

PRELIMINARY EXAMINATION OF CARBONACEOUS MATERIALS OF THE HAYABUSA-RETURNED SAMPLES.

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Introduction: Extraterrestrial Sample Curation Team (ESCuTe) recovered more than 400 particles from the sample catcher of the Hayabusa, after the returning of the spacecraft to the Earth [1]. Most of the particles were silicate materials, mainly composed of olivine, pyroxene, plagioclase and iron-sulfide. Through the preliminary examinations, it was confirmed that these silicate materials were actually extraterrestrial origin, and equivalent to the high petrologic type of LL chondrite [2-7]. In addition to these silicate particles, some amount of carbonaceous materials were also found. Those carbonaceous materials, named as category 3, were found in the form of particles with similar size range of the silicates. More than 50 particles out of the recovered particles were recognized as category 3. Initial description by the SEM-EDS analysis shows variable textures and chemical compositions of them, suggesting the multiple origins of the carbonaceous materials.

Preliminary examinations of category 3 particles were carefully processed in parallel with those of silicate materials. However, we could not obtain the information for the origin of category 3 particles before the opening of international announcement of opportunity (A/O). The ESCuTe and preliminary examination team of category 3 particles have continued their investigations, and recently we could obtain several results of our continuous analysis.

In this paper, we introduce the preliminary examination of category 3 particles with the concept of the sequential studies.

Procedure of the study and future plan: Three samples were analyzed so far. The samples were pressed on the Au plate and fixed without any adhesive materials. We analyzed H, C and N isotopic composition by nano-SIMS in the beginning of the sequential study, in order to investigate the isotopic anomaly which is a direct evidence of extraterrestrial origin of organic materials. FT-IR and micro-Raman spectroscopy were also applied for the pressed samples, and then the samples were sliced by FIB in order to investigate the fine structure of the samples by XANES and TEM/STEM. We did not obtain any signature for an extraterrestrial origin from category 3 particles so far. Details of those analyses and results will be also presented by several authors [8, 9].

We are planning to continue the preliminary examination of category 3 by the end of March 2014. We are also planning to open the category 3 particles to the future International A/O, with the data of preliminary examinations before the end of 2014.

References: [1] Yada et al. 2011. *Meteoritics & Planetary Science* 32:A74. [2] Nakamura et al. 2011. *Science* 333:1113-1116. [3] Yurimoto et al. 2011. *Science* 333:1116-1119. [4] Ebihara et al. 2011. *Science* 333:1119-1121. [5] Noguchi et al. (2011) *Science* 333:1121-1125. [6] Tsuchiyama et al. 2011. *Science* 333:1125-1128. [7] Nagao et al. 2011. *Science* 333:1128-1131. [8] Ito et al. 2013. Abstract of Hayabusa Symposium this issue [9] Uesugi et al. 2013. Abstract of Hayabusa Symposium this issue.