CARBONACEOUS XENOLITHS FROM THE KRYMKA CHONDRITE AS PROBABLE COMETARY MATERIAL.
V.P. Semenenko[1,2], E.K. Jessberger[2], M. Chaussidon[3], I. Weber[2], C. Wies[2] and T. Stephan[2]. [1]Institute of Environmental Geochemistry, NAS of Ukraine, Kyiv-142, 03180 Ukraine, [2]Institut für Planetologie, 48149 Muenster, Germany, [3] CRPG-CNRS, Vandoeuvre-lès-Nancy, France

Campins and Swindle [1] using results from the Halley missions [2] discussed the expected characteristics of cometary meteoritic material. They suggested that among any known type of meteoritic material, carbonaceous xenoliths from the Krymka LL3.1 chondrite [3-6] are the most probable candidates to be of cometary origin.

Here we present the results of mineralogical, chemical and isotopic study of two Krymka carbonaceous xenoliths. One of them (K1) is known from a previous investigation [5, 6] and the second one (K3) is new. Occurrences of organic material and graphite microcrystals within xenolith K1 allowed to propose a metamorphic origin of graphite from organic compounds [6].

The xenoliths resemble each other and correspond chemically to C-chondrites. They differ, however, from the Krymka host by low totals of the bulk composition, higher Fe-content, higher FeO/(FeO+MgO) ratio, higher S and Ag contents, lower abundance of chondrules, and occurrence of carbon in three different forms: graphite, carbon-rich material, and organic compounds.

The structural order of graphite crystals is directly correlated to the grade of metamorphism of carbonaceous material [7]. TEM-studies show that graphite from K1 is well crystallized. These data strongly support the conclusion from the mineralogy on the metamorphic nature of graphite [6]. The presence of molten troilite, the moderately high dislocation density in olivine, the coexistence of ortho- and clinoenstatite lamellae, and the superstructure of FeS indicate shock metamorphism, which had promoted [7] the metamorphic processing of the carbonaceous material.

O-isotopic data attest that most of the xenolitic silicates have the same isotopic composition ($\delta^{18}O \geq 5.9‰$; $\delta^{17}O \geq 3.8‰$). Except a unique amoeboid olivine inclusion ($\delta^{18}O \leq -19.4‰$; $\delta^{17}O \leq -23.6‰$), the main textural components of K1 are genetically interrelated and represent different stages of transformation of isotopically identical silicate material. K1 is very similar to the Krymka graphite-containing fragments [8, 9] in mineralogy, chemistry and the C-isotopic composition of its graphite ($\delta^{13}C \approx 0‰$) although differs by a lower grade of metamorphism.

Most features of the studied xenoliths are in a good agreement with expected characteristics of cometary material [1]. Some distinctions may be explained by low metamorphic processing probably due to lithification of the xenoliths or shock metamorphism of the Krymka parent body. We propose that carbonaceous materials of the xenoliths accreted in an environment, which was rich in organic compounds, i.e., in highly volatile elements. These results testify that the precursors of the studied objects might be genetically related to cometary material.

Acknowledgement: This work was supported by INTAS grant 93-2101 and by the German Research Foundation (436UKR).

References: [1] Campins H. and Swindle T.D. (1998) *MAPS 33,* 1201-1211. [2] Jessberger E.K. (2000) In Proc. *The Origin and Comp. of Comet. mater.,* 91-97. [3] Higuchi H. et al., (1977) *GCA 41*, 843-852. [4] Grossman L. et al., (1980) *GCA 44*, 211-216. [5] Semenenko V.P. et al., (1991) *Geochimiya 8,* 1111-1121. In Russian. [6] Semenenko V.P. (1996) *MAPS 31,* A126-127. [7] Buseck P.R. and Bo-Jun H. (1985) *GCA 49,* 2003-2016. [8] Semenenko V.P. and Girich A.L. (1998) *MAPS 33,* A141. [9] Semenenko V.P. et al (1998) *MAPS 33,* A141-142.