

Assessment of organic, inorganic and microbial contamination in the facilities of the Extraterrestrial Sample Curation Center of JAXA

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The Extraterrestrial Sample Curation Center of JAXA (ESCuC) have received samples from S-type near-Earth asteroid 25143 Itokawa returned by Hayabusa and C-type near-Earth asteroid 162173 Ryugu by Hayabusa2 [1, 2]. The samples have been taken out from sample containers, investigated in a non-destructive way, and stored in high vacuum and purified nitrogen circulating clean chambers installed in ISO Class 6 clean rooms in the ESCuC. A series of cleaning procedures for tools, jigs, and sample storage/transport containers has been established for the usage in the clean chambers to avoid potential contamination of samples [3].

Along with the contamination control, it is also important to keep monitoring the cleanliness of clean rooms and clean chambers. For instance, several biotic amino acids were once detected from contamination coupons set inside the clean chamber for Itokawa grains [4], of which contamination level was similar to that reported at the curation facility at NASA Johnson Space Center [5, 6]. In recent years, contamination of organics has been assessed regularly through exposure of wafers for 15-20 hours in the clean rooms and clean chambers. The regular assessment has found that the clean rooms is kept at the ISO-SCC Class -8 level and the clean chambers at the ISO-SCC Class -9 for organics. Regular contamination assessment of metallic elements has shown that both clean rooms and clean chambers maintain the level of ISO-SCC Class -10 or higher for all measured elements although elements contained in equipments and tools, such as Fe, Cu, Ni, Cr, Al, Zn, Mn, and Co, were often detected at a higher level in the clean chambers than in the cleanrooms. The contamination levels of Na and K, both of which are good indicators of contamination from human beings, are low enough to be at the ISO-SCC class -11 level for both clean chambers and cleanrooms. In addition to organic and inorganic monitoring, assessment of microbial contamination level is scheduled for the cleanrooms and clean chambers in this fiscal year.

References

[1] Yada T. et al. (2014) *Meteoritics Planet. Sci.* 49, 135-153. [2] Yada, T. et al. (2021) LPSC 52, #2008. [3] Yoshitake M. et al. (2021) JAXA-RR-20-004E, 1-30. [4] Sugahara H. et al. (2018) *Earth Planets Space* 70, 194. [5] Dworkin et al. (2018) OSIRIS-REx contamination control strategy and implementation. *Space Sci Rev* 214:9. [6] McLain et al. (2015) Contamination Knowledge Report JSC Curation Cabinets, personal communication.