

## **Particle Size Effects on Minerals Under Simulated Lunar Environment**

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**Abstract:** Remote sensing is an important tool for understanding the Moon and other airless Solar System bodies; however, remote mineral spectroscopy requires detailed laboratory validation. Additionally, a truly comparable spectral library must include spectra measured in similar environmental conditions to that of the planetary body in question instead of the terrestrial environment. The Planetary and Asteroid Regolith Spectroscopy Environmental Chamber (PARSEC) is a new instrument at Stony Brook University capable of measuring samples at lunar and asteroid pressures and temperatures. Equally as important, PARSEC can recreate lunar and asteroid like thermal gradients within regolith samples.

We have measured the first visible, near-infrared, and mid-infrared (MIR) emissivity spectra obtained using PARSEC for minerals: forsterite, augite, ilmenite, enstatite, anorthite. All of which were measured under terrestrial and simulated lunar environment (SLE) conditions for several particle size fractions. Each mineral showed marked variation in the MIR in the Christiansen Feature and Reststrahlen Bands under SLE conditions from terrestrial, and with grain size. These features are diagnostic of a mineral, and shifts dependant on particle size can influence our interpretation of lunar regolith composition.

We will continue to acquire the spectra of minerals of different grain sizes and mineral mixtures and compare them directly to data received from current missions, such as the Diviner Lunar Radiometer Experiment. These experiments will give us a better understanding of the environmental conditions in which spectra are acquired on the Moon, as well as better classify the mineral assemblages we can identify from orbit.