Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

PPS25-07 Room:201B Time:May 23 10:45-11:00

Comparison of reflectance spectra of sintered olivine with those of olivine powder.

MARUYAMA, Kaori[1*], SAIKI, Kazuto[1], OHI, Shugo[2]

[1]Department of Earth and Space Science,Graduate School of Science,Osaka University, [2]Graduate School of Human and Environmental Studies, kyoto University

Global lunar remote-sensing data acquired through visible to near-infrared reflectance spectroscopy is used to identify rock types and rock-forming mineral compositions of the lunar surface. There is some debate over whether the grain sizes of rock-forming minerals can be estimated like powders or not. We studied the difference of reflectance spectra between sintered olivine as a quasi-rock and olivine powders.

We used olivine because it is one of the major constituent minerals of the lunar crust and the crystal structure does not change when it is sintered. The olivine used in this study is from San Carlos. To prepare sintered olivine, the samples were crushed into powders, sieved into two size fractions (75-10 micrometers, 230-250 micrometers) and pressed and sintered (1GPa, 1400-1500 degrees). The sintered olivine was cut into two pieces and one was polished with 0.1 micrometers diamond paste and sand paper (#1000). Another sintered olivine was slice into a thin section and observed under a polarizing microscope to measure their grain sizes. Powders which have the same grain size were prepared. Powders were poured into an aluminum pan and its surface was smoothed. At reflectance spectrum measurement, a halogen lamp was used as a light source and a hyper-spectral microscope (range(wavelength):380-1100nm, wavelength resolution:5nm) was used as a detector. The light reflected on the samples was dispersed by a grism. Spectralon was used for a reflectance standard. The incident angle was 40 degree and observed angle was 0 degree. The results of reflectance spectra of sintered olivine and olivine powders were widely different at their reflectance. The reflectance of the sintered olivine was extremely lower than that of olivine powders. The effect of the difference of surface roughness of the sintered olivine on reflectance spectra remained unclear within our measurements. Concerning the grain size, smaller the grain sizes of olivine powders were, the higher their reflectance was. On the other hand, smaller the grain sizes of the sintered olivine were, the lower their reflectance was. These results suggest that a new scattering model for rocks different from that for powders is required to estimate grain sizes of the sintered olivine.

Keywords: reflectance spectrum, olivine, sintered olivine, remote-sensing, lunar surface, hyper-spectral sensor