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An Amoeboid Olivine Aggregate in LEW 85300

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Introduction: Amoeboid Olivine aggregates (AOAs) are irregularly shaped objects commonly observed in carbonaceous chondrites. Because they are composed of fine-grained olivine and Ca-Al-rich minerals, they are sensitive indicators for nebular process and parent body alteration of their parent bodies [e.g.,1].

Recently an AOA was found in a carbonaceous clast in polymict eucrite LEW 85300 [2]. The bulk major element composition of the clast matrix in LEW 85300 suggests a relation to CM, CO and CV chondrites, whereas bulk clast trace and major element compositions do not match any carbonaceous chondrite, suggesting they have a unique origin [3]. Here we characterize the mineralogy of AOA in LEW 85300 and discuss the origin of the carbonaceous clasts.

Results and Discussion: The AOA is located in an impact melt vein. Half of the aggregate shows recrystallization textures (euhedral pyroxene and molten metal/FeS) due to impact melting, but the remaining part preserves the original texture. The AOA is composed of olivine, FeS and Mg,Al-phyllosilicate. Individual olivine grains measure 1-8 µm, with Fe-rich rims, probably due to impact heating.

Olivines in the AOA are highly forsteritic (Fo_{95-99}), indicating that the AOA escaped thermal metamorphism [4]. Although no LIME (Low-Fe, Mn-Enriched) olivine is observed, forsterite composition and the coexistence of Mg,Al- phyllosilicate suggest that the AOA is similar to those in the Bali-type oxidized CV (CV_{oxB}) and CR chondrites. However, it should be noted that fayalitic olivine, which commonly occurs in CV_{oxB} AOA, is not observed in this AOA. Also, the smaller grain size (<8 µm) of olivine suggests they may be related to CM or CO chondrites. Therefore, we cannot exclude the possibility that the AOA originated from a unique carbonaceous chondrite as suggested by [3].

REFERENCES: [1] Krot A. N. et al. (2004) *Chem. Erde,* 64, 185-282. [2] Shirai N. et al. (2016) *EPSL*, 437, 57-65. [3]

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