ULTRA-RAPID CHONDRITE FORMATION BY HOT CHONDRULE ACCRETION? EVIDENCE FROM UOC´S

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Introduction: Most unequilibrated ordinary chondrites (UOC´s) appear to be processed rocks, affected by post-accretional mechanical processes that led to abrasion, fragmentation, relocation and mixing of their constituents. This can be concluded from the brecciation textures of many UOC´s [1], and the existence of components with aberrant chemical compositions [2] and shock stages [3]. Additionally, many obviously unbrecciated UOC´s may represent "hidden" breccias [4], consisting of mixtures of components with different provenience and history. Hence, the search for mechanically unaltered relicts of the very first stages of chondrite accretion is a crucial task. In my view, those relicts are actually present in UOC´s. They have been sporadically described in the literature as units with close-fit textures of mutually indented chondrules and are interpreted as the result of collisions between hot and thus plastic chondrules [e.g. 5-9].

Results: I found that these textures are restricted to a specific type of chondritic rock which occurs in several UOC´s as lithic clasts up to 10 cm in size. This rock type consists of a mixture of deformed and undeformed chondrules and is characterized by low abundances of interchondrule matrix, low abundances of distinct chondrule fragments, and restricted variations of chondrules sizes. In order to distinguish this rock type from other chondritic lithologies I propose to name it "cluster chondrite". In order to quantify the above textures I measured the degree of deformation for 188 chondrules in 3 cluster chondrite clasts from 3 brecciated UOC´s (NWA 869, L3-6; NWA 1756, LL3.10; NWA 5205, LL3.2). This parameter is defined as the ratio of the measured chondrule perimeter and the calculated circle perimeter of the corresponding chondrule area in a thin section. Despite considerable data scatter a characteristic inverse correlation between the apparent size (area) of chondrules and their degree of deformation is observed. The meaning of this finding remains to be explained. For comparison, 53 chondrules from a "regular" UOC (NWA 4572, LL3.6) have been measured in the same way and in this case the described inverse correlation is missing.

Conclusions: Clasts of cluster chondrites seem to represent remnants of primary accretionary rocks of unknown original dimensions. They seemingly formed by concentration, collision and instantaneous compaction of hot and plastic chondrules within hours to a few days after chondrule forming events. Chondrule deformations seem to result from chondrite accretion, not from post-accretional processes, as advocated by [10]. The fact that clasts of these rocks occur in many UOC´s may indicate that ultra-rapid chondrite accretion immediately after chondrule formation has been a widespread process in the protoplanetary disk.

References: [1] Bischoff A. et al. 2006. In: *Meteorites and the Early Solar System* II:679-712. [2] Scott E.R.D. 1984. *Smithsonian Contributions to the Earth Sciences* 26:73-93. [3] Stöffler D. 2011. Personal communication [4] Romstedt J. and Metzler K. *Meteoritics* 29, 523-524. [5] Hutchison R. and Bevan A.W.R. 1983. In *Chondrules and Their Origins*:162-179. [6] Taylor G.J et al. 1983. In *Chondrules and Their Origins*:262-278. [7] Holmén B.A. and Wood J.A. 1986. *Meteoritics* 21:399. [8] Hutchison R. 1996. 27th *Lunar and Planetary Science Conference*:579. [9] Zanda B. 2004. *Earth and Planetary Science Letters* 224:1-17. [10] Rubin A.E. and Brearley A.J. 1996. *Icarus* 124, 86-96.