# Correlated analyses of D- and 15N-rich carbon grains from CR2 chondrite EET 92042

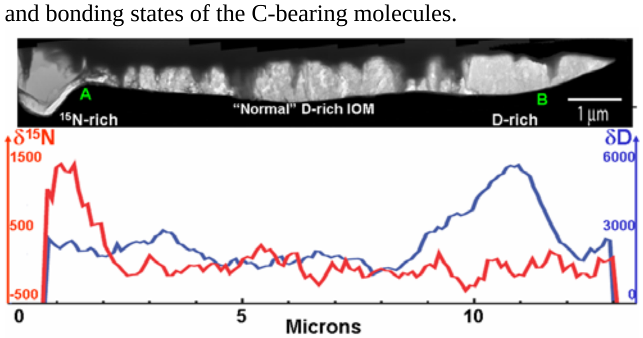
Conference or Workshop Item

# CORRELATED ANALYSES OF D- AND $^{15}$N-RICH CARBON GRAINS FROM CR2 CHONDRITE EET 92042.

H. Busemann[1], C. M. O'D. Alexander[1], L. R. Nittler[1], T. J. Zega[2], R. M. Stroud[2], S. Bajt[3], G. D. Cody[4] and H. Yabuta[4]. [1]DTM, Carnegie Institution of Washington DC. [2]Naval Research Laboratory Washington DC, [3]Lawrence Livermore National Laboratory, Livermore CA, [4]GL, Carnegie Institution of Washington DC, USA. (busemann@dtm.ciw.edu)

**Introduction:** Insoluble organic matter (IOM) and matrix from primitive carbonaceous chondrites carry isotope enrichments (δD≤20000‰, $\delta^{15}$N≤3200‰) that are comparable to those in interplanetary dust particles [1, this work]. Hence, primitive organics that formed in the protosolar cloud (PSC) – or maybe in the cold outer regions of the protoplanetary disk – survived accretion and planetary processing on the asteroids, the parent bodies of the chondrites. Most D and $^{15}$N anomalies are spatially uncorrelated, indicating that distinct processes produced them. While various reactions in the PSC can account for the D enrichments [2], the $^{15}$N anomalies cannot be explained by existing models [3]. Alternative mechanisms, possibly within the solar system [4], have to be considered. Identifying the isotopically anomalous carriers will help to understand the earliest evolution of organic matter from PSC to the solar system.

**Results:** SIMS analyses of CR2 chondrite EET 92042 IOM [5] revealed two isotopically anomalous, micron-size discrete carbon grains ("A" with $\delta^{13}$C~–113‰ and $\delta^{15}$N ~1150‰; "B" with δD~6000‰, Fig.). Grains and intermediate IOM (δD ~2200‰) were thinned and extracted by FIB-SEM [6] and examined by transmission electron microscopy (Fig.). EDS and electron diffraction patterns show that all analyzed matter is C-rich and amorphous. $^{15}$N-rich grain A is monolithic C with trace Si; D-rich grain B is porous organic C with traces of Si and S. The intermediate IOM is also porous organic C and contains nm-size Fe-Ni, chromite and Ca-rich grains. C- and N-XANES spectroscopy proves the hydro-carbonaceous, non-graphitic character of the IOM and indicates distinct N bonding states for grains A and B. On-going EELS, NanoSIMS, and synchrotron IR microspectroscopic analyses will characterize the isotopic compositions of additional elements, and the chemical structural variation and bonding states of the C-bearing molecules.

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