ELECTROSTATIC CHARGING OF LUNAR DUST. M. Horanyi, *LASP, U.of Colorado, Boulder, CO 80309-0392, USA, horanyi@styx.colorado.edu*, B. Walch, *Physics Department, U.of Northern Colorado, Greely, CO 80639, USA*, S. Robertson, *Physics Department, U.of Colorado, Boulder, CO 80309-0391, USA*.

Perhaps one of the most interesting and controversial science issue from the Apollo era remains the possible electrostatic levitation and transport of lunar dust [Gold and Williams, 1972]. This issue is also of great engineering importance in designing and protecting optical devices, for example.

Transient dust clouds suspended above the lunar surface were indicated by the horizon glow observed by the Surveyor spacecrafts [Rennilson and Criswell, 1973], and the Lunar Ejecta and Meteorite Experiment (LEAM) deployed during the Apollo 17 mission [Berg *et al.,* 1974], for example. The available theoretical models cannot fully explain these observations. However, the models suggest that electrostatic charging of the lunar surface due to exposure to the solar wind plasma and UV radiation could result in levitation, transport and ejection of small grains [Singer and Walker, 1962; Criswell, 1973; De and Criswell, 1977; Criswell and De, 1977].

To conduct laboratory investigations of the surface dust transport on the Moon, we need to find substitute materials that well reproduce the electrostatic charging properties of the lunar fines. The chemical and mineralogical composition of lunar dust is well matched by two widely used lunar simulants: MLS-1 (Minnesota Lunar Simulant) [Weibben *et al.,* 1990] and JSC-1 (Johnson Space Flight Center) [McKay *et al.,* 1994]. However, their charging properties were not compared to that of the lunar soil [Willis *et al.,* 1973].

We have constructed an experiment, where individual dust grains can be exposed to a thermal plasma background and a flux of fast electrons. We have conducted experiments using glass, copper, graphite and silicon particles [Walch *et al.,* 1995] and also grains from MLS-1 and JSC-1 lunar substitute materials [Horanyi *et al.,* 1995]. We report our new set of measurements comparing Apollo-17, MLS-1 and JSC-1 samples.

The secondary electron production from these materials, in the energy range of $20 \leq E \leq 90$ eV of the bombarding electrons, are similar. The measured secondary electron yield for the Apollo-17 sample was intermediate between MLS-1 and JSC-1 simulants, closer to that of MLS-1. We have verified, that multiple charge states could exists on the Moon, as it traverses through the plasma tail of the Earth, where it encounters an energetic plasma environment.

On the day side of the Moon, photoelectron production becomes dominant. We are now modifying our plasma chamber to accommodate a solar UV simulant light source to examine charging due to photoelectron production.

Our long term goal remains to develop a laboratory lunar surface model, where time dependent illumination and plasma bombardment will closely emulate the conditions on the surface of the Moon.

This project was funded by the Planetary Materials and Geochemistry Program of NASA (NAG-6138). We thank the Curation and Analysis Planning Team (CAPTEM) for supplying the Apollo-17 lunar soil sample and Drs. J.L Gooding, J.A. Nuth III and C.B. Pilcher for their support.

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