

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
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PROOF OF CONCEPT DEMONSTRATION OF NOVEL TECHNOLOGIES FOR LUNAR SPACESUIT
DUST MITIGATION

Abstract

A recent report by NASA identified dust/particulate mitigation techniques as a high relevant study for future long-term space exploration missions (NASA 2015). Apollo missions showed the deleterious effects of lunar dust on spacesuits compelling NASA to identify dust mitigation as being on the critical path to send humans back to the lunar surface. The complexity of spacesuit design has constrained incorporating existing active and passive dust removal technologies proven on rigid surfaces into the spacesuit system.

This research investigated novel methods to integrate proven dust mitigation technologies for spacesuits. We examined utilizing a combination of active and passive technology to mitigate spacesuit dust contamination integrated into the spacesuit outerlayer. Leveraging two specific technologies, the Electrostatic Dust Shield active technology and Work Function Coating passive technology developed by NASA for rigid surfaces, we applied new high performance materials and fabrication techniques to develop a spacesuit integrated dust removal system. We examined the feasibility of these techniques and demonstrated proof of concept through experiments conducted at NASA Kennedy Space Center using lunar dust simulant on coupon size spacesuit outerlayer prototypes. We describe the new techniques and results from the experiments in this paper. Future challenges of implementing the new approach into flight suits are identified.

NASA. (2015). Asteroid Redirect Mission Future Assessment Support Team Report. Retrieved from NASA website: <https://www.nasa.gov/sites/default/files/atoms/files/fast-final-report-draft-for-public-comment.pdf>