NASA SBIR/STTR Technologies

Engineered MultiFunction Surfaces For Fluid Handling

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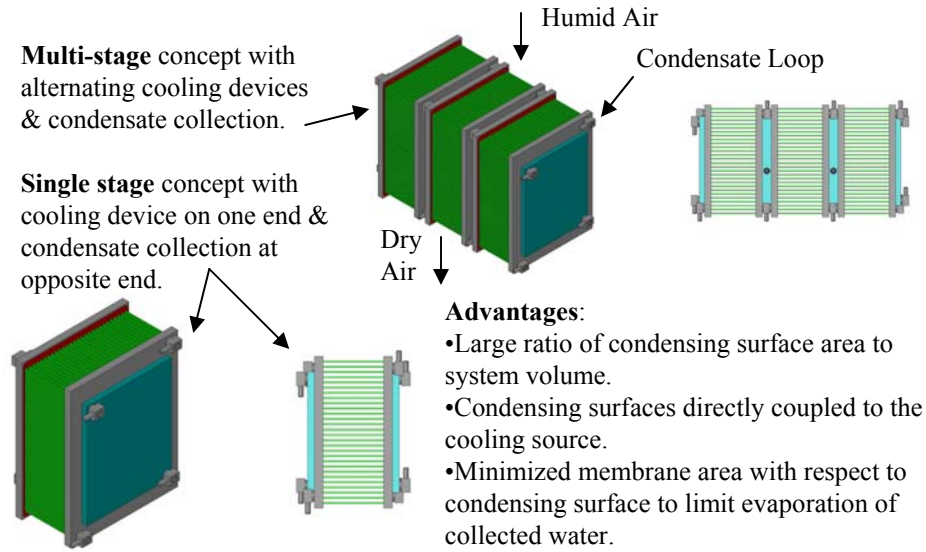
Identification and Significance of Innovation

- MFS/CHX can be scaled for wide range of early Exploration Applications including existing environmental control systems, space suits, CEVs, Rovers and Small/Transit/Large Habitats.
- MFS includes hydrophilic & biocidal nanocoatings and advanced capillary channels for condensation, passive transport and collection of condensate.
- Division of condensation & phase separation functions.
- Unique Cold Plasma Processes.
- No moving parts and No particulate coatings.

Multi-stage concept with alternating cooling devices & condensate collection.

Single stage concept with cooling device on one end & condensate collection at opposite end.



Advantages:
- Large ratio of condensing surface area to system volume.
- Condensing surfaces directly coupled to the cooling source.
- Minimized membrane area with respect to condensing surface to limit evaporation of collected water.

Technical Objectives

- Develop MFS for gravity-independent, modular and scalable Distributed Humidity Control System (DHCS).
- Selection of new materials & development of Cold Plasma Processes for deposition of nanocoatings onto new materials.
- Life-time performance testing & evaluation of MFS.

Work Plan

Task 1. Design Modular, Scalable, Advanced MFS/CHX.
Task 2. Develop & Refine Cold Plasma Processes for Nanocoatings.
Task 3. Design & Test Advanced Capillary Channels.
Task 4. Test & Evaluate Life-Time Performance of Nanocoatings.

NASA Applications

- Existing life support & environmental control components & systems such as the Common Cabin Air Assembly (CCAA).
- Mars / Lunar / Space Suits / Rovers / CEV / Habitat ALS systems.
- Tubing & other water transport components in ALS systems.

Non-NASA Applications

- Commercial humidity control systems
- Scientific controlled environment chambers
- Automotive industry
- Manufacture/Marketing of Cold Plasma equipment & services

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