# Characteristics of mineralogy and carbonaceous materials in micrometeorites retrieved from surface snow in Antarctica

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Since 2005, we have collected and investigated micrometeorites (MMs) in surface snow near Dome Fuji Station, Antarctica. Up to now, we have found ˜200 MMs from ˜300 kg snow. It is quite important that there are MMs containing GEMS (glass with embedded metal and sulfides) and enstatite whiskers or platelets, as well as phyllosilicate-rich MMs. Obviously they correspond to anhydrous and hydrated interplanetary dust particles (IDPs) found above ground. In this paper, we refer to the former as anhydrous MMs and the latter hydrated MMs. It has been thought that at least a part of anhydrous IDPs were derived from comets or comet-like icy primitive bodies and that hydrated IDPs were originated from asteroids that experienced aqueous alteration processes. These expected parent bodies can be applied to our MMs retrieved from snow.

Mineralogy of anhydrous IDPs is quite different from that of hydrated ones. However, it is not clear whether carbonaceous material in the anhydrous IDPs is different from that of the hydrated ones or not. The purpose of this study is to clarify whether carbonaceous materials are different between them or not. We combined mineralogical studies such as synchrotron radiation X-ray diffraction and transmission electron microscopy with micro-Raman spectroscopy. We compared mineralogy and Raman spectra of carbonaceous materials of the MMs and those of some carbonaceous chondrites. In this study, we used a laser source with a wavelength of 784.7 nm during micro-Raman spectroscopy.

We found that anhydrous MMs and hydrated ones occupy different areas with some overlap on diagrams such as the G-band center position versus G-band FWHM diagram. Anhydrous MMs have almost no overlap with carbonaceous chondrites experienced heavy aqueous alteration. We also measured micro-Raman spectra of an anhydrous IDP. The analytical values of the IDP are plotted within the area of the anhydrous MMs. These data suggest that carbonaceous materials in anhydrous MMs (and probably in anhydrous IDPs) are different in structure from that in hydrated MMs and carbonaceous chondrites.

A few hydrated MMs are plotted among the area of the anhydrous MMs. They contain Ni-poor pyrrhotite as Fe-rich sulfides although typical hydrated MMs and hydrated carbonaceous chondrites contain Ni-rich pyrrhotite and pentlandite as Fe-bearing sulfides. It is known that mineralogy of Fe-rich sulfides is a sensitive indicator of aqueous alteration in parent bodies. Mineralogy of Fe-rich sulfides in the hydrated MMs suggests that they experienced relatively weak aqueous alteration. They may contain carbonaceous material that preserves primary structural features before aqueous alteration.