

Laboratory simulation of light scattering from regolith analogue: Effect of porosity and particle size

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The surfaces of most atmosphereless solar system objects are referred to as regolith or layers of usually loosely connected fragmentary debris, produced by meteorite impacts. Measurement of light scattered from such surface provide information about the composition and structure of the surface. A suitable way to characterize the scattering properties is to consider how the intensity and polarization of scattering depends on the particle size, composition, porosity, roughness, wavelength of incident light and the different geometry of observation. Laboratory photometry and polarimetry of regolith like sample is important for interpreting the phase curves, which are being used as a planetary surface characterization tool. Hence the laboratory based experiments on regolith analogue are more significant, so that the in situ data can be matched with the laboratory result.

Here in Assam University, Silchar, India we have set up a laboratory to simulate the light scattering properties of such surface in intensity as well as in polarization. For the laboratory simulation a goniometer is used with a CCD as a detector and He-Ne gas lasers having wavelengths 543.5 nm and 632.8 nm are used as source. For measuring degree of polarization an additional polaroid has been mounted in front of the detector. The polaroid can be rotated in many discrete steps. The light scattered from the regolith surface is detected by the CCD camera at three different positions of polaroid. The intensity and polarization are measured by varying phase angle, for synthetic samples having various degrees of porosities and sizes. Results obtained by the above experiment will be discussed.