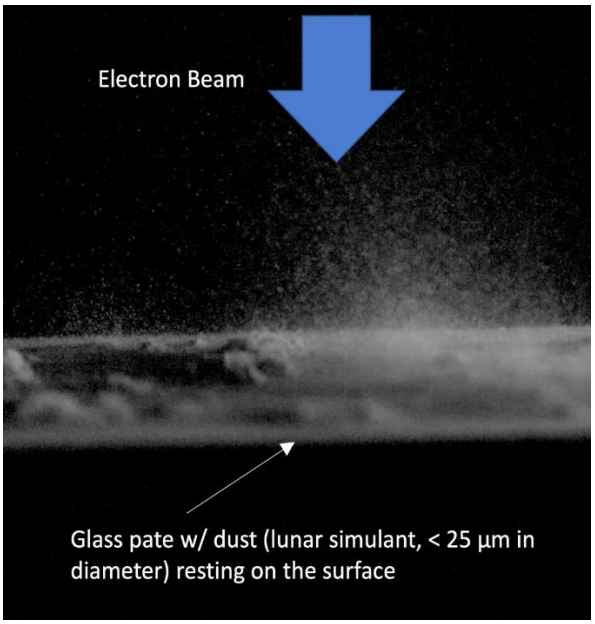
Experiment of Dust Mitigation for Lunar Surface Exploration. Benjamin Farr[1], Xu Wang[1], John Goree[2], Inseob Hahn[3], Israelsson E. Ulf[3] and Mihály Horányi[1], [1]Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO 80303, [2]Department of Physics and Astronomy, University of Iowa, Iowa City, IA 52242, [3]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109

Dust has been recognized as a potential hazard for human and robotic exploration on planetary surfaces since the Apollo era. Several dust mitigation technologies have been investigated over the past years. We are currently investigating electrostatic methods to mitigate lunar dust that clings to surfaces, particularly spacesuits and optical lenses. For lunar surface exploration, we investigate the use of an electron beam to remove dust. The experiment is performed in a small vacuum chamber in which a sample of lunar simulant, <25 microns in diameter JSC-1A, is deposited on either a spacesuit sample or a glass plate and is placed underneath a tungsten filament that emits an 80-230eV electron beam with a current between 50 and 200 mA. As expected, dust particles are shed off the surface as a result of repulsive forces between particles that are charged due to a microcavity charging effect by secondary electrons [Wang et al., 2016]. Our findings indicate that this method is efficient in removing fine dust particles. Tests with various beam currents and energies as well as various surface materials have been performed and have revealed that a sample cleanliness of ~75-85% can be achieved with the optimized electron beam parameters (~230 eV and >1.5 $\mu A/cm^2$). Moving forward, the experiment will focus on removal of the last layer of the dust that covers 15-25% of the surface.