

## **CIF 22-3: Electrodynamic Dust Shield for Active Dust Mitigation of Thermal Radiators**

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**Activity Type:** New Start

**Primary STMD Taxonomy:** TX07.2.5 Particulate Contamination Prevention and Mitigation

**Start TRL:** 3

**End TRL:** 5

**Executive Summary:** This project sought to investigate whether the Electrodynamic Dust Shield (EDS) would work with various thermal control coatings (TCC) to remove dust off the TCC. Keeping surfaces dust free is essential for thermal radiators as the dust acts as both a blackbody and a thermal insulator so it will absorb more sunlight and prevent the radiator from radiating heat. The lack of heat rejection on dusty surfaces causes the radiator to be oversized and potentially cause catastrophic system failure due to overheating. With an EDS integrated into the radiator system, dust impacts can be mitigated by removing the dust off the surface using electric fields. This project tested dust removal, solar absorptance, emittance, and limited thermal vacuum with a TCC on an EDS which is bonded to an aluminum plate acting like a radiator. The results of various coatings suggests that the EDS can work with insulative TCC in high vacuum for removing dust, and that after removing dust, the solar absorptance can be restored to within 5-10% of its original value when the EDS works properly. More work is necessary to determine how the EDS impacts the emittance of the whole radiator system and bonding between the different layers needs to be investigated to withstand temperature cycling of the moon without delamination occurring.