COMPARISON OF FINE GRAINED MATRIX IN PRIMITIVE METEORITES.

E. Vaccaro[1,3], P. J. Wozniakiewicz[1,2], N. A. Starkey[3], I. A. Franchi[3], S. S. Russell[1,3]. [1]Dept of Earth Sciences, Natural History Museum, London, UK. E-mail: e.vaccaro@nhm.ac.uk. [2]Sch. Phys. Sci., Univ. of Kent, UK. [3]Planetary & Space Sciences, Open University, Milton Keynes, UK.

Introduction: Unaltered carbonaceous chondrite (CC) matrix is a mixture of fine-grained materials, thought to sample dust from the protoplanetary disk. It is therefore considered to be among the most pristine extra-terrestrial material available to study [1]. A study of selected matrix regions of the primitive carbonaceous chondrites: Acfer 094 (C2-ung.), ALHA77307 (CO3), MIL 07687 (C3-ung.) and QUE 99177 (CR2) has been performed in order to explore the grain size distribution, mineralogy and O isotopic composition within individual meteorite matrix components. This can provide insight into matrix components from bulk specimens to better understand the precursor material within the solar accretionary disk, and the processes affecting it during the earliest stages of Solar System formation.

Methods: High-resolution (BSE) maps were acquired for selected regions of matrix, using the Zeiss Ultra Plus FEG-SEM, and EDX element maps were also acquired using FEI Quanta 650 SEM with an innovative XFlash QUAD 5060F Bruker detector with capability for low kV, high spatial resolution, mapping. Measurements of O-isotopic composition of matrix regions were performed using the Cameca NanoSIMS 50L ion probe at The Open University (for details see [2]). Each area was extensively pre-sputtered (e.g. ≈ 35×35 μm with a 300pA probe for 15 minutes) prior to analyses of 25×25 μm areas with a ≈ 1.6pA primary probe current.

Results and discussions: Our data acquired by high resolution element and image maps show differences in the relative abundances and size distribution of silicate and metal/sulfide grains in the matrix of different meteorites. The oxygen isotopic investigation carried out on the same matrix regions, for samples: ALHA77307, MIL 07687, and QUE 99177, appear to be more similar to values previously reported for IDPs [e.g. 2-4], than those of bulk meteorites [5], having shown values ranging from $\delta^{17}O$, $\delta^{18}O$ = -7.4(±11.4 (2σ)), -22.3(±5.0) to 25.7 (±3.9), 25.0 (±1.7). We will discuss how the observed differences between these matrix components may be evidence of parent body processes (e.g. aqueous alteration) and/or protoplanetary disk processes.

References: [1] Buseck P. R. 1993. *Annu. Rev. Earth Planet. Sci*. 21:255-305. [2] N.A. Starkey et al. 2014. *Geochimica et Cosmochimica Acta* 142:115–131. [3] Nakashima et al. 2012. *Meteoritics & Planetary Science* 47:197–208. [4] J.Aleon et al. 2009. *Geochimica et Cosmochimica Acta* 73: 4558–4575. [5] Clayton et al. 1999. *Geochimica et Cosmochimica Acta* 63:2089-2104.