

**MINERAL CONDENSATES IN BLACK LITHOLOGY OF CHELYABINSK CHONDRITE**

V.V. Sharygin<sup>1</sup>, V.I. Grokhovsky<sup>2</sup>, G. A. Yakovlev<sup>2</sup>. <sup>1</sup>V.S. Sobolev Institute of Geology and Mineralogy, SB RAS, Novosibirsk, 630090, Russia; <sup>2</sup>Institute of Physics and Technology, Ural Federal University, Ekaterinburg, 620002, Russia. E-mail: grokh47@mail.ru

**Introduction:** The Chelyabinsk LL5 chondrite fell on February 15, 2013. The meteorite was shattered to a huge amount of fragments weighted from 0.1 g and up to 650 kg (the main body found in the Chebarkul lake). All fragments have different lithology; slightly shocked light-colored lithology is abundant and melted black-colored lithology is minor and has two visible zones: entirely molted gray zone and partially melted black one [1-3]. The study of the relatively big pieces from the main body is of interest, because the mutual position of various lithologies represents unique opportunity for explanation of origin, history and structural feature of the meteorite.

**Experimental:** Some fragments of the Chelyabinsk meteorite were lifted up from the Chebarkul lake bottom. They were sawn and polished. Prepared samples were examined using inverted optical microscope Axiovert 40 MAT, TESCAN MIRA 3MLU SEM with EDS system and FE SEM Sigma VP with EDS and EBSD systems.

**Results and Discussion:** Extensive areas of completely remelted matter were observed in gray zones of the black-colored fragments. Rounded and shrank vugs (up to 5 mm) with idiomorphic minerals on the walls were found in these areas. Mineral phases were possibly formed by the gas condensation. Numerous vugs are mainly common in the gray and black zones. They were caused by shrinkage phenomena during impact melting and further rapid crystallization in extraterrestrial conditions. Some vugs contain skeletal crystals of metal (mainly taenite) covered by troilite and octahedra of chromite. Rare vugs are completely filled with metal+troilite aggregate. Individual euhedral crystals of olivine, chromite and taenite have been found in other cavities, whereas troilite is a late mineral and rarely occurs as crystals forming aggregates with specific growth zones. It is worth to note that dendritic or skeletal metal crystals are specific structure and have peculiar relief of the surface. The same features were observed earlier on the surface of lunar soil particles which were formed as condensates by VLS mechanism [4].

**Acknowledgement:** This work was supported in part by the RFBR (grant № 15-35-21164 mol\_a\_ved) and by the grant of "OPTEC" company for young scientists.

**References:** [1] Popova O.P. 2013. Science, vol. 342, № 6162:1069-1073. [2] Kohout T. et al. 2014. Icarus, 228:78-85. [3] Badyukov D.D. et al. 2015. Petrology, vol. 23, 2:103-115. [4] Carter J.L. 1973. Science, vol. 181, №4102:841-842.