Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.21485

Initial and advanced description of Bennu samples in JAXA curation

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Materials from primitive asteroids record the evolutionary history of the early Solar System. Diversities of physical and chemical compositions in asteroids provide key constraints on planet formation, planet migration, and late accretion. Pristine samples from the Cb-type asteroid Ryugu and B-type asteroid Bennu provide great opportunities to challenge these topics. JAXA will receive 0.5 % of bulk Bennu samples from NASA this year based on a Memorandum of Understanding. We plan to conduct the twofold examinations on Bennu samples at the curation facility – the initial description within N_2 clean chambers and the detailed description outside N_2 clean chambers. We then plan to publish the obtained data in the database, which members of the scientific communities can use to request samples via the Announcement of Opportunity. Also, we will develop the curation technique using the opportunity of Bennu sample curation, which can be applied to Phobos sample curation in the Martian Moons eXploration mission [1]. Bennu samples provide a great opportunity to push the boundary of developing analyses conducted at the JAXA curation facility. This will establish the foundation to study the Phobos sample.

We will observe the bulk and individual Bennu samples with visible and infrared spectrometers within the N_2 clean chamber. Infrared reflectance spectra of the Bennu samples will be obtained using a μFT-IR (wavelength: 2.0–13 μm) and MicrOmega (wavelength: 0.99–3.7 μm). We will confirm whether the band depth of OH-band (2.7–3.0 μm) between Ryugu and Bennu samples is different, as observed by the remote-sensing [2]. Visible and near-infrared band spectra of the samples will also be obtained through a flat glass window using a suite of cameras, a digital microscope with six band filters, and visible–infrared cameras (OROCHI). These two cameras will contribute to finding exogenous grains likely to be delivered from other asteroids, potentially included in the Bennu samples [3].

References: [1] Kuramoto, K. et al. (2022) *Earth, Planets and Space*, 74 (12). [2] Hamilton, V. E. et al. (2019) *Nature Astronomy* 3, 332–340. [3] DellaGiustina, D. N. et al. (2020) *Nature Astronomy* 5, 31–38.