CHARACTERIZATION OF MATRIX IN THE EET92042 CR2 CARBONACEOUS CHONDRITE: INSIGHTS INTO TEXTURAL AND MINERALOGICAL HETEROGENEITY

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Introduction: CR2 chondrites are a group of primitive carbonaceous chondrites that record a variety of early solar system processes. In particular, the CR2 chondrites show varying degrees of aqueous alteration, that has affected fine-grained matrices and, to a lesser extent, chondrules [1,2]. At present our understanding of the effects of progressive aqueous alteration on the mineralogy of CR matrices is incomplete. Here we report preliminary SEM and EPMA results of matrix in EET92042, a CR chondrite that has not been studied in detail.

Results: SEM studies show that, like other CR chondrites, EET 92042 is a breccia [1]. Mineral and lithic fragments are common in some regions of the matrix and dark inclusions (DIs) also occur. The matrix shows considerable textural and mineralogical heterogeneity from region to region. Most areas of matrix are similar to other CR matrices [2,3,4], indicated by fine-grained magnetite framboids and platelets, calcite and sulfides (~1-5 m). These phases are embedded within a groundmass that is too fine-grained to resolve in detail by SEM, but may consist of phyllosilicates. These areas of matrix are textural distinct from fine-grained rims that are present on some chondrules. Other regions of the matrix of EET92042 are dominated by relatively coarse-grained materials that show a distinct preferred alignment. Observations from one DI show that it is finer-grained than the host meteorite, with only minor magnetite, but relatively abundant calcite. The boundary between the DI and the host chondrite matrix is gradational in character. EMPA analyses show the DI has essentially the same major element composition as the matrix, consistent with the results of [4,5]. However, fine-grained rims are notably lower in Mg, S and Ni than either typical regions of matrix or the DI.

Discussion: These studies show that matrix in EET92042 is textural and mineralogical complex and has been affected by a number of different processes. First, it is clear that there are primary heterogeneities in the matrix composition. For example, fine-grained rims are texturally and compositionally distinct from adjacent matrix and these differences have been preserved during aqueous alteration. Second, the effects of brecciation/shock have caused significant modification of the matrix, at least on a localized scale, as indicated by the local fabrics, particular around chondrule boundaries. Brecciation has also formed regions of matrix that are highly clastic in character. Although there are distinct regions of matrix in EET92042, there are no clearly defined boundaries between one type of matrix and another. It is possible that some of the heterogeneity is the result of fine-scale regolith mixing of clasts of CR-related materials that have experienced different degrees of alteration, but if this is the case, then the boundaries between these clasts have been obscured by some later process, such as continued aqueous alteration and/or brecciation that resulted in final lithification of the meteorite.

References: [1] Weisberg, et al. (1993). *GCA* **57**, 1567-1586. [2] Ichikawa, O. and Ikeda, Y. (1995). *Proc. NIPR Symp. Antarct. Meteorites* **8**, 63-78. [3] Krot et al. (2002). *MAPS* **37**, 1451-1490. [4] Zolensky, et al. (1993). *GCA* **57**, 3123-3148. [5] McSween and Richardson (1977). *GCA* **41**, 1145-1161.

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