RECENT RESULTS OF INITIAL DESCRIPTIONS OF HAYABUSA SAMPLES AND THEIR 4TH INTERNATIONAL ANNOUNCEMENT OF OPPORTUNITY.

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Introduction: Meteorites and cosmic dust are essential planetary materials to understand the evolution of the solar system. However, their parent bodies cannot be identified in most cases. Therefore, sample return missions are necessary for reconstruction of the geological map of the solar system and better understanding of the evolution of the solar system. For this purpose, JAXA conducted the sample return missions from the near Earth asteroid Itokawa: Hayabusa. Here we review the curatorial works held for Hayabusa-returned samples.

Initial description and curation of Hayabusa-returned samples: Hayabusa spacecraft successfully returned asteroid regolith from Itokawa to the Earth in 2010[1,2]. Because its sample recovery system had not worked as we had planned, a particle of >1mm size is absent inside its sample canister. Astromaterial Science Research Group (ASRG) of JAXA set quartz glass disks to the opening of the sample canister and tapped it in the upside down position to make particles inside fall onto the disks. Then we continue handpicking particles one by one with an electrostatically controlled micromanipulator and describing them with FE-SEM/EDS. So far, a number of particles described has reached around 680, and more than 570 of them are identified as Itokawa origin. Itokawa particles, which size from <10 μ m to 320 μ m in their major axes. Figure 1 shows a cumulative size distribution of Itokawa particles. It looks lie on a power law in >30μm size range, whose power is around -2 which is consistence with the result of their preliminary examinations [3]. The major mineral phase of Itokawa particles are olivine, and their minor phases are low-Ca pyroxene, plagioclase and high-Ca pyroxene. Their accessary phases are troilite, Fe-Ni metal, chromite, and phosphate. Figure 2 shows their mineral modal abundance, which is almost comparable to those of equilibrated LL chondrites, which is consistent with results of preliminary examinations (PEs) [e.g. 4]. We have distributed more than 210 of them to PEs, NASA, and world-wide researchers selected by the international announcement of opportunity (AO) held for three times. 15% of them are allocated to JAXA and most of them are assigned as consortium studies conducted with ASRG team members [5-10]. We have now started the 4th international AO from this July, and are still accepting proposals from world-wide researchers until this Nov.

References:

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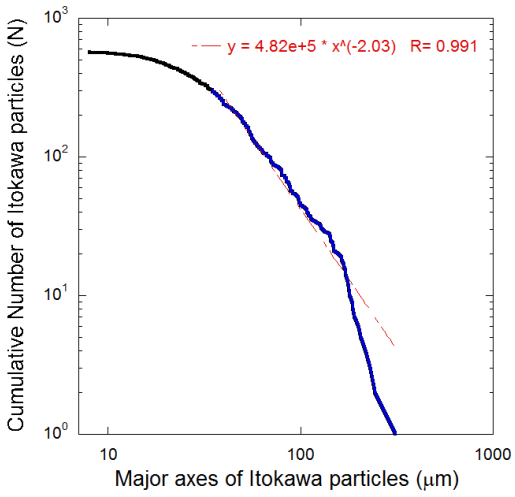

Fig. 1. A cumulative size distribution of Itokawa particles described so far. Both horizontal and vertical axes are expressed as logarithms.

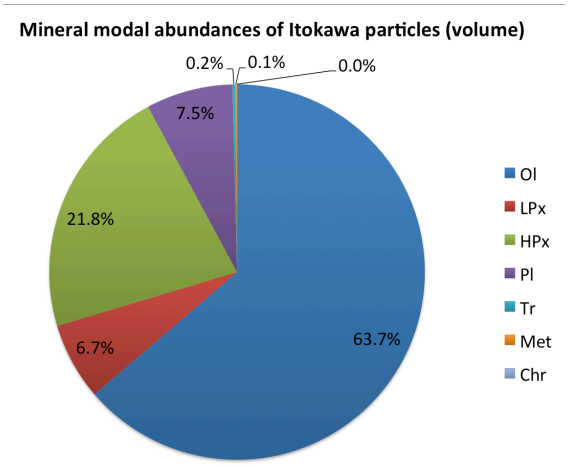

Fig. 2. A pie chart of mineral modal abundances of Itokawa particles. Note that a volume of each particle is calculated as a sphere of its major axes and that we assume whole the particle is composed of its major mineral.