PETROLOGY OF A GRANITIC CLAST IN POLYMICT UREILITE EET 83309. H Downes[1,2], A D Beard[1] and K Howard[2]. 1: Birkbeck/UCL Research School of Earth Sciences, Birkbeck, University of London, Malet St, London WC1E 7HX, U.K. E-mail: h.downes@ucl.ac.uk. 2: Department of Mineralogy, Natural History Museum, Cromwell Rd, London, UK

Introduction: EET87720 is a polymict ureilite breccia showing a cataclastic aggregate dominated by rounded clasts of large olivine, up to 3mm in diameter, plagioclase and minor amounts of low-Ca pyroxene with traces of Ni-rich iron, troilite, suessite and graphite set in a clast-supported matrix of finer mineral clasts. Here we report the first occurrence of a granitic clast in an interior chip of EET87720.

Results: The granitic clast is approximately 550 x 850 µm in size (0.5 mm^2) consisting of quartz, albite (Ab_{89-93}) and oligoclase. The oligoclase occurs as a large (150 x 225 µm) euhedral strongly zoned phenocryst (core = $Ab_{73;}$ rim = Ab_{91}). Quartz and albite occur as a granophyre-like intergrowth (150-200µm) mantling the oligoclase phenocryst. In the intergrowth, quartz occurs as thin elongated vermicular blebs, with an average diameter of 5-10 µm and up to 100-120 µm in length within larger albite crystals. Outside the intergrowth quartz and albite occur as anhedal crystals up to 150µm in diameter. The quartz is slightly impure containing up to 1.3 wt.% Al_2O_3 and 0.2 wt.% Na_2O. Although the normal granophyre mineralogy of K-feldspar and quartz does not occur within this granitic clast, the texture is very similar to that of terrestrial granophyres. The granophyre-like intergrowth and the oligoclase phenocryst share a common margin, suggesting the granitic clast was part of a larger fragment. An estimate of bulk composition reveals that the clast is an alkali granite.

Origin of the granitic clast: Although granite is abundant in the Earth's crust, it is thought to be rare on other planets. It is also extremely rare as lithic clasts in brecciated meteorites, being only reported in a few meteorites (e.g. four granite clasts in the LL3-6 chondritic breccia Adzhi-Bogdo [1]) and as small inclusions in returned Apollo samples [2,3]. The formation of granitic magma on Earth can occur in several ways. Firstly, anatexis of pre-existing silica-rich feldspar-bearing material, such as terrigenous sediments, schists and felsic gneisses, can produce a eutectic partial melt with a granitic composition. This case is unlikely to be responsible for the origin of the granite clast described here, since it requires a sedimentary cycle that probably involves water. Alternatively, granites can be produced by extensive fractionation of a basaltic magma, or partial melting of igneous rocks. Since EET87720 is from the Antarctic, it is highly unlikely that the granite clast could have been derived by contamination from the terrestrial environment. Its presence in the regolith of an achondrite asteroid indicates that granitic material was present on bodies that were involved in collisions early in solar system history.

References: [1]. Bischoff et al, 1993. Meteoritics 28, 570-578. [2] Warren et al., 1983. EPSL, 64, 175-185. [3] Rutherford et al., 1976. Proc. 7th Lunar Sci Conf., 1723-1740.