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DUST RESISTANT NEXT GENERATION SPACESUIT THROUGH CITIZEN SCIENCE

Abstract

Lunar dust proved to be troublesome during the Apollo missions by abrading suit fabric and clogging seals, which degraded the performance of spacesuits. As eyes are set on the Moon and beyond, this historical evidence has compelled NASA and the private sector to identify solutions to mitigate dust as a critical path for the next generation spacesuits for future manned missions into deeper space exploration. This research project proposes a new solution for dust mitigation and removal for the Exploration Extravehicular Mobility Unity (xEMU) using Electrodynamic Dust Shield (EDS) with Carbon Nanotubes (CNT) electrodes technology known as xEMU EDS spacesuit configuration. This EDS CNT solution will prevent dust particles from attaching to the surface of the spacesuit by neutralizing the charge on dust particles. This research project aims to integrate the EDS CNT technology in form of a fabric-embedded mechanism into the existing xEMU by using electrodes to generate an electrostatic field which will push dust particles away from the spacesuit. The EDS CNT solution will be embedded on the top layer of the suit, and it will be a wearable/detachable system. Proposed solution and methodology will be examined, and an EDS CNT prototype will be introduced. Testing plans procedures will be led by citizen scientists for data collection and analysis, and costs involved will be explored in order to mature this EDS technology for implementation on the next generation of spacesuits.