

EVALUATION OF MODAL ABUNDANCES OF ITOKAWA PARTICLES.

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Introduction: The Hayabusa spacecraft accomplished touchdowns onto a S-type asteroid Itokawa twice and returned its reentry capsule to the Earth in June 2010 [1]. After it was recovered in the Australian desert and sent back to Japan, it was treated in clean rooms of the extraterrestrial sample curation center (ESCUC) of JAXA and finally returned samples were recovered from the sample catcher, as described in [2]. During initial descriptions of the recovered particles, they were analyzed with SEM-EDS for their backscattered electron images and qualitative chemical compositions. With these data, we estimated modal abundances of Itokawa particles to understand their general characteristics [3].

Methods to estimate modal abundances: Two approximations have been applied to the estimation of the modal abundances of Itokawa particles. One is that a particle is regarded to be only composed of its major constituent mineral. The other is that its volume is calculated by a cube of its major axis. The modal abundance of Itokawa particles was estimated by summing up all of the estimated mineral volume of the initially described particles.

On the other hand, the modal abundance of Itokawa particles were also determined from three-dimensional X-ray linear attenuation coefficient (LAC) data for preliminary examined Itokawa particles obtained by two energy synchrotron computed tomography (CT) [4].

The latter is more accurate than the former, because the former is based on two-dimensional surface data and ignored minor minerals contained in the particles. However, the latter method could not have been applied to initial description for all recovered particles, because contaminations by terrestrial air and glue and multiple preparation processes are inevitable for the latter analyses.

Suggestion of different modal abundances in different sampling point on the asteroid: The modal abundance obtained by both the former and the latter indicated that they were comparable to that of equilibrated LL chondrites [3, 4]. It was suggested that that from a sample catcher room A was different from that from room B. Because those from room A should have gathered the second touchdown point while room B should be the first one, it was suggested that this could indicate local heterogeneity of the surface of the asteroid Itokawa [3].

We are now planning to evaluate an error in the former estimation, with comparing modal abundances obtained by both methods. We analyzed particles of Kilabo (LL6 chondrite) [5] by both methods. Their data reductions are ongoing.

References: [1] Abe M. et al. (2011) *LPS XLII*: #1638. [2] Yada T. et al. (2013) *MAPS*, *in press*. [3] Yada T. et al. (2013) *LPS XLIV* #1948. [4] Tsuchiyama A. et al. (2013) *MAPS*, *in press*. [5] Russell S. et al. (2003) *MAPS* 38: A189.