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Relative abundances of light elements between Ryugu and Ivuna.

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The returned samples from the asteroid Ryugu are the least weathered CI chondrite-like materials on Earth [1]. Here we report the preliminary results of in-situ quantitative isotope imaging of the Ryugu samples and the Ivuna CI carbonaceous chondrite.

Polished sections A0058-C1001 and C0002-C1001, prepared from samples from 1st and 2nd touchdown sites, respectively, were used. An Ivuna section was made by the same methods for the Ryugu sections. Isotope images were obtained by O^- primary ion beam with the isotope microscope system at Hokkaido University [2]. The analytical conditions and method are described in [3, 4]. Elemental ratios were calculated by normalizing the average values of output voltages of pixels of the SCAPS ion imager divided by the average of silicon in the same region for each isotope image after masking resin areas and cracks on the samples using ImageJ software. The calculation used 11, 37 and 40 images for the sections A0058-C1001, C0002-C1001 and Ivuna, totally 88,000, 296,000 and 320,000 μm^2, respectively.

Some isotope images of A0058-C1001 and Ivuna are shown in Fig. 1. All measured elements, except hydrogen and carbon, have higher ion intensities from the samples than the resin surrounding them, suggesting that contamination by resin could be negligible. The averaged elemental ratios with their variations (1SD) calculated from all measured areas of the Ryugu and Ivuna samples are shown in Fig. 2, The logarithmic plot shows that all analyzed elements (normalized by Si) have a good 1:1 correlation between Ryugu and Ivuna, suggesting light element abundances of the Ryugu sample are almost identical with those of Ivuna, although further data processing and evaluation of contamination are necessary.

References: [1] Yokoyama et al. (2022), *Science*, submitted. [2] Yurimoto et al. (2003) *Appl. Surf. Sci.* **203–204**, 793–797. [3] Sakamoto et al. (2022), *JpGU meeting*, submitted. [4] Tagawa et al. (2021), *Nat. Commun.* **12**, #2588.

Figure 1

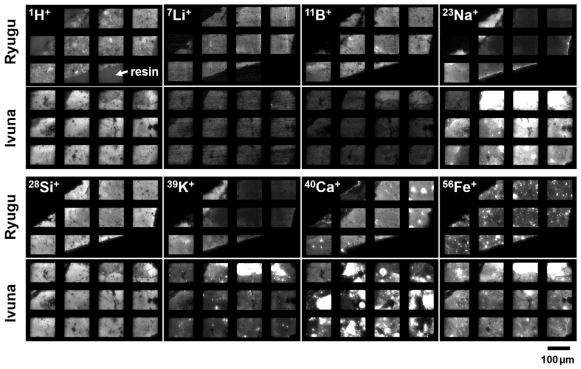

Figure 2