A COBINED MINERALOGICAL AND NOBLE GAS STUDY OF FOUR ITOKAWAS PARTICLES: A PROGRESS REPORT.

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Introduction: Various types of surface modification textures were found on the surface (<100 nm) of Itokawa particles [1-6]. Their textures suggest that irradiation by solar wind play an important role to form the surface modification [1,2]. On the other hand, noble gas isotopic compositions suggest that each particle had its individual irradiation history [7]. Therefore, we intended to investigate the relationships between surface modification textures related to space weathering and noble gas implantation signatures. We developed a method to perform a combined study of mineralogy and noble gas mass spectrometry for individual Itokawa particles.

Samples and Methods: We fixed four Itokawa particles on molybdenum plates by acetone soluble glue. Three particles were fixed in a N_2 filled glove box at the PMSCF/JAXA. However, we once lost sight of one particle in a small hole on a silica glass slide. It was attached on a Mo plate later in a clean room and carbon coated at Ibaraki University. All the samples attached on four small Mo plates were attached on a sample holder for FIB sample preparation. They were coated again by platinum. We observed the surface of the particles and prepared by FIB sections from them by JEOL JIB-4501 FIB-SEM at Ibaraki University. The FIB sections were further processed by low accelerating voltage Ar milling machine Fischone NanoMill. The sections were promptly stored in a vacuum desiccator.

After preparation of FIB sections, all the Mo plates with samples were stored in small envelopes made by thin aluminum foils and were rinsed by acetone in a N_2 filled glove box at Ibaraki University. They were transferred to Kyushu University and noble gas mass spectrometry were performed for all noble gas elements using a modified VG-5400. Noble gas extraction from each sample was conducted stepwise at 50, 100, and 200 °C using an infrared lamp and at 300, 600 and 1400 °C using a "Pot-Pie" mini-furnace equipped with the mass spectrometer. FIB sections were also transferred to Kyushu University in accordance with the move of T. Noguchi from Ibaraki University to Kyushu University.

Present state: TEM observation of the FIB sections revealed that all the sections had been completely covered by Cu sulfide (or sulfate) small crystals after about 6 months storage in a vacuum desiccator. We are now trying to rescue the FIB sections from the overlying Cu sulfide crystals by using FIB-SEM carefully. We will give a status report at the meeting.

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