

U005-14

Room:IC

Time:May 26 12:30-12:50

Initial analysis of the Hayabusa recovery materials: Laboratory processing of individual grains

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In the initial analysis stage, one of our major objectives is the petrological and geochemical description of the Hayabusa recovery materials, thus providing the foundation upon which to base further scientific studies. According to the initial observations conducted during sample curation by JAXA, the recovery materials are different types of small lithic particles typically less than several tens of microns in diameter. It is, therefore, quite important to apply grain-by-grain comprehensive analysis and make a catalog of grains based on these data-sets. These data will provide fundamental information that will assist in future studies directed towards understanding the asteroid ITOKAWA.

One of the challenges in our initial analysis is the establishment of a sequence of laboratory processing techniques applicable for such tiny particles. A sequential protocol has been developed that is composed of simple and robust techniques for handling tiny free-particles with minimum contamination and, at the same time, minimizes the amount of sample consumption. Therefore, the techniques established in this study will be easily applicable for general micro-petrology and geochemistry.

In this presentation, we focus on newly developed techniques and methods, associated sample handling, fabrications and treatment in the initial analysis. The following topics are reported on;

- 1) particle handling procedure in a transporting vessel.
- 2) sample fabrication procedure by Focused Ion Beam System (FIB).
- 3) sample preparation procedure for in-situ descriptions by SEM, EPMA and ion probes.
- 4) protocol to preserve an individual sample portion for further studies.

The detailed analytical sequence and background of our processing techniques will be also presented.

Keywords: Hayabusa, MUSES-C, Asteroid Itokawa, initial analysis, sample fabrication