

NASA SBIR/STTR Technologies



E1.03-9368 – Miniaturized Variable-Pressure Scanning Electron Microscope

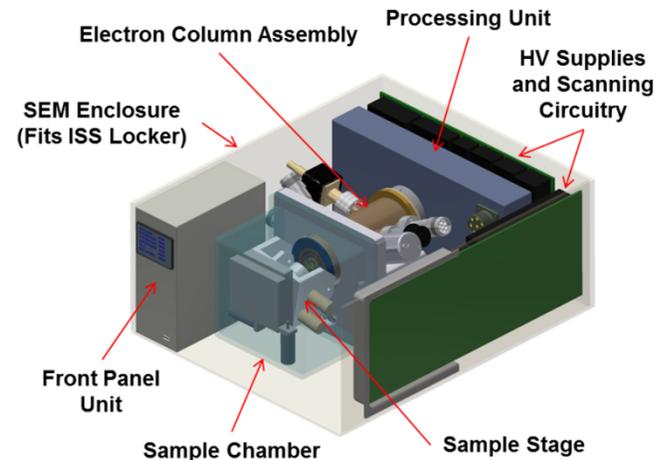
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Identification and Significance of Innovation

The need to develop new on-orbit analysis capabilities arises because of the high cost associated with returning samples to Earth for analysis, the limited availability of crew time, and the relatively modest capabilities and interfaces of the existing hardware on the International Space Station (ISS). The goal of this project is the development of a miniature variable-pressure scanning electron microscope (MVP-SEM) that can be rapidly developed, space qualified, and deployed on the ISS. The MVP-SEM is a cross-cutting tool for in situ topographical imaging and compositional X ray fluorescence mapping of uncoated conductive and non-conductive samples useful to multiple disciplines, including nondestructive imaging of inorganic and organic materials, surface contamination analyses, and scientific studies.

Expected TRL Range at the end of Contract (1–9): 4–5



Technical Objectives

- Confirm MVP-SEM system requirements
- Select and confirm MVP-SEM system technology
- Select optimal auxiliary technologies
- Finalize overall system design

Work Plan

- Task 1. Determine Specifications
- Task 2. Design Electron Gun and Focusing Column
- Task 3. Design Sample Chamber and Vacuum System
- Task 4. Develop Conceptual System Design
- Task 5. Manage and Report

NASA Applications

The MVP-SEM will provide the ISS with a cross-cutting tool for in situ topographical imaging and compositional X ray fluorescence mapping of uncoated conductive and non-conductive samples useful to multiple disciplines. Derivatives will be able to carry out geological and astrobiological scientific studies on Mars. It would be able to efficiently operate in all environments listed in the Planetary Decadal Survey.

Non-NASA Applications

Portable or Backpack SEM. This would be a laboratory-quality, highly portable scanning electron microscope for use in the field or in even remote locations. Weight, robustness, and low power consumption of the SEM are all necessary for use in terrestrial and non-terrestrial applications.

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NONPROPRIETARY DATA