XENOLITHS IN CARBONACEOUS AND ORDINARY CHONDRITES

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Introduction: Xenoliths in meteorites are rock fragments of different lithologies genetically not related to the host rock [1]. In this study we systematically searched for xenoliths in primitive carbonaceous and ordinary chondrites in order to find: (1) fragments of known meteorite classes, but occurring as exotic clasts in other chondrite classes, (2) materials with mineralogical and textural properties of chemically unprocessed material, (3) unknown or unusual materials, and (4) igneous-textured lithologies that clearly underwent differentiation processes.

Results: The investigated samples include 26 thin sections of 23 carbonaceous chondrites and 31 thin sections of 23 ordinary chondrites. Xenoliths are present in Acfer 114 (CR2), Sahara 98645 (H3), Dhajala (H3.8), Tanezrouft 039 (L3), Sahara 98035 (L/LL3), Adrar 003 (L/LL3.1), and Krymka (LL3.1).

In *Acfer 114* an optically dark fragment was found and interpreted as a clast of primitive accretionary material consisting predominantly of olivine grains with varying chemical compositions different to olivines in the Acfer/El Djouf host meteorite [2]. The xenolith in *Sahara 98645* has affinities to CI and CM chondrites. The fragment largely consists of fine-grained phyllosilicate-rich matrix. Coarse-grained constituents include several pyrrhotites, minor amounts of pentlandite and troilite, some small clusters of framboidal and isolated magnetites, carbonates (mainly dolomite), and some olivine and pyroxene grains. The *Dhajala* meteorite comprises a fragment that mainly consists of an extremely fine-grained and porous matrix in which several multiphase-aggregates and rounded objects are embedded. The rounded objects show diameters of 10–30 µm and are very similar to the "accretionary objects" found within the fine-grained fragment BK13 in the Krymka LL3.1 chondrite [3]. Within *Tanezrouft 039* (L3) an LL-chondritic xenolith was found. Another fragment in the same thin section predominantly consist of a kind of Fe,Ni-metal groundmass in which chemically almost homogeneous low-Ca-pyroxenes, sulfides, unidentified Fe-oxides, silica and feldspar is embedded. Olivine is completely absent. The mineral assemblage and the texture of the clast lead to the assumption that this fragment might originate from a mesosideritic parent body. *Sahara 98035* contains an extremely fine-grained fragment with several unusual multi-phase aggregates and very few microchondrules. In addition Kakangari chondrite-like xenoliths were found within the *Adrar 003* and the *Krymka* meteorite.

Future investigations by transmission electron microscopy and secondary ion mass spectrometry will allow to clearly define the origin of some of the observed xenoliths.

References: [1] Bischoff et al. 2006. In *Meteorites and the Early Solar System II.* Edited by Lauretta D. S. and McSween H. Y., pp. 679-712. [2] Bischoff et al. 1993. *Geochimica et Cosmochimica Acta* 57:1587-1603. [3] Semenenko et al. 2001. *Meteoritics & Planetary Science* 36:1067-1085.