Polarimetric Measurements of Lunar Soils by Particle Size

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Polarization properties of the moon provide valuable insights into lunar soil information such as particle size and composition. But there is a lack of related research and laboratory measurements using lunar samples. For this reason, we have performed polarimetric experiments at a phase angle of 100°using lunar soil in multi-band (B, V, and R). We used a total of five samples (14163, 14260, 61141, 61221, and 65701) from Apollo 14 and 16 missions. The samples have been divided into different size groups including the bulk group: XS(<25 μm), S(25–45 μm), M(45–90 μm), L(90–150 μm), XL(>150 μm) and S-bulk (<150 μm). Our investigation focuses on the effect of particle size on the degree of polarization (DoP) and its wavelength dependence. We show that DoP increases with the grain size up to the S size group, but the larger size groups show various trends. This is different from the results of experiments using terrestrial samples in which particle size and DoP are proportional. Also, for all samples, DoP decreases as the wavelength increases. This is the same result of lunar soil simulant and lunar observation.