NASA SBIR/STTR Technologies

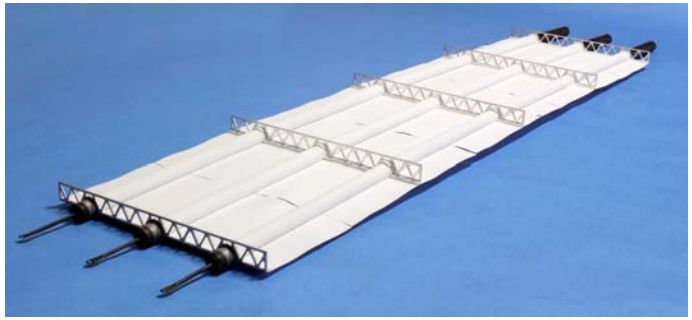
Proposal No. 06-2X8.02-9409 – A Novel, Ultra-Light, Heat Rejection System for Nuclear Power Generation

PI: Jay C. Rozzi, Ph.D.
Creare Incorporated, Hanover, NH

Identification and Significance of Innovation

- Lightweight, high-temperature systems are needed to reject waste heat from Fission Surface Power (FSP)
- Our innovation is the Ultra-Light Heat Rejection System (ULHRS) that uses of highly conductive, lightweight panel materials with a Ti 15-3 heat pipe resulting in a high efficiency, lightweight HRS
- Achieved an MPUHR of 0.42 kg/kW at an evaporator temperature of 500 K and a sink temperature of 200 K. Near the FSP operating point of 400 K, the MPUHR was less than 0.8 kg/kW, for a sink temperature of 200 K

Expected TRL Range at the end of Contract (1-9): 6



View of 1.0 m by 0.2 m ULHRS Panel Showing Ti-15-3 Heat Pipes, Structural Supports, and Fins With Z-93P Coating

Technical Objectives

Designed and Optimized a ULHRS Demonstrator
Demonstrated and Evaluated the Performance
Delivered the ULHRS Demonstrator to NASA

Work Plan

Task 1. Set Specifications
Task 2. Design ULHRS Demonstrator
Task 3. Fabricate
Task 4. Test, Evaluate, and Deliver
Task 5. Manage and Report

30 Month Work Plan (including a 6 month no-cost extension)

NASA and Non-NASA Applications

NASA Applications include:
Fission Surface Power (FSP) for In-Situ Resource Utilization (IRSU) or for Mars missions
Lightweight, heat rejection applications

Non-NASA Applications Include:
Radar, aerospace, and energy recovery applications
High-Altitude, Long-Endurance (HALE) aircraft such as DARPA's Integrated Sensor IS Structure and Vulture

Firm Contacts

Jay C Rozzi, Creare, Inc. 603-640-2367, jcr@creare.com

NON-PROPRIETARY DATA