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Mineralogical chondrule zonation in ordinary chondrites

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Most chondrules (ca. 75%) in carbonaceous and Rumuruti chondrites consists of an olivine core, surrounded by a low-Ca pyroxene rim [1]. We study the appearance, abundance and distribution of these zoned chondrules in all groups of ordinary chondrites (OC). Weak to strong poikilitic low-Ca pyroxene rims of varying thickness enclose the olivine-dominated core in 35% out of the 230 studied chondrules. Mineralogical zoned chondrules are, therefore, typical in OC, although significantly less abundant compared to the 75% mineralogically zoned chondrules in carbonaceous chondrites.

Low-Ca pyroxene rims most probably formed by substantial material exchange between the molten chondrule with the surrounding gas, i.e. chondrules acted as an open system [1, 2]. This represents a fundamentally important process during chondrule formation and supports the findings from complementarity that chondrules and matrix formed from the same chemical reservoir [e.g. 1, 3].

[1] Friend, P. et al. (2016) GCA 173, 198–209. [2]

Chaussidon, M. et al. (2008) GCA 72, 1924–1938. [3]

Hezel, D.C. et al. (2008) E & Pl. Sc. Letters 265, 716–725.

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