Journal of Geophysical Research: Planets

Supporting Information for

Far-Ultraviolet Photometric Characteristics of JSC-1A and LMS-1 Lunar Regolith Simulants: Comparative Investigations with Apollo 10084

C. J. Gimar[1,2], U. Raut[2,1], M. P. Poston[2], A. Stevanovic[3], S. Protopapa[4,2], T. K. Greathouse[5], K. D. Retherford[2,1], J. M. Friday[2], and J. T. Grimes[2] (more TBD)

[1]Department of Physics and Astronomy, University of Texas at San Antonio, San Antonio, TX 78249.

[2]Center for Laboratory Astrophysics and Space Science Experiments (CLASSE), Space Science and Engineering Division, Southwest Research Institute, San Antonio, TX, 78238.

[3]Kleberg Advanced Microscopy Center, University of Texas at San Antonio, San Antonio, TX 78249.

[4]Department of Space Studies, Southwest Research Institute, Boulder, CO 80302, USA.

[5]Space Science and Engineering Division, Southwest Research Institute, San Antonio, TX, 78238.

Contents of this file

Introduction

The supplemental information included here consists of four additional figures. While not representing major findings or aspects of the research described in our publication, the reader may nonetheless find this information illustrative of points made in the text. The first figure shows electron microscopy views of JSC-1A lunar simulant grains, revealing complex crystalline structures in the grain. The second figure consists of digitized plots from older papers on titanium dioxide (Cardona & Harbeke, 1965) and ilmenite (Wagner et al., 1987) as examples of suppressed reflectance in the far-ultraviolet (FUV) resultant of titanium content. These were digitized using the built-in plot digitization tools included in the OriginPro software suite, a product of the OriginLab Corporation. The third figure shows our results for the FUV reflectance phase curves of three different sieved categories of JSC-1A lunar soil simulant at an incident light wavelength of 140 nm, showing no statistically significant difference between the curves.

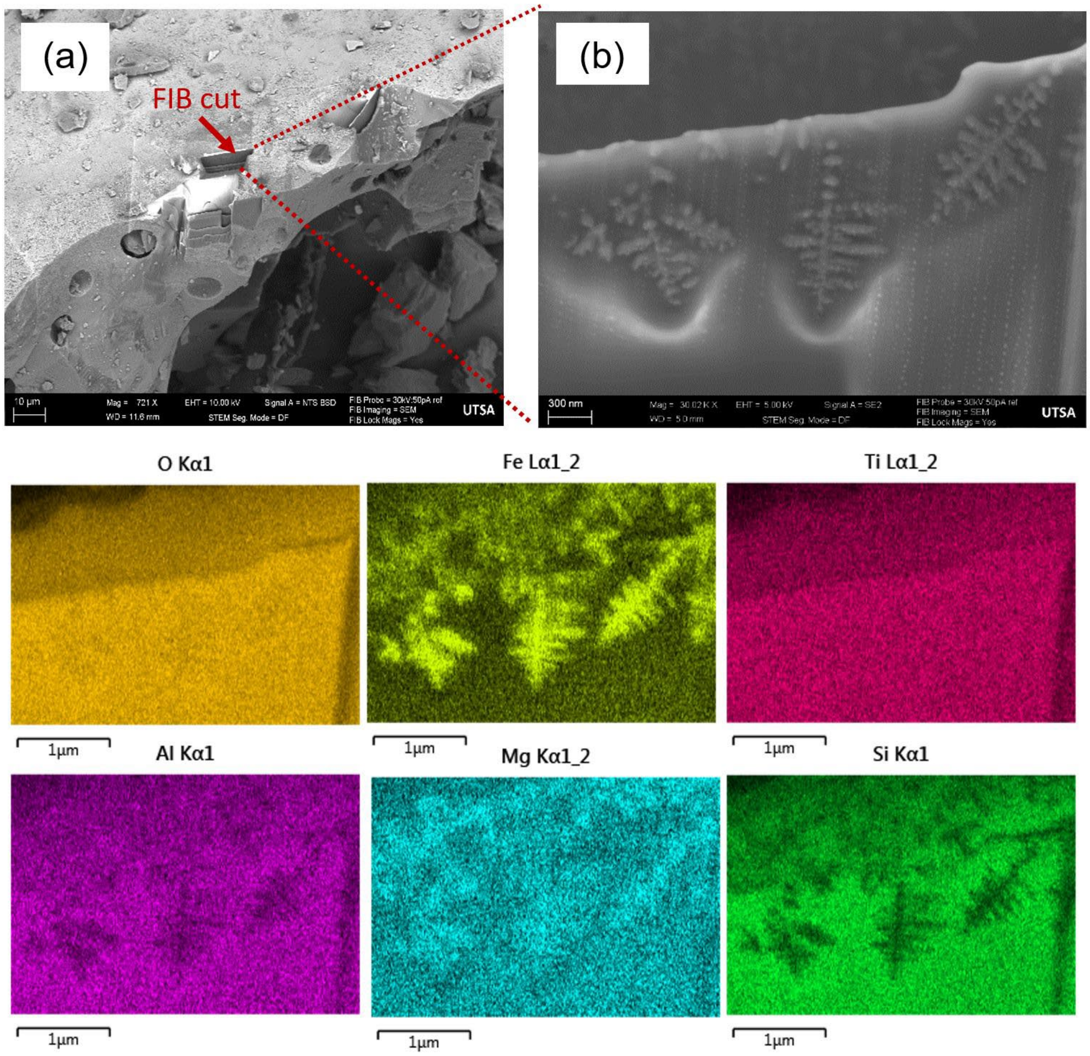

Figure S1. (**a**) Focused ion beam of 30 keV and 700 pA Ga^{+} ions was used to make a trench ~ 5 µm deep into a JSC-1A grain. (**b**) The SEM image shows a 300-1000 nm dendritic crystal structure consisting mainly of iron oxide (yellow map) and some magnesium oxide (blue map). The silicon-drift X-Max EDS detector (Oxford Instruments) was used to obtain the elemental maps of the revealed JSC-1A inner surface. The grain was excited by a 5 keV electron beam, capable of exciting all the elements of interest in the grain and obtaining the highest mapping resolution of ~ 0.05 µm. To confirm that the Ti atoms emitting characteristic X-rays at 4.51 keV were well excited and detected, we also used a 10 keV electron beam (not shown here) and found no change in Ti-content and its distribution throughout the surface.

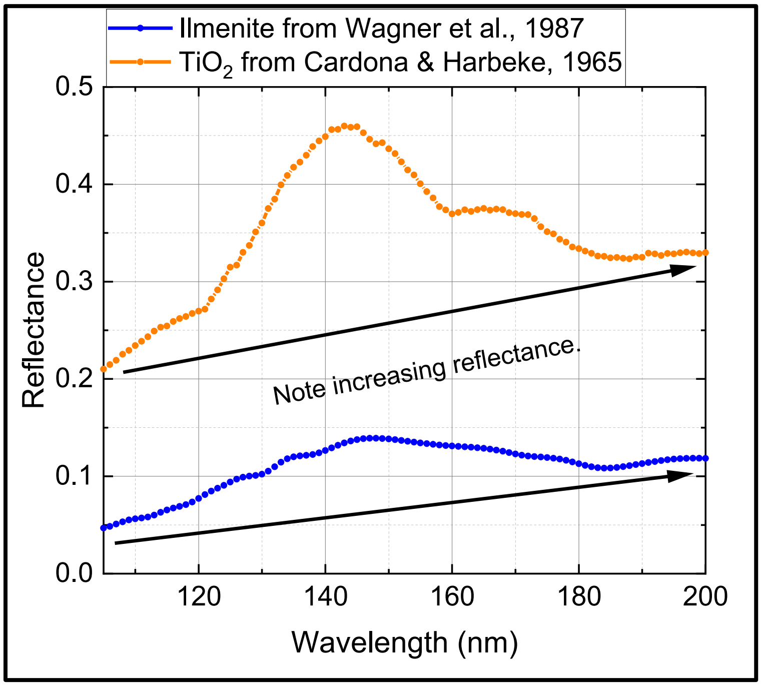

Figure S2. Reflectance spectra between 115 and 200 nm incident wavelength of ilmenite and titanium dioxide powders as reported by Wagner et al. (1987) and Cardona & Harbeke (1965) respectively. Note the increasing reflectance, particularly in the region shortward of ~145 nm.

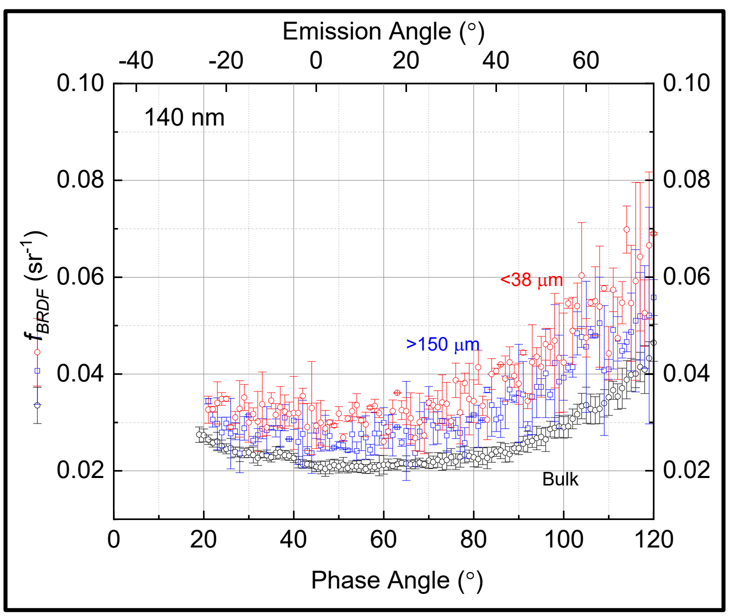

Figure S3. Phase curves of unsieved (black) and sieved (red and blue) JSC-1A powders at 140 nm. No statistically significant correlation between the grain size and reflectance was evident from these data.