

INITIAL DESCRIPTIONS OF ASTEROID RYUGU SAMPLES RETURNED BY HAYABUSA2.

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Introduction: As reported before, Hayabusa2 spacecraft brought asteroid samples recovered from a near-Earth C-type asteroid (162173) Ryugu on 6 Dec 2020, which were enclosed in a reentry capsule [1]. The sample container extracted from the capsule experienced a series of processes without exposing to terrestrial atmosphere and pebbles and sand particles were recovered from the Chamber A and C of the sample catcher, which is corresponding to those sampled in the first touch-down point (TD1) and the second touch-down point (TD2), respectively [2].

Initial description methods: The Ryugu samples have been maintained under a pure nitrogen of atmospheric pressure with dew point temperature less than -80 degree. Initial descriptions for Ryugu samples have been prepared under the same atmosphere. Among five individual clean chambers (CCs) for Hayabusa2 returned samples, CC4-2 is equipped with an optical microscope above the chamber, which enable us to observe the samples inside the chamber through its glass window. A visible spectral imager is also installed above the chamber to obtain images of the samples in five different bandwidths, which is comparable to ONC-T onboard Hayabusa2 spacecraft [3]. CC4-2 is also equipped with a balance inside the chamber, which can weigh samples from 0.1mg to 410g. Moreover, the chamber can attach an FT-IR sub-chamber aside, which can analyze infrared spectra of samples through a sapphire viewport of the sub-chamber. CC3-3 is equipped with a sub-chamber for MicrOmega analysis, which is an infrared spectral imager comparable to that onboard the MASCOT lander released from Hayabusa2 spacecraft, which is detailed in [4]. The samples recovered from the Chamber A and C of the catcher were encapsulated into three sapphire dishes for each of the chambers (corresponding to the three “bulk samples”), and experienced a series of initial descriptions mentioned above. Then particles of >1mm in size are handpicked one by one with a vacuum tweezers and moved to individual sample dishes, to be described with the same methods as the bulk samples.

Results: The results of the initial descriptions are gathered, set up and sited on a database prepared in Astro-material Science Research Group (ASRG) of JAXA. The database website will be ready to appear in public at the time of release of the first international Announcement of Opportunity (AO).

Sample distribution plan: Some part of the described samples will be firstly distributed to initial analyses team and phase2 curation teams in this June. 10% of the whole samples will be distributed to NASA based on Memorandum Of Understanding (MOU) between JAXA and NASA in this December. Some part of samples will be also distributed to phase2 curation oversea in the same timing as the NASA. Finally, samples will be distributed to international AO PIs in June 2022.

References: [1] Tachibana S. et al. (2021) *LPS XXXXXII*, Abstract #1289. [2] Yada et al. (2021). *LPS XXXXXII*, Abstract #2008. [3] Sugita S. et al. (2019) *Science* 364, 252. [4] Bibring J. -P. (2021), *this meeting*.