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Extraterrestrial sample curation at JAXA: Handling fine particles and powders from small bodies

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The sample-return mission is an important step in exploring the Solar System. It will create opportunities for new discoveries in planetary science. Sample curation includes the process of managing scientific achievements in sample science by allocating samples to the community. At JAXA's curation facility, three asteroidal samples from Itokawa, Ryugu, and Bennu are stored. We also plan to receive regolith samples from Phobos, which will be returned by the MMX (Martian Moons eXploration) spacecraft. Since the curation of the Itokawa samples, the need to handle fine returned particles has re-emerged. First, NASA-allocated Bennu samples include fine grains (<100 μm) from the contact pad, which are intended to adhere to most surface grains of the Bennu asteroid. In addition to handling fine particles, powders composed of fine particles need to be curated. Also, the average grain size of regolith on Phobos is estimated to be several hundred micrometers. In this presentation, we will talk about the sample curation activity at JAXA, with a focus on fine (submicron to submillimeter) particle and powder samples.

Bulk Bennu samples and part of the grain-scale samples were characterized using instruments equipped with a clean chamber [1]. The samples were allocated to the community via Announcement of Opportunity (AO) and to the Ryugu Comparative Study (RCS) team. The tiny Bennu grains (10–100 μm) were picked up from the contact pad (ORX-09000) using a micro-tweezer [2]. These samples were catalogued (ORX-00001 to -00010) in the Bennu Sample Database. A portion of the samples was also allocated to the RCS sub-team.

The establishment of handling procedures for powdered samples should be required primarily for Phobos sample curation. To prevent sample scattering due to electrostatic effects, the UV source was introduced into the glovebox. In addition, polishing or blasting changes the micro-texture of the sample container surface, which may reduce adhesion of these fine powders during transport.

[1] Fukai et al. (2025) *Meteoritics and Planetary Science* **61 (1)** 3–16. [2] Tahara et al. (2025) *Meteoritics and Planetary Science* **61 (1)** 182–207.