CURATORIAL WORKS FOR THE HAYABUSA-returned SAMPLES AND PREPARATION FOR HAYABUSA2 SAMPLE CURATION.

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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. JAXA has conducted sample return missions: Hayabusa and Hayabusa2. Here we review the curatorial works held for Hayabusa-returned samples and preparation for Hayabusa2 sample curation.

Curation of Hayabusa-returned samples: Hayabusa spacecraft successfully returned asteroid regoliths from Itokawa to the Earth in 2010[1,2]. Because it could not have performed sample recovery on the asteroid in the way we had planned, a particle of >1mm size is absent inside its sample container. Astromaterial Science Research Group (ASRG) of JAXA set quartz glass disks to the opening of the sample canister and tapped the canister 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 650, and more than 540 of them are identified as Itokawa origin. Itokawa particles, which size from <10µm to 320µm in their major axes, are mainly composed of olivine, and their minor phases are low-Ca pyroxene, plagioclase and high-Ca pyroxene. Their accessory phases are troilite, Fe-Ni metal, chromite, and phosphate. Their mineral modal abundance is almost comparable to those of equilibrated LL chondrites, which is consistent with results of preliminary examinations (PEs) [e.g. 3]. 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 [4-9]. We are now planning to hold the fourth international AO in this year.

Preparation for Hayabusa2 sample curation: Hayabusa2 has been launched successfully in 2014[10], now flying toward its target C-type asteroid Ryugu, previously called 1999JU3. It will reach the asteroid in 2018, and after a year and half stay in there, it will return to the Earth to send back samples recovered from the asteroid in 2020. In the last fiscal year, we have been discussing the specification of curation facility for Hayabusa2-returned sample with an advisory committee which consists mainly of researchers of planetary material sciences outside JAXA. We are now designing its clean room and clean chambers in detail. In 2017, we will start building the clean room and manufacturing clean chambers and finish in 2018. Then we will perform their functional check for a year and a rehearsal for handling Hayabusa2-returned samples for a year, preparing for the sample return in 2020.

References: