

## ORGANIC MATTER INCLUSIONS IN CM2 CHONDRITE MURCHISON

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**Introduction:** large (up to ~10  $\mu\text{m}$ ) inclusions of pure organic material have previously been found in CR chondrites QUE 99177 (CR3) and GRA 95229 (CR2) [1]. The inclusions were found to be enriched in  $^{15}\text{N}$  and D, consistent with enrichments of bulk IOM in CR chondrites [2]. The XANES spectra of thin cross-sections of these organic inclusions varied between samples, indicating differences in the carbon and nitrogen chemical bonding environment. Finally, at least one large inclusion was shown to be filled with a large number of nanoglobules [3]. Those previous experiments were performed only on CR chondrites, the most primitive (unaltered) group of carbonaceous chondrites. Here we continue the experiments and include the more aqueously altered CM2 chondrite Murchison.

**Experimental:** we used our nanosIMS to image a  $200 \times 100 \mu\text{m}$  polished section of the Murchison meteorite in  $^{12}\text{C}$ ,  $^{13}\text{C}$ ,  $^{14}\text{N}$ , and  $^{15}\text{N}$ . From these maps we identified three carbon-rich and  $^{15}\text{N}$ -enriched targets. Cross-sections of the inclusions and surrounding matrix were extracted from the meteorite using a FIB with micromanipulator. The results of XANES spectroscopy performed at the National Synchrotron Radiation Research Center (Hsinchu, Taiwan), TEM imaging, and nanosIMS imaging of the FIB sections will be discussed and compared to previous results of the CR chondrites.

[1] Z. Peeters, H. G. Changela, R. M. Stroud, C. M. O'D. Alexander, and L. R. Nittler. *Meteoritical & Planetary Science*, 2012, 47:A5283.

[2] C. M. O'D. Alexander, M. L. Fogel, H. Yabuta, and G. D. Cody. *Geochimica et Cosmochimica Acta*, 2007, 71(17):4380–4403.

[3] Z. Peeters, H. G. Changela, R. M. Stroud, C. M. O'D. Alexander, and L. R. Nittler. In *LPS XLIII*, 2012, A2612.