

PI: Weibo Chen  
 Creare, Inc. - Hanover, NH

### Identification and Significance of Innovation

Large spacecraft need a reconfigurable thermal control system to cool multiple instruments and reject heat through multiple radiators

An innovative two-phase pumped loop architecture with multiple evaporators and multiple heat sinks

- \* Unique mechanism to circulate two-phase flow exiting radiators
- \* Stable cooling temperatures for a network of evaporators with variable heat loads
- \* Unique mechanism to enable pumped loop reliable start-up

#### Benefits

- \* Highly adaptable and reconfigurable
- \* Compact, lightweight, and low pumping power
- \* High-heat transfer capacity and heat-transfer performance
- \* Compatible with microgravity environments

Estimated TRL at beginning and end of contract: ( Begin: 3 End: 4 )

### Technical Objectives and Work Plan

#### Technical Objectives

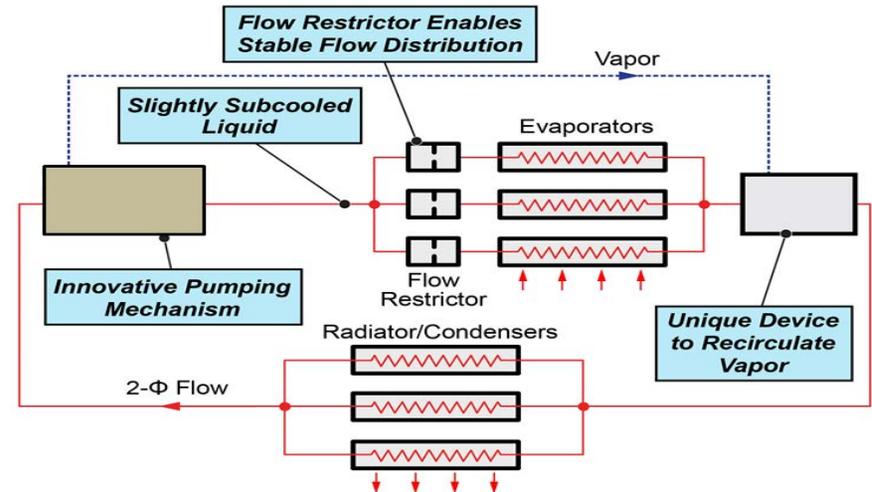
- \* Reliable cooling even when significant vapor exiting condenser
- \* Reliable start-up
- \* Stable cooling temperature
- \* Lightweight, compact system

#### Phase I Work Plan

Assemble and test a proof-of-concept two-phase pumped loop

- \* Demonstrate reliable steady-state operation and start-up
- \* Demonstrate stable cooling temperature

Optimize component and system for reliable operation and lightweight design



### NASA Applications

- Thermal control systems for future unmanned spacecraft, including satellites and unmanned exploration vehicles
- Thermal control systems for large spacecraft with multiple instruments
- Thermal control systems for aircraft, UAV, and high altitude balloons

### Non-NASA Applications

- Two-phase thermal control systems in commercial and military satellites, aircraft, and vehicles
- Thermal management systems for high-power electronics systems

### Firm Contacts

Weibo Chen  
 Creare, Inc.  
 P.O. Box 71  
 Hanover, NH, 03755-3116  
 PHONE: (603) 643-3800  
 FAX: (603) 643-4657