



Lunar Simulants



What is a Lunar simulant?

The CLASS Exolith Lab offers high-fidelity simulated Lunar regolith (known as “simulant”) for use in research, technology development, and education. These products simulate the two primary compositional units on the Moon’s surface: the Highlands and the Maria. Simulant development begins by matching mineral proportions and particle size distributions to the actual Lunar regolith, which has been characterized using samples collected by Apollo astronauts. By replicating Lunar mineralogy, Exolith simulants recreate bulk chemistry, volatile content, and spectral properties of the intended regolith. Currently we do not simulate agglutinates or nanophase iron, and it has not been demonstrated that doing so is necessary to capture the major properties of Lunar regolith with simulants. Our approach is in contrast to that used for previous simulants, many of which are based on terrestrial geology. We carefully document simulant development, test mineral constituents and final products to maintain quality.



Figure 1a: Moon Credit: Gary Seronik

What are the differences between our simulants?



Figure 2a: LHS-1 Simulant Credit: Matthew Villegas

LHS-1 Lunar Highlands Simulant

Lunar Highlands Simulant (LHS-1) is a simulant for the average anorthositic highlands terrain that makes up over 80% of the Moon’s surface area, including the poles. The particle size distribution for LHS-1 is constrained by samples from Apollo 16, which visited the Lunar Highlands.

Suggested Uses: Generic Lunar simulant for ISRU applications, technology development, scientific studies, classroom and educational purposes.



Figure 2b: Apollo soil core tube 60014 Credit: NASA/JPL



Figure 3a: LHS-1D Simulant Credit: Matthew Villegas

LHS- 1D Lunar Highlands Dust

Lunar Highlands Dust Simulant (LHS-1D) is a very fine-grained version of our LHS-1 simulant. The maximum particle diameter is 30 microns and 98% of the particles are smaller than 25 microns. Upon request, we also offer Lunar Mare Dust Simulant (LMS-1D) which is a very-fine grained version of LMS-1.

Suggested Uses: Dust mitigation studies.



Figure 3b: Apollo 16 Lunar Lander Leg Credit: NASA



Figure 4a: LMS-1 Simulant Credit: Matthew Villegas

LMS-1 Lunar Mare Simulant

Lunar Mare Simulant (LMS-1) is a moderate-Ti simulant for the dark, basaltic Lunar Maria that makes up the remaining 20% of the Moon’s surface area, including the poles. The a particle size distribution for LMS-1 is constrained by Apollo Mare samples.

Suggested Uses: Mare-specific studies.

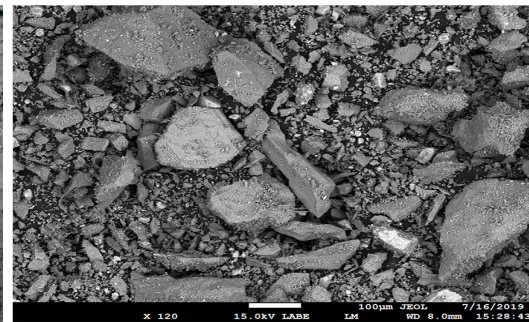


Figure 4b: SEM micrograph of LMS-1 Credit: NASA/JPL