BRIEFING CHART

NASA SBIR/STTR Technologies
An Efficient Heat Exchanger for In Situ Resource Utilization
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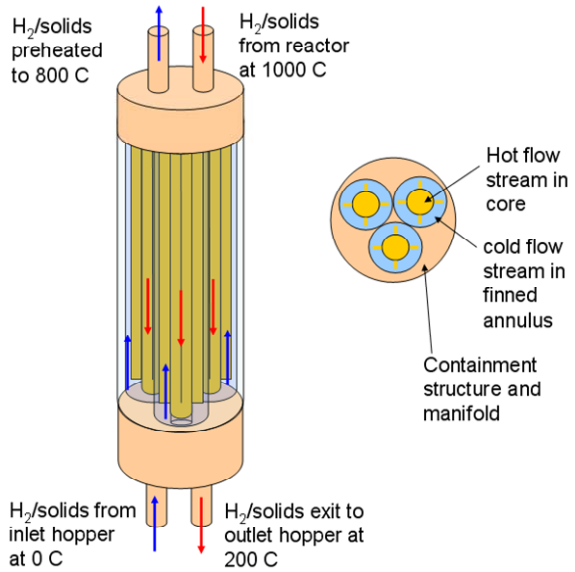
Proposal No.: 10-X1.01-9449

Identification and Significance of Innovation

- NASA envisions that in situ resource utilization (ISRU) will be essential for future manned Mars and lunar missions as well as for sample return missions.
- Typical ISRU designs involve heating reactants to high temperature. Currently, this thermal energy is not recovered from the spent reactant, which leads to a low overall energy efficiency of the ISRU.
- Creare proposes to develop, design, build, and test a robust, high efficiency passive counter-flow heat exchanger that will recover 80% of the thermal energy used.

Expected TRL Range at the end of Contract: 4



Phase I Technical Objectives:

- Define the required performance specifications for the ISRU heat exchanger.
- Develop detailed thermal and flow model for a counter flow heat exchanger.
- Demonstrate the performance of the heat exchanger through model validation tests.
- Perform detailed design of prototype heat exchanger.

Work Plan

Task 1. Determine Heat Exchanger Requirements
Task 2. Develop Thermal Heat Exchanger Model
Task 3. Heat Exchanger Model Validation Test
Task 4. Detailed Heat Exchanger Design
Task 5. Manage and Report

NASA Applications

- ISRU plants for the production of oxygen, hydrogen, water, and other compounds from the regolith for fuel and/or life support on the Mars sample return mission and manned missions to the Moon and Mars.

Non-NASA Applications

- Improvement of the energy efficiency of high temperature processes involving particulate matter, such as cement kilns, grain drying processes, etc.

Contact

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Non-Proprietary Data
No ITAR Restricted Data