

Shooting star formation in a laboratory experiment

*Hiroki Senshu¹, Kosuke Kurosawa¹, Takaya Okamoto¹

1.Planetary Exploration Research Center, Chiba Institute of Technology

A shooting star is caused by an entry of a cosmic dust particle into the planetary atmosphere. The light from the shooting star composed of thermal emission and emission lines from the gas in from of the dust particle and the vapor from the dust particle. It means that the physical and chemical condition of the dust particle can be estimated from a photometric and/or spectroscopic observations. However a shooting star is a sporadic and un-controlled event, and thus the relation between the physical and chemical condition and the resulting spectroscopic observation is estimated by empirical equations.

We are constructing a laboratory experimental system to simulate shooting stars by using a two-stage light gas gun at Planetary Exploration Research Center (PERC), Chiba Instiute of Technology, Japan. This gun shoots a projectile with size of 2 mm into a observational chamber filled with gas. The light from the projectile is observed by high-speed camera with 1 Mfps and its spectrum is taken by spectrometer simultaneously.

We carried out a series of experiments using the system with a variety of projectile composition. The specific spectra relating to the projectile component were confirmed as a function of the location from the projectile (during head-neck-tail structure). We will give the experimental results and discuss the chemical and physical status of shooting star.

Keywords: shooting star, impact, spectroscopy