Coordinated NanoSIMS and iMScope analyses for extraterrestrial organics in Murchison matrix.

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Carbonaceous chondrites contain a variety of extraterrestrial organic molecules (e.g., Sephton and Botta, 2005). Chemical, structural and stable isotopic characteristics in those organics suggest that several environments (the interstellar space, the solar nebula and the meteorite parent body) may have contributed to the formation of organics (Sephton, 2002). Therefore, it is important to know spatial distributions of these orgcanics in the host mineral matrix, and relationship to the isotopic compositions of H, C and N.

Simon and coworkers reported the coordinated chemical and isotopic *in-situ* measurements in a carobonaceous chondrite (Simon et al., 2014). They developed the JSC μ-L^{2}MS instruments to obtain chemical map of organics whthin the sample. Using the capability, they succesfully acquire chmical image (m/z ~ 15 to 250) in the CM2 Bells chondrite together with C and N isotope maps obtained by NanoSIMS in the same region.

In this study, we plan to perform the coordinated NanoSIMS (isotopes) and iMScope (chemistry) study for Murchison CM chondrite to acquire spatial distributions of H, C and N isotopes and chemistry in spatially distributed organics in the chondrite. We carried out chemical imaging in the Murchison matrix using the Shimadzu iMScope imaging mass microsope that allows us to identify and visualize the spatial distribution of organic molecules. We obtained organics chemistry maps (#a: 380 x 320 and #b: 800 x 800 μm^2) with a spatial resolution of ~5 μm and m/z = 50 to 800. Chemical map shows that organics were widely spreaded within the Murchison matrix. Several hots spots, ranging from 50 μm to 200 μm and with m/z ~ 93 and 149, were found in the matrix #b . We analyzed selected mass peaks using a Kendrick Mass Defect method (e.g., Schmitt-Kopplin et al., 2010) to arrange the diverse compositions with common repeat units, e.g., CH_2 and COO, and determined possible structures of organics from selected mass peaks. We will performe a NanoSIMS imaging to acquire H, C and N isotopic compositions in selected hot spots, and then will show a relationship between isotopes and chemical formula (structure) in the conference.