A CONSORTIUM STUDY FOR THE LARGEST PARTICLE OF THE HAYABUSA-RETURNED SAMPLES.

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Introduction: Hayabusa-returned samples retrieved by the Hayabusa spacecraft were already distributed and investigated in the preliminary examinations and international A/Os. Through the investigations, several insights have been obtained on the formation process of 25143 Itokawa and surface processes occurred on the asteroid, as well as the confirmation that the particles were certainly regolith particles from there [1-6].

There are several particles, however, which have not been distributed for those examinations because of their rare features appeared in the initial description done by extraterrestrial sample curation team (ESCuTe) of JAXA. Though those particles will provide us further information for Itokawa and evolution of the asteroid, the samples should be investigated as carefully as possible to reduce consumption and damage of the samples. Referring the method and results of the previous studies, we decided to start the investigations of those rare particles by constructing the consortium of each particle. We will accept proposals for the consortium studies in order to maximize scientific gain from the Hayabusa-returned samples [7,8]. In this paper, we show an overview and a tentative research plan for the one of the consortium particles.

RA-QD02-0136-01: RA-QD02-0136-01 is currently the largest sample of Hayabusa-returned samples recovered from the sample catcher. The major axis of the particle r_a is around 310 μm, and weight of the particles is estimated around 150 μg, assuming the volume $V = 4/3\pi r_a r_b r_c \sim 4/3\pi/(2\sqrt{2}) r_a^3$ and density of the particle as 3.4 g/cm^3 [5]. The RA-QD02-0136-01 is mainly composed of Ca-rich pyroxene, and also contains minor amount of low-Ca pyroxene, olivine, plagioclase and troilite. The surface of the particle is in irregular shape, and showing variable structure such as large crystal base and aggregation of small particles.

Research plan: The textural and mineralogical information will be obtained at first, using Synchrotron radiation (SR) CT and diffraction. These observations will be operated without exposing the sample to the atmosphere, and also without any adhesive material using a special sample holder for the SR experiments. We can obtain the textures inside the particle, and rough chemical composition of the minerals combining the linear absorption coefficient in the CT image and EDS observation of the surface of the particle.

Further studies using the particle will become possible using the results of the SR experiments, such as detection of the solar wind, cosmogenic and the radiogenic nuclides, as well as studies based on the specific minerals or structures. We are also planning to cut the sample by laser, and distribute the pieces to the several lines of the investigations.

The research plan is tentative and anyone can propose their analysis to the consortium study.

References: [1] Nakamura et al. 2011. *Science 333*:1113-1116. [2] Yurimoto et al. 2011. *Science 333*:1116-1119. [3] Ebihara et al. 2011. *Science 333*:1119-1121. [4] Noguchi et al. (2011) *Science 333*:1121-1125. [5] Tsuchiyama et al. 2011. *Science 333*:1125-1128. [6] Nagao et al. 2011. *Science 333*:1128-1131. [7] Abe et al. 2013. *Meteoritics & Planetary Science* 48:A5147. [7] Uesugi et al. 2013. *Meteoritics & Planetary Science* 48:A5146.