Description of return sample from C-type asteroid Ryugu using the MicrOmega hyperspectral microscope in JAXA Curation Facility

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Sample from C-type asteroid 162173 Ryugu has been returned by Hayabusa2, and now treated in the Hayabusa2 Curation Facility. One of the tasks in the facility is to characterize the sample and describe its feature as the sample catalogue for further analysis by the initial analysis teams, the second-stage curation activity, NASA sample curation, and the future AO researches. The MicrOmega is a hyperspectral microscope developed by IAS and applied to characterize the sample as bulk properties and as individual particles, with the wavelength range scanning from 0.99 to 3.65 μm using AOTF and with four visible to near infrared LEDs, and with the area of 5 x 5 mm square at the spatial resolution of 22 μm per pixel. The sample has to be kept in the clean chamber under an ultra-purified nitrogen condition to avoid from contamination by terrestrial materials and from exposure to the terrestrial atmosphere, while the instrument is mounted outside of the clean chamber. Therefore, the sample observation must be conducted through the sapphire window with the MicrOmega. During the observation, the instrument is kept at about 10 ℃ for stable operation. The specially developed sample holder is mounted on the XYZ-R stage in the clean chamber which can be cooled down to ~0 ℃ during the observation to reduce thermal radiation from the sample. The stage is moved in three directions in micron steps to adjust the surface of the sample at the focal position, and is rotated around 360 ˚to enable the observation from various directions, while the incident angle is 35 ˚and the emission angle is 0 ˚. The MicrOmega and the dedicated chamber with these functions has been setup, tested, and calibrated by the team from IAS and ISAS Curation Facility. Many kindes of scripts for the observations are used for the observations to detemine the suitable methods of analyis. The catalogue information will include the images obtained at several wavelengths, a few color ratio images, and the spectra of several specific areas, and some brief description from MicrOmega, along with the data from other measurements in the Curation Facility such as optical microscope, FTIR, and weighing. The status and performance of MicrOmega activity will be presented in more detail.

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