately after acquisition, the sample is completely encapsulated within the sealed end-effector chamber and subsequent processing can be undertaken without further robotic manipulation and sample transfer. SAMPLE will give NASA a unique tool by combining innovative resource assessment and processing technology. Because the end-effector has only one moving part, the device demonstrates reliability, but does not sacrifice versatility. Additionally, the SAMPLE concept allows minimization of mass and power requirements due to its simplistic, yet innovative, design.



Technical Objectives

- Perform a systems requirements definition.
- Conduct analyses of preliminary engineering design of the sampling device, focusing on the scoop mechanism, its actuation, and interfaces.
- Build, assemble, and test (in lunar simulants) working prototypes of the Phase I sampling devices to prove sealing, resilience to dirt/dust contamination, and resistance to extreme thermal conditions.
- Provide a preliminary design of a Phase II prototype system.

Work Plan

Task 1. Systems Requirements Definition
Task 2. Conduct Analyses and Develop a Preliminary Design
Task 3. Build, Assemble, and Test a Working Prototype(s)
Task 4. Preliminary Design of Phase II Prototype
Task 5. Reporting

NASA Applications

SAMPLE could be mounted on a rover along with a variety of other equipment to explore and characterize the resources that exist on the Moon, including the cold traps at the lunar poles. SAMPLE would be an important tool to perform this characterization as well as serving as a small scale demonstration of several ISRU extraction technologies. SAMPLE could also be used for Mars, asteroid, and other planetary body exploration.

Non-NASA Applications

There are several related terrestrial applications of the SAMPLE technology. One important application could include the remote sampling of chemically or radioactive contaminated soils on Earth.

Firm Contacts

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