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# EXPERIMENTAL INVESTIGATION OF CARBON NANOTUBE DUST MITIGATION SYSTEM FOR HABITAT STRUCTURES

**Abstract**

NASA's Artemis program envisions to establish a sustainable presence on the Moon by the end of this decade. To enable this vision, one of the top priorities listed in the Artemis Plan is developing and demonstrating capabilities to retire technology hurdles in area of Dust mitigation to diminish dust hazards on lunar surface systems [1]. Lunar dust has proved to cause abrasion, thermal problems, wear and tear of materials exposed to the environments and health hazards, making it a major challenge for surface operations, as witnessed during the Apollo missions. It is therefore imperative that we overcome the dust hazards posed by the lunar environment and protect hardware deployed on the moon to enable sustainable missions.

This research study is an extension of utilizing the SPecially Integrated carbon nanotube Dust Ejection/Removal system (SPIcDER) technology to lunar habitat structures. SPIcDER technology that was originally developed for spacesuit dust cleaning was shown to be compatible with state-of-the-art habitat concepts in a previous study [2]. The concept is extendable from spacesuits to flexible/inflatable/deployable habitat surface systems due to their similar construction techniques: pressurized structures, outerlayer materials, irregular contours of flexible material and several layers of insulation. The usage of Carbon nanotube (CNT) flexible fibers as electrodes in the SPIcDER system makes it uniquely suited for flexible and deployable structures, where the surfaces have irregular contours and/or various curvatures. SPIcDER is modular and easily configurable and optimized for various surface systems for dust protection.

This paper reports on the experimental investigation of applying the SPIcDER system to inflatable habitat structures. A study was conducted using SPIcDER prototypes on the Inflatable Lunar Mars Habitat module build by University of North Dakota. Results from the experiments are provided in this paper.