MICROSPECTROSCOPIC CHARACTERIZATION OF MICROMETEORITES AND THERMAL / AQUEOUS ALTERATION EXPERIMENTS OF CARBONACEOUS CHONDRITES AND MODEL MATERIALS

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ABSTRACT

The small extraterrestrial materials, such as micrometeorites, have precious information of early solar system on minerals and organics, but are generally too small to be analyzed by conventional analytical methods.

First, multiple non-destructive spectroscopic characterization on Antarctic micrometeorites (AMMs) was conducted on a common mounting method on Al-foils. 8 AMM grains picked up at Kuwagata No.11 point experienced Antarctic weathering by electron probe micro analysis and visible spectroscopic analysis. From the IR spectra, the AMMs are similar to type 2 and 3 carbonaceous chondrites. From the Raman feature, the AMMs resemble to type 1 or 2 carbonaceous chondrites. The genetic classification of individual AMM grains can be conducted by the present multiple micro-spectroscopic reflectance methods on the same sample configuration pressed on Al-foils. These methods will also be useful for characterization of any precious small samples.

The Raman features of carbonaceous chondrites have possibility of showing the heating and aqueous alteration effects on the parent body. In order to verify these possibilities, I conducted heating experiments of insoluble organic matter (IOM) of Orgeuil (CI1) and hydrothermal alteration experiments of Ningqiang (C3) and IOM of Vigarano (CV3). By heating, the Raman G band parameters of Orgueil IOM approached to those for type 3 carbonaceous chondrites. Raman G band features for Ningqiang and Vigarano IOM changed toward these for type 1 or 2 carbonaceous chondrites by their hydrothermal alteration. These experiments indicated that changes in Raman G band features of carbonaceous chondrites can be simulated by heating and hydrothermal alteration experiments. Raman G band features might therefore be used as indicators of thermal and aqueous alteration on the parent body.