

# Passive Dust Mitigation Technologies Being Developed for Demonstration Under Patch Plate Materials Compatibility Assessment Task

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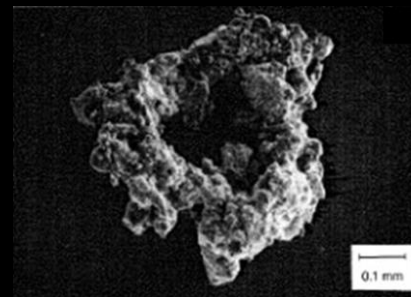
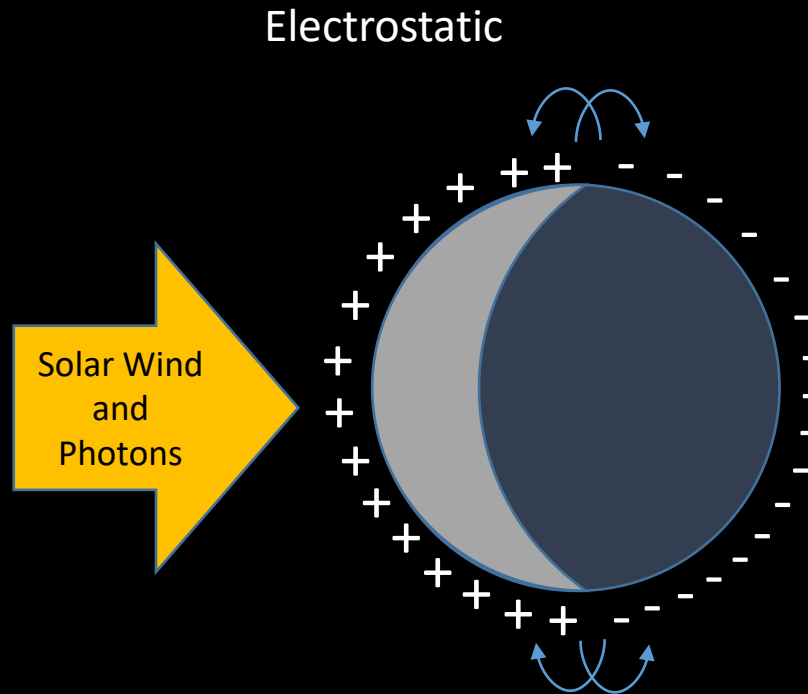
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# Lunar Dust Adhesion and Wear



Image from Clementine Spacecraft-NASA



SEM Image of Lunar Soil Agglutinate  
NASA S87-38112

Triboelectric



Apollo 12 Image Library-NASA

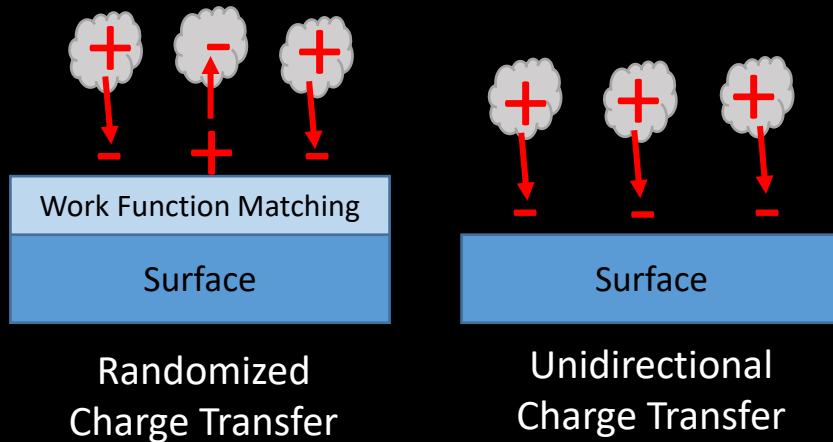


A portion of the leg of Harrison Schmitt's Apollo 17  
Pressure Garment Assembly –NASA from Gaier 2009

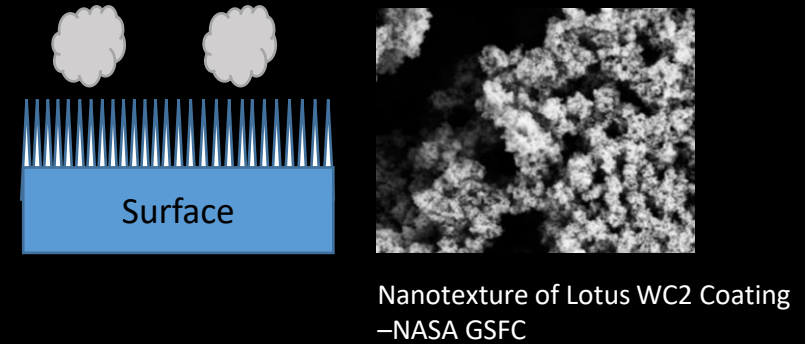
# Goal of the Patch Plate Materials Compatibility Assessment Task

To develop passive approaches to mitigate lunar dust adhesion to surfaces and bring them to TRL level 5 through ground-based assessment, culminating in a demonstration flight experiment on a Commercial Lunar Payload Services (CLPS) lander

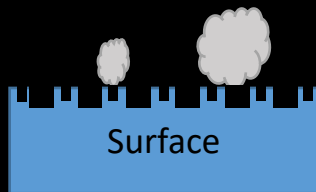
## Work Function Matching Coatings



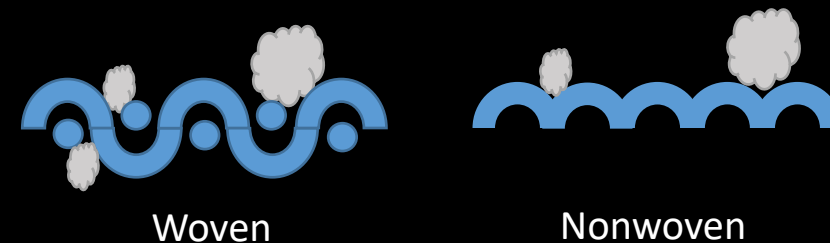
## Low Energy/Surface Contact Coatings



## Laser Ablation Patterning of Metals, Polymers and Ceramics



## Non-woven Fabrics



# Ground Testing of Passive Dust Mitigation Concepts

## Ground Testing:

- Performed at various Centers
- Simulant sifted onto surfaces in air or in vacuum (JSC-1AF, LHT-1...)
- Non-adhering simulant removed by sonic wand, nitrogen jet, spinning, tilting or Electrodynamic Dust Shield

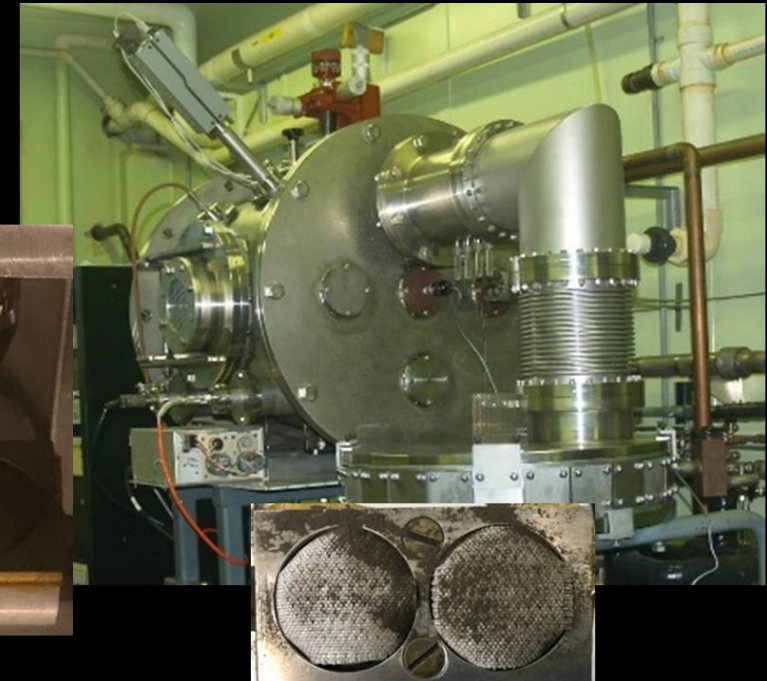
## Characterization:

- Mass measurement of simulant removed
- Transmittance
- Solar Absorptance
- Solar Absorptance/Thermal Emittance
- Imaging (counting of particles and size)
- Conductivity

## Lunar Dust Adhesion Belljar



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



Sample pair after exposure to nitrogen jet

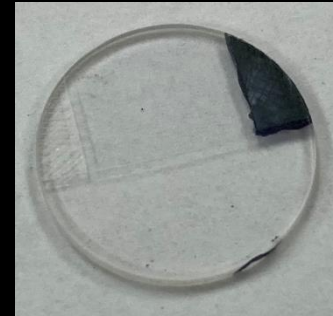


# Commercial Lunar Payload Services Flight Test

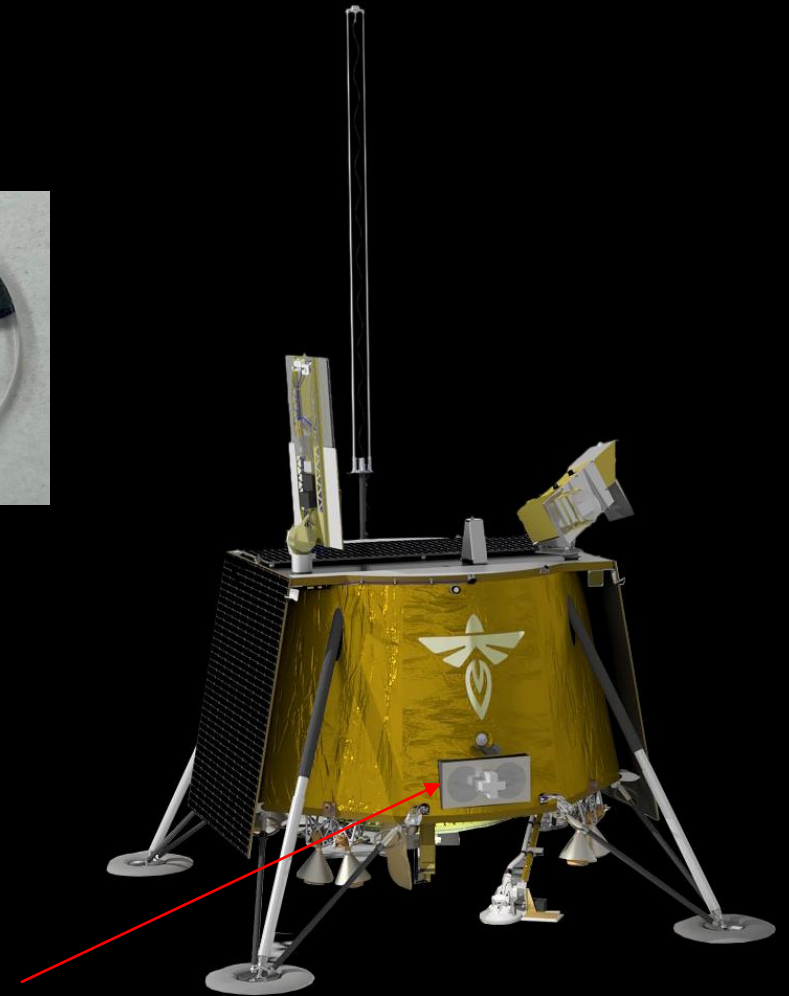
Work function  
matching coating,  
laser ablation  
patterned surfaces  
and ortho-fabric flight  
and backup samples  
delivered to Alpha  
Space for integration  
into the Regolith  
Adherence  
Characterization (RAC)  
experiment which will  
launch in 2023 flight  
to Mare Crisium on  
Firefly Blue Ghost  
Lander



Laser Ablation Patterning on half of metal and polymer flight sample coupons



Work Function Matching Coating on top half of fused silica window



RAC Experiment

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



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