# Mass-velocity relation of impact ejecta from regolith targets

# Satoru Yamamoto[1], Satoru Nakazawa[2], Akiko Nakamura[3]

[1] Inst. of Low Temp. Sci., Hokkaido Univ, [2] ISAS, [3] Grad. Sch. of Sci. and Tech., Kobe Univ.

We have performed impact experiments onto regolith targets to investigate the mass-velocity relation of powdery ejecta. Targets were soda-lime glass powders of different sizes. Projectiles with diameter of 15 mm were accelerated to about 2 km/s by using a single-stage powder gun (with 15 mm bore) at Nagoya University, Japan. The ejecta were captured by foamed polystyrene as secondary targets, and the size distribution of collected ejecta was measured. Al foil were set in front of the foamed polystyrene to measure the velocity distribution. Based on the size distribution and velocity distribution of collected ejecta, we discuss the mass-velocity relation of ejecta from regolith targets.

Continuous bombardments of cosmic dust onto small bodies, such as the Moon or planetary satellites, provide a large amount of impact ejecta. The impact ejecta with low ejection velocities fall back to the surface of the target body. The ground-based observation and in-situ measurements revealed that a real surface of the small body is covered by regolith layers. The impact ejecta with enough ejection velocities to escape from the target body can contribute to the population of interplanetary dust particles. The dynamical evolution of the ejecta in interplanetary space depends strongly on the grain mass as well as its porosity, shape and material component. However, the mass and velocity distributions of impact ejecta from regolith targets have not been cleared in previous studies of impact experiments.

We have performed impact experiments onto regolith targets to investigate the mass-velocity relation of powdery ejecta. Targets were soda-lime glass powders of different sizes. Projectiles with diameter of 15 mm were accelerated to about 2 km/s by using a single-stage powder gun (with 15 mm bore) at Nagoya University, Japan. The ejecta were captured by foamed polystyrene as secondary targets, and the size distribution of collected ejecta was measured. Al foil were set in front of the foamed polystyrene to measure the velocity distribution. Ejecta with sufficient velocity penetrated Al foil, and left holes. In our analysis, an empirical relation of threshold penetration was adopted to determine the limiting velocity of the penetrating particles. Based on the size distribution and velocity distribution of collected ejecta, we discuss the mass-velocity relation of ejecta from regolith targets.