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The sequential analysis using different types of instruments is essential for small and precious sample. For example, Uesugi et al. (2014) proposed a coordinated analytical system for carbonaceous materials found in the Hayabusa returned samples, and successfully obtained maximum chemical, elemental and isotopic information in the materials using micro-Raman spectroscopy, FT-IR, XANES, ToF-SIMS, FIB, TEM/STEM and NanoSIMS. Part of this type of coordinated method has been applied to carbonaceous materials by Stardust cometary dust return mission (e.g., Sandford et al. 2006; Matrajt et al. 2008).
In this study, we focus on the development of coordinated FIB-SEM, NanoSIMS and TEM analysis to obtain the characteristics of isotopic compositions and mineral texture in fine-grained mineral assemblages in few tens to hundreds of micrometer-scale extraterrestrial samples. We, therefore, have chosen Antarctic micrometeorites as an analogue of Hayabusa 2 sample because of their size (10 to 800 μm) and characteristics in terms of isotopes and constituent minerals.
The sample we used in this study is a scoriaceous type micrometeorite, named TT006B101, collected at Tottuki in Antactica in 2000 (Iwata and Imae, 2002), and provided from Antarctic micrometeorite collection in National Institute of Polar Research. The TT006B101 is sphere with ~200 micrometer in diameter, and was mounted on the carbon-nanotube Gecko Tape (Nitto Denko corp.). First measurement by EPMA with EDS (JEOL JXA-8200) was carried out at NIPR for the sample to obtain elemental abundances and BSE image. We, then, prepared a cross-section of the sample (60 x 25 x 5 micrometer) using an FIB instrument (Hitachi SMI4050). The cross-section was transferred into the FIB-SEM instrument (Hitachi SMJ4000L equipped with Oxford X-max150 EDS and Oxford NordlysNano EBSD). Mineral phases of olivine, magnetite and silicate glass were identified by EDS spectra and EBSD patterns on the sample surface. We have applied a rastered ion imaging by the JAMSTEC NanoSIMS 50L to investigate distributions of O isotopes on a part of the sample. All mineral phases showed homogeneous distributions of terrestrial O isotopic ratios. After the O isotopic imaging, we determine the detailed mineralogy and microstructure of the same area that we acquired O isotope map to gain insight into its petrogenesis by TEM (JEOL ARM-200F equipped with EDS) followed by FIB treatment to prepare an ultra thin section (20 x 25 x 0.1 micrometer). We confirmed three different mineral phases that was determined by SEM-EDS system exist in the thin section by mineralogical and crystallographic observation by TEM.
In this talk we will discuss about detailed analytical conditions and results of another micrometeorites (ie., smaller size of ~50 micrometer, unmelted type), and perspective to the Hayabusa 2 sample analysis.

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