



Work Function Matching Passive Lunar Dust Mitigation Coating Preparation for Lunar Flight Opportunity

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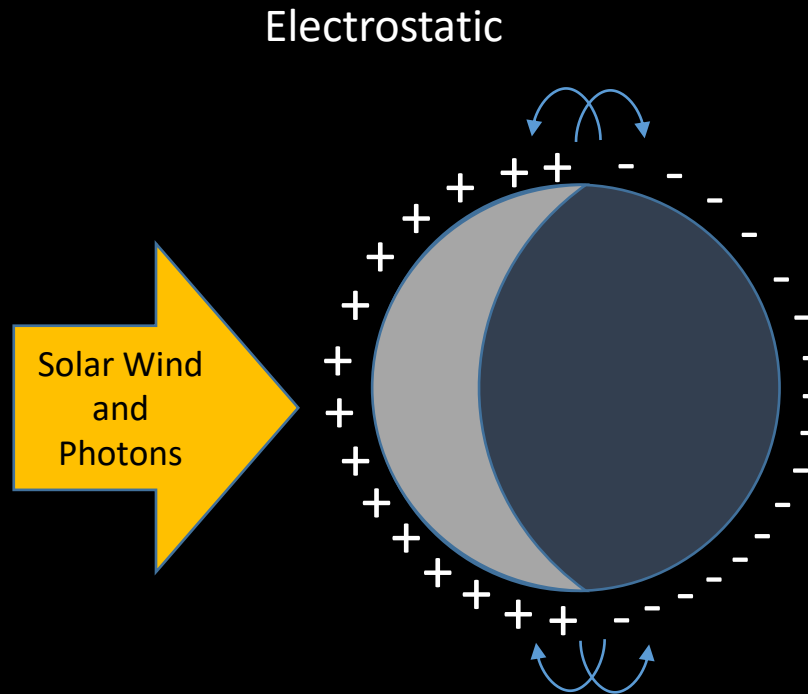
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Lunar Dust Adhesion and Wear



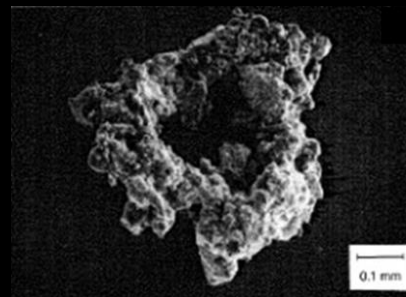
Image from Clementine Spacecraft-NASA



Triboelectric



Apollo 12 Image Library-NASA

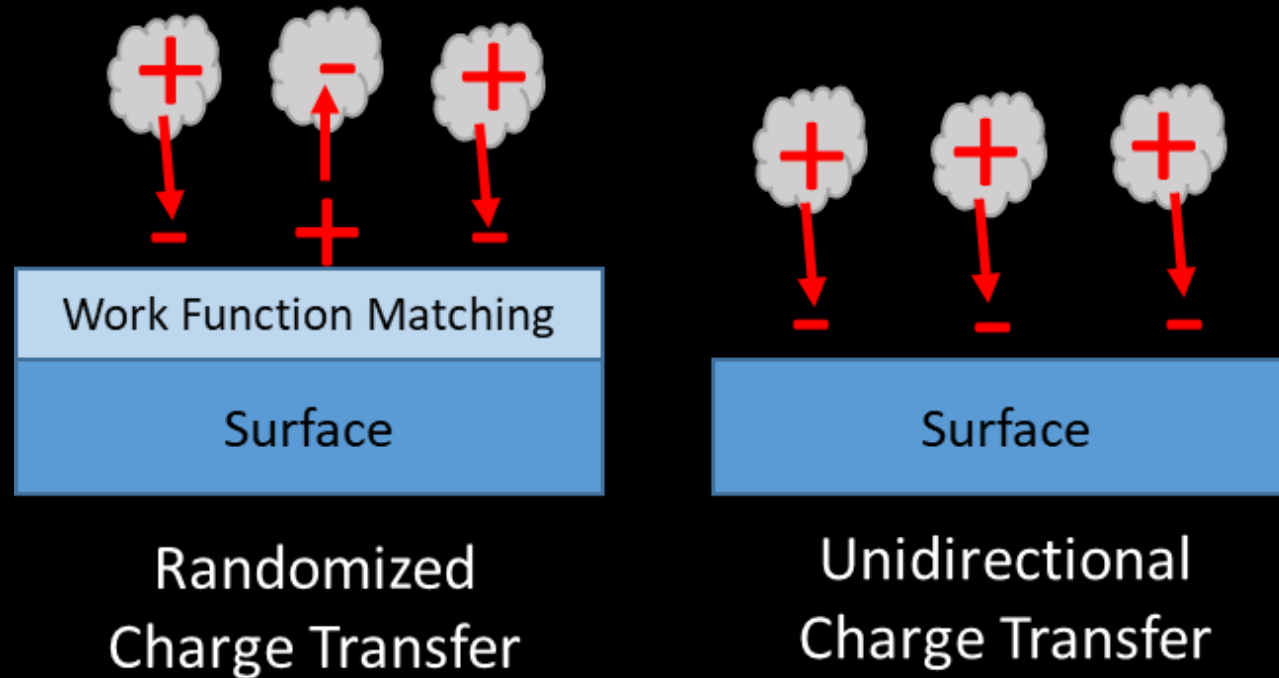


SEM Image of Lunar Soil Agglutinate
NASA S87-38112

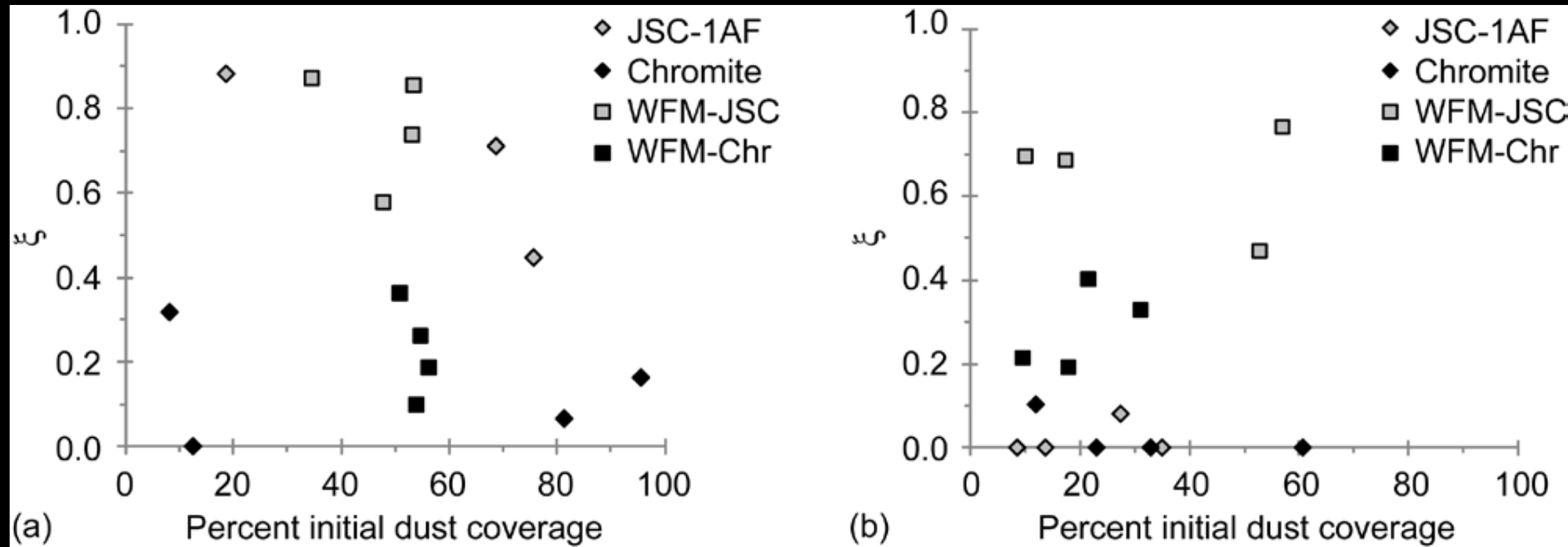


A portion of the leg of Harrison Schmitt's Apollo 17
Pressure Garment Assembly –NASA from Gaier 2009

Work Function Matching Coatings for Passive Dust Mitigation



Effectiveness of Work Function Matching Coatings in Removal of Lunar Simulant Using a Regulated Puff of Nitrogen Gas



Dust removal efficiency, ξ , calculated for pristine and workfunction matching coated (a) AZ93 and (b) AxFEP using JSC1-AF and Chromite simulants for dusting. (From Gaier, J.R., Waters, D.L., Misconin, R.M., Banks, B.A and Crowder, M. "Evaluation of Surface Modification as a Lunar Dust Mitigation Strategy for Thermal Control Surfaces" NASA/TM—2011-217230.)

Ground Testing of Passive Dust Mitigation Concepts

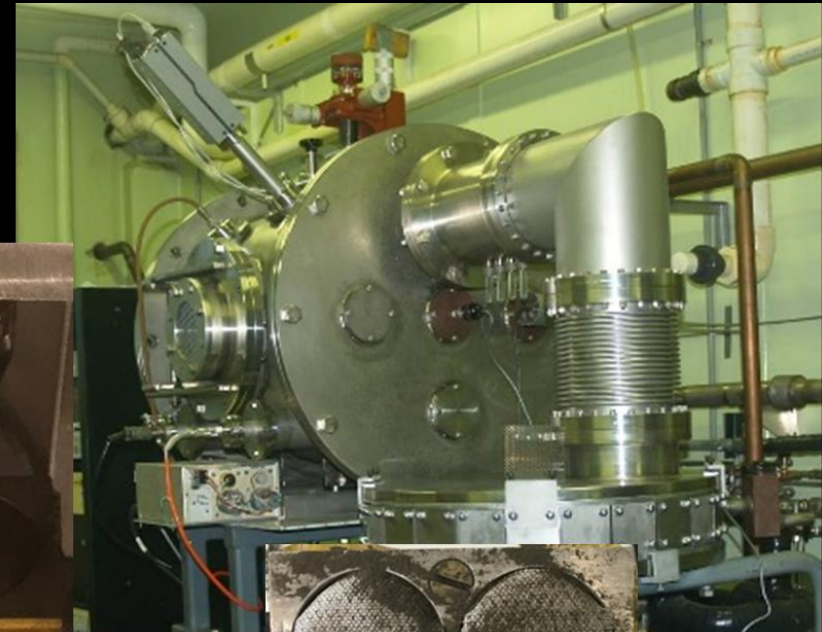
Ground Testing:

- Simulant (JSC-1AF, LHT-1...) sifted onto surfaces in vacuum ($<1e-6$ Torr) after bakeout at 200 °C for several hours
- Non-adhering simulant removed by nitrogen jet

Lunar Dust Adhesion Belljar



Sample pair under nitrogen jets after dusting, prior to nitrogen jet

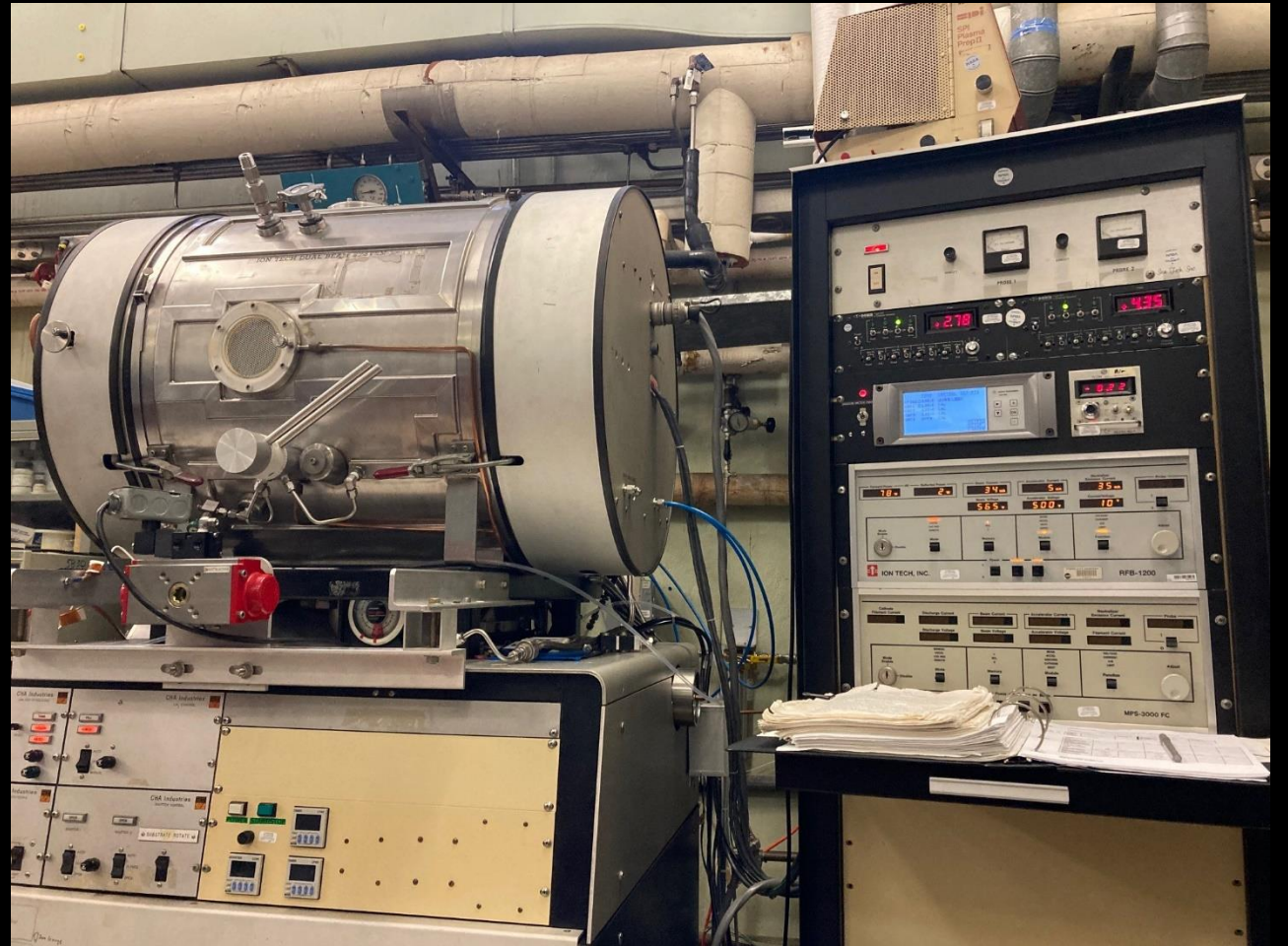
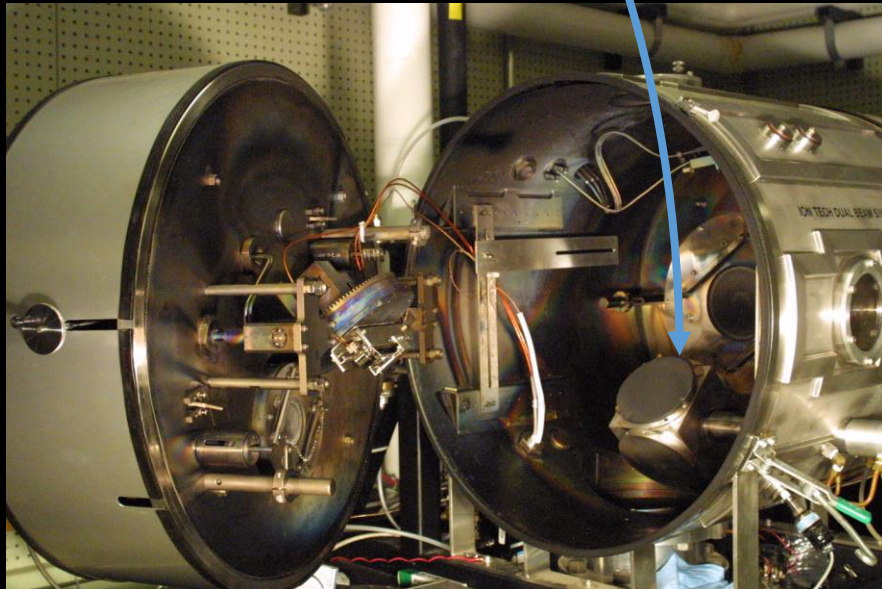


Sample pair after exposure to nitrogen jet

Work Function Matching Coating Preparation



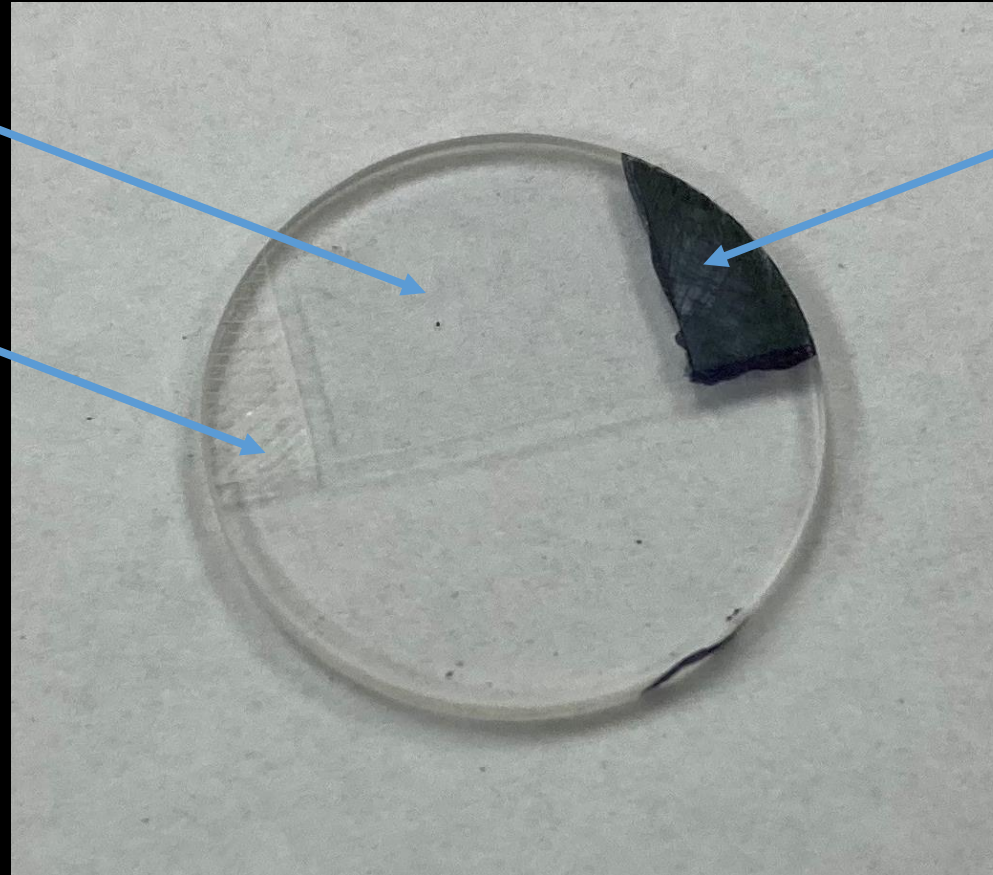
Sputter target made from simulant with chemistry closest to Mare Crisium



Work Function Matching Coating on Upper Marked Half of Fused Silica Disk

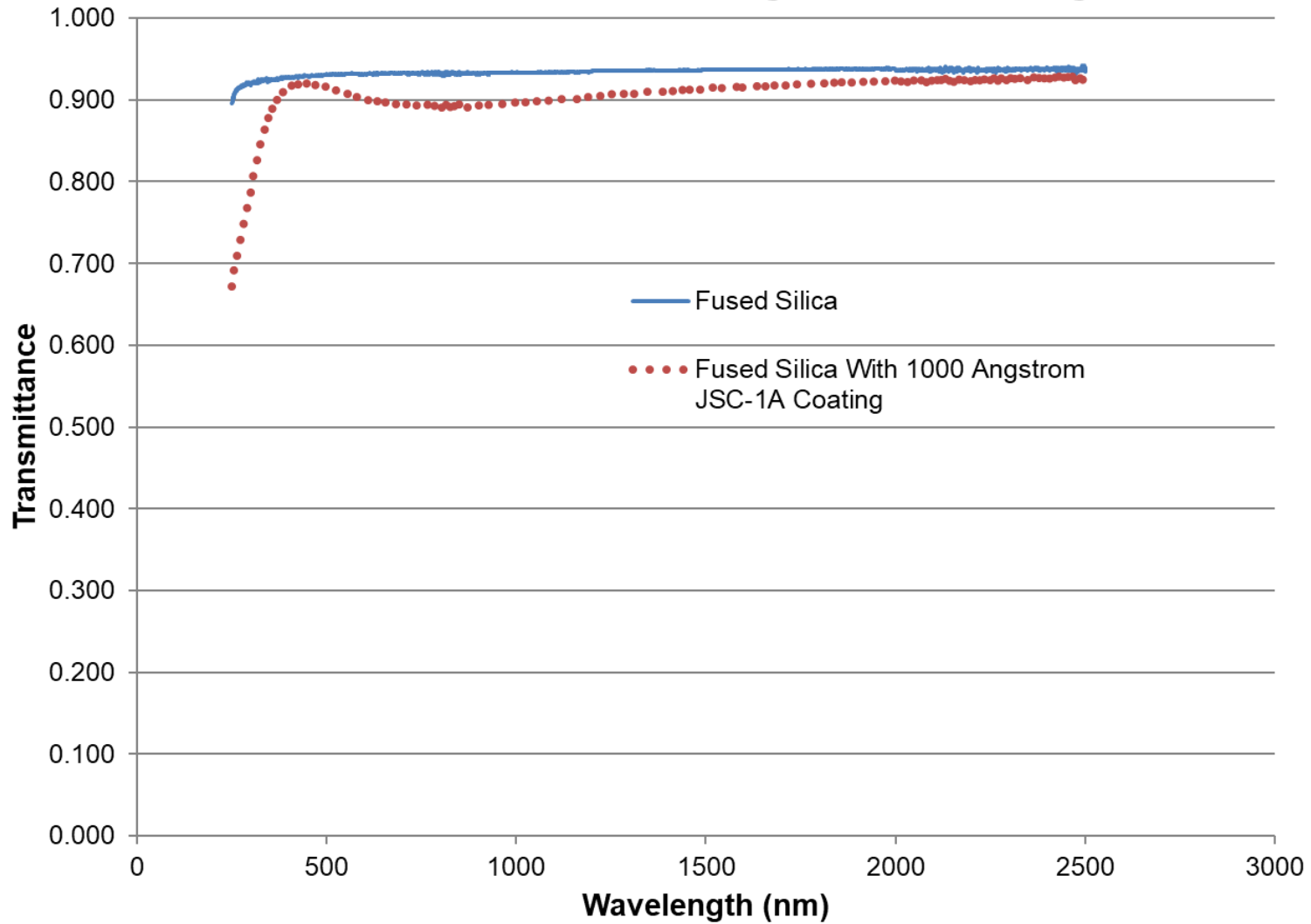
Work Function Matching Coating (1000 Å) on Top Half

Section of Fused Silica with Hash Marks Applied by Diamond Scribe Prior to Work Function Matching Coating (to distinguish coated and uncoated halves in camera images when on the lunar surface)

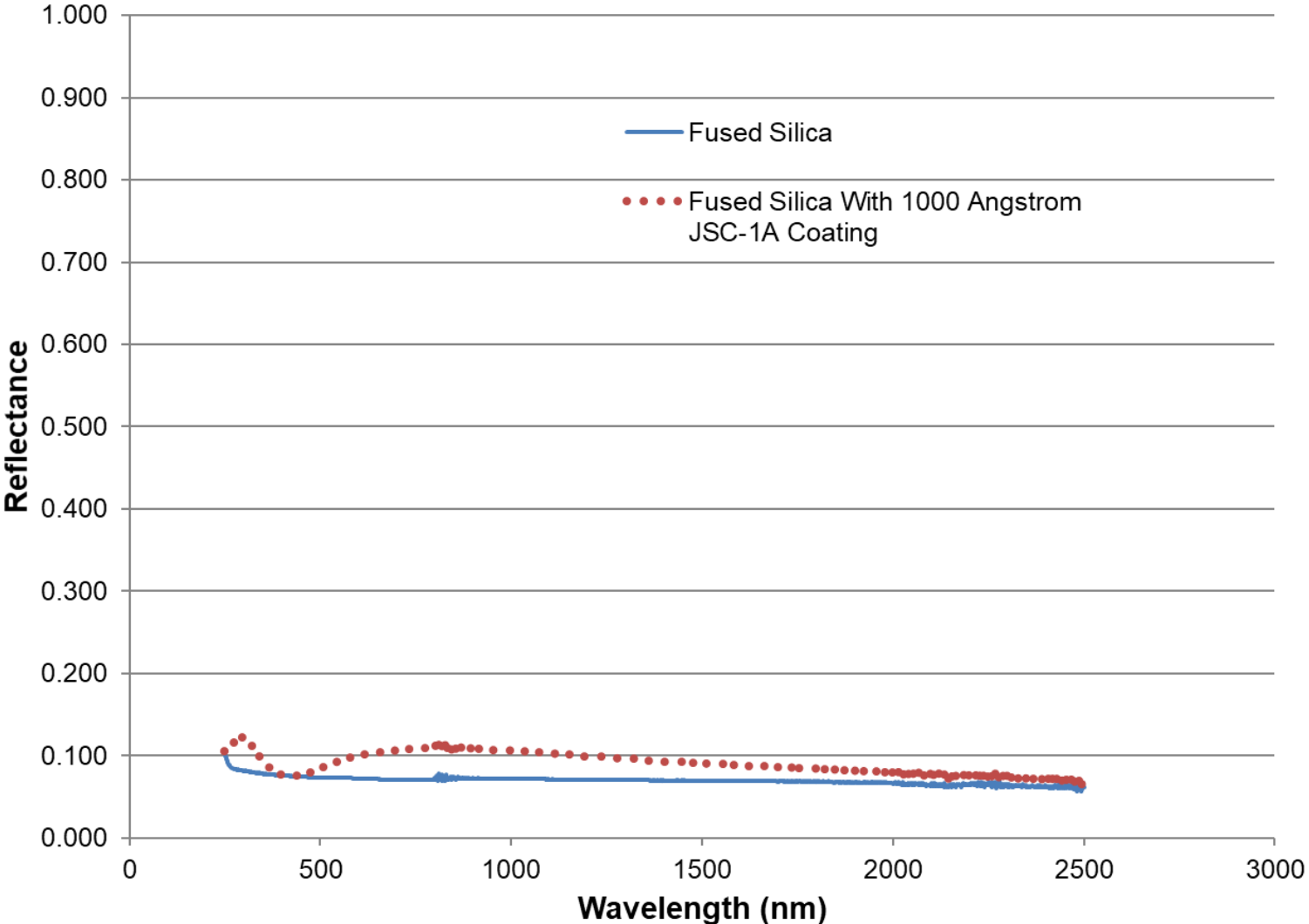


Section of Fused Silica with Hash Marks Applied by Diamond Scribe then Overcoated with Black Ink Prior to Work Function Matching Coating (to distinguish coated and uncoated halves in camera images when on the lunar surface)

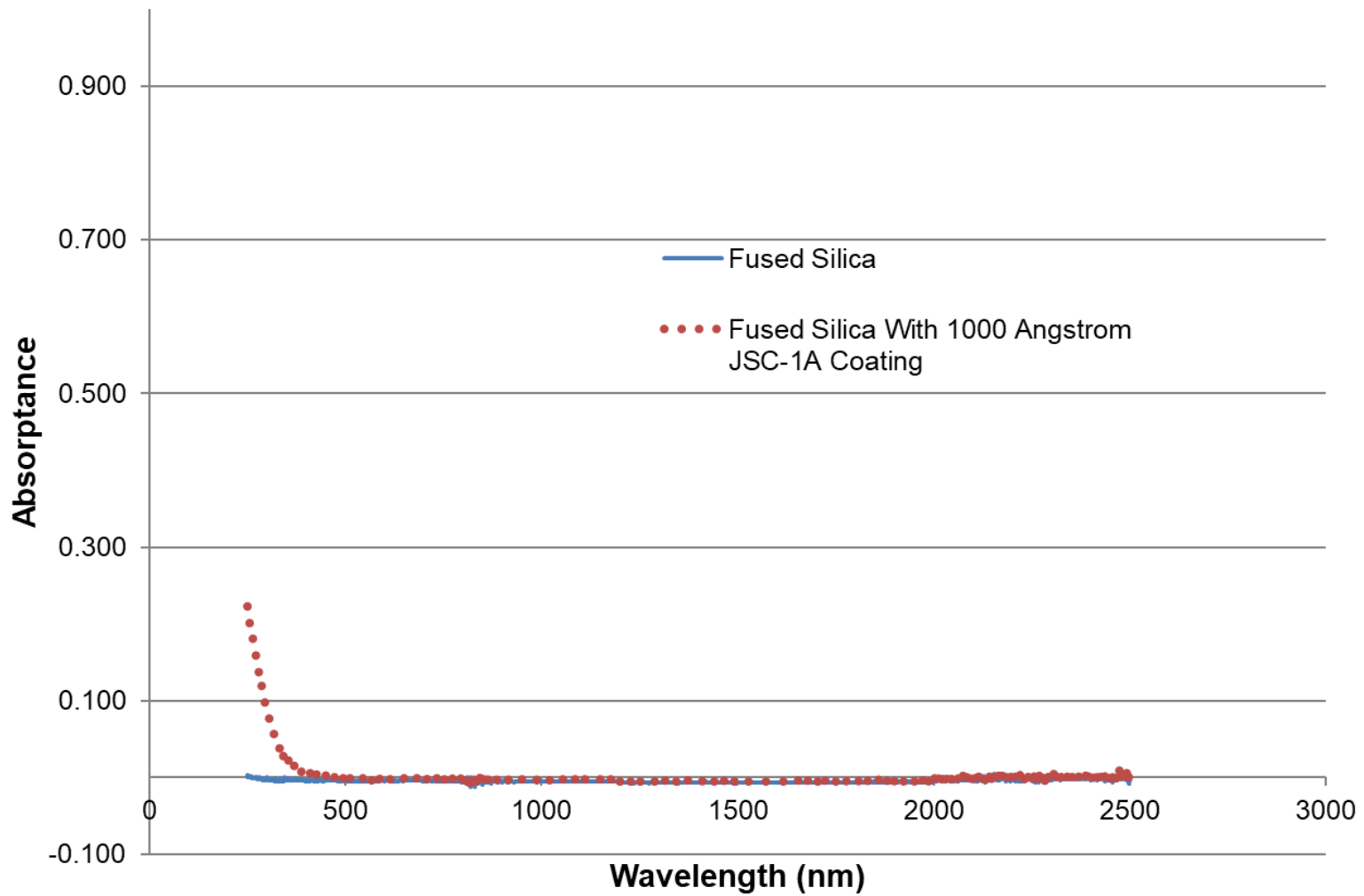
Total Transmittance Comparison of Fused Silica With and Without Work Function Matching JSC-1A Coating for RAC



Total Reflectance Comparison of Fused Silica With and Without Work Function Matching JSC-1A Coating for RAC



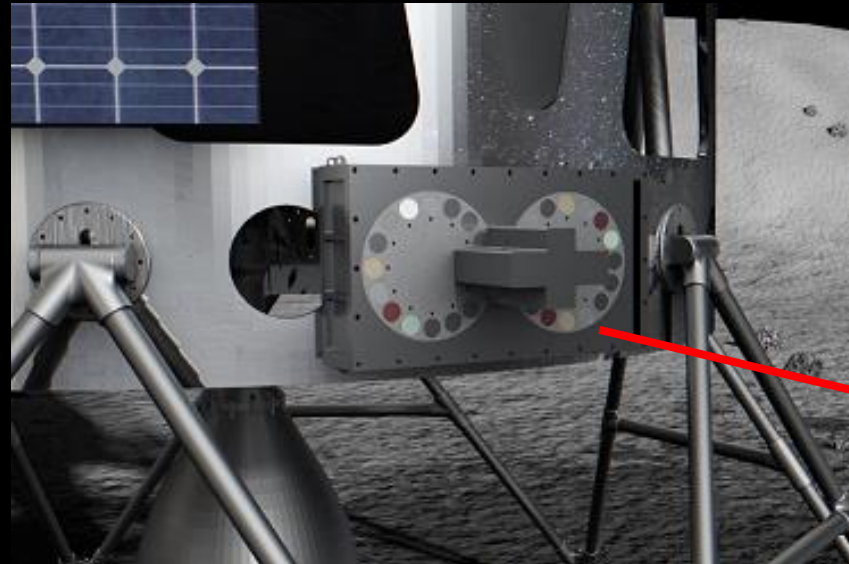
Total Absorptance Comparison of Fused Silica With and Without Work Function Matching JSC-1A Coating for RAC



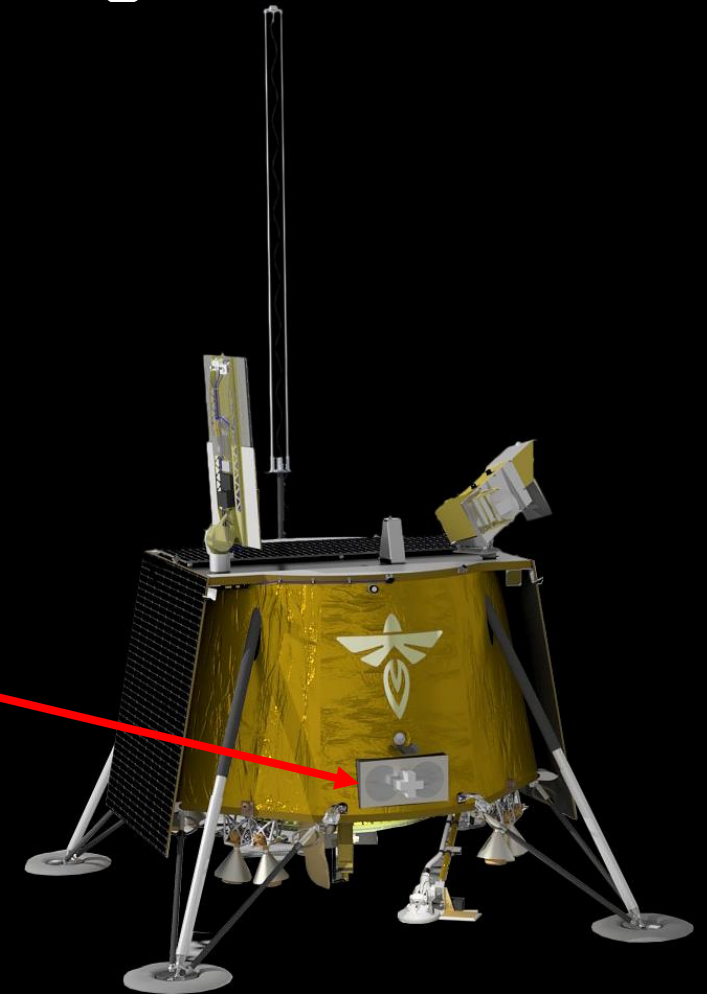
Commercial Lunar Payload Services Flight Test

RAC Experiment

Two identical flight and backup samples delivered to Aegis Aerospace for integration into the Regolith Adherence Characterization (RAC) experiment which will launch in 2023 flight to Mare Crisium on Firefly Blue Ghost Lander



Aegis Aerospace (formerly Alpha Space) : [NASA Selects Alpha Space for Lunar Payload – News and Events](#)



Firefly Aerospace: <https://firefly.com/lunar-lander/>



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