NATIVE SILVER IN A METEORITE

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Native silver was found in a cavity in a polished section of the Krymka chondrite as round micrometric grains and dendritic-like agglomerates. To our knowledge, this is the first time this mineral is found in a meteorite. The grains are located within pores in Fe,Ni,S-hydroxides, on the bottom and walls of the cavity. The Fe,Ni,S-hydroxides belong to wethering products of a remelted metal-troilite rim around a porphyritic olivine chondrule. Like for terrestrial native silver, the grains and aggregates are characterized by an extremely high brightness in optical and scanning electron microscopy. Their secondary electron images indicate a very fine globular structure. The highest measured Ag content by means of EDS, is 95.6 wt. %. Because of the small sizes of the grains, the other elements detected reflect contamination by the surrounding Fe,Ni,S-hydroxides. Very thin inclusions of silver, less then 0.1 μm in size, are found within the rim of Fe,Ni,S-hydroxides around the cavity. In addition a few grains of olivine, Ca-pyroxene and 3 micrometric, hexagonal crystals of corundum (99.6 wt. % Al_2O_3) were observed on the bottom of the cavity.

Based on the tight association of the native silver grains with the Fe,Ni,S-hydroxides, their formation is most probably the result of weathering of the metal-sulfide remelted rim as it is the case within oxidation zones of terrestrial sulfides [1, 2]. This data allows us to speculate on the possible condensation origin of Ag-bearing pristine minerals, for example nickel iron and/or iron sulfides [3, 5], accreated on the chondrule surface from a dusty environment. The presence of euhedral crystals of corundum is the second important feature of the studied object. Without isotopic data it is not possible to determine their origin. Did they formed as a result of weathering, as is typical for terrestrial corundum, or did they condense in the solar nebular or a circumstellar environment? Taking into account that presolar corundum has been chemically separated from Krymka and isotopically characterized [4], the presolar nature of both the corundum crystals and an Ag-bearing precursor of the native silver in the polished section is not excluded.

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