

NASA SBIR/STTR Technologies



Liquid Crystal Membrane Dust Mitigation System for Lunar or Martian Operations

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Identification and Significance of Innovation

Problem:

A dust mitigation system which mechanically removes lunar dust and electro-statically prevents deposition is needed.

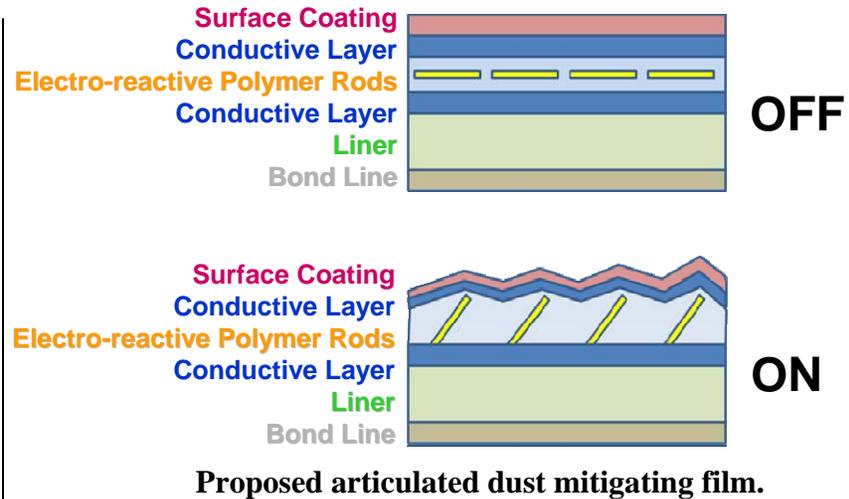
Lunar dust presents the following problems for Lunar operations:

- *Human health hazard.
- *Degradation of life support systems.
- *Wear to mechanisms.
- *Loss of efficiency of Solar Arrays

Solution: PSI and WVU development of a Liquid Crystal Membrane Dust Mitigation System (LCMDMS)

- *Mechanical-Vibrating eletro-reactive polymer rods
- *Electrostatic-Conductive layers allow electric charge control

Expected TRL Range at the end of Contract (1-9): 3-4



Technical Objectives and Work Plan

- 1: Define requirements for dust mitigation system.
- 2: Conceptual Description of Liquid Crystal Membrane Dust Mitigation Concept (Actuated Surface Roughness)
- 3: Prototype Systems Design
- 4: Experimentation of Actuated Roughness Membrane
- 5: Assess Real-World Viability of Liquid Crystal Based Actuated Roughness

NASA and Non-NASA Applications

- Dust mitigation for lunar, martian and earth based systems
- Boundary layer control through dynamic roughness;
- UAV and MAV control of flow separation and transition
- Maneuvering enhancement using “differential” dynamic roughness;
- Control of flow separation in internal flow applications;
- De-icing of aerodynamic surfaces;
- Act as active “turbulators” in pipe flow;
- Flow control for marine based systems.

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NON-PROPRIETARY DATA