

ABOUT MACKINAWITE INCLUSIONS IN GROSSULAR CRYSTALS AT THE TALNAKH (MT. OTDEL'NAYA) ACHTARANDITE LOCALITY

Maria S. Alferova

Fersman Mineralogical Museum, RAS, Moscow, alferova@fmm.ru

The discovery of mackinawite in paragenesis with magnesio-chromite within inclusions in grossular garnet at the Otdel'naya mountain locality of achtarandite in the Talnakh region is described. An occurrence of the mackinawite is an evidence of the low-temperature conditions of the achtarandite mineral association formation.

1 figure, 3 references.

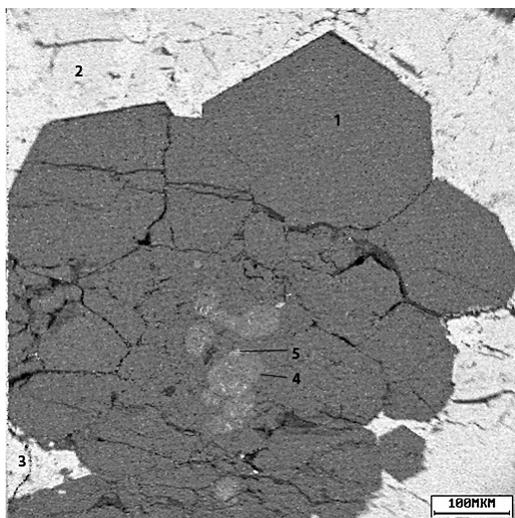
Keywords: mackinawite, grossular, prehnite-pumpellyite facies, low-grade metamorphism, Otdel'naya mountain.

Otdel'naya mountain locality of achtarandite in the Talnakh region is analogous to the world-known Wiluy river one in Yakutia by its mineral composition. The main ore-forming minerals at both localities are grossular, vesuvianite and achtarandite formed as phenocrysts in the strongly altered rocks. The most widely spread garnet at the Mt. Otdel'naya locality is Cr-Ti-containing grossular and grossular which constitute central and edge parts of a crystal respectively (Alferova, 2007). The garnet contains multiple mineral and fluid inclusions, and therefore looks semi-translucent. Mineral inclusions are represented with relatively high-temperature magnesio-chromite, Al-containing magnesio-chromite,

vesuvianite, amesite, stilbite, chalcocopyrite and mackinawite — the most low-temperature of all above-listed.

The mackinawite occurs as a xenomorphic ingrowth up to 10 μ in the central, dark-green part of a garnet in contact with magnesio-chromite and within its crystals (Fig. 1). Chemical composition of the mackinawite corresponds to the formula $\text{Fe}_{0.64}\text{Ni}_{0.36}\text{Co}_{0.01}\text{S}_{0.99}$. Both the mackinawite presence and its ingrowths position in the phase contact zone testify to the low-grade forming conditions responding to the prehnite-pumpellyite facia of a low-grade metamorphism (Spiridonov *et al.*, 2000). Experimental study showed that the mackinawite stability field temperature limits are 50°C to 130–240°C (Takeno *et al.*, 1970). Thus, the mineral paragenesis with mackinawite once again reveals the low-temperature and multi-stage conditions of its formation at Mt. Otdel'naya achtarandite locality.

Figure 1. Cr-Ti-containing grossular aggregate (1) within pyrrhotite-pentlandite matrix (2) having chalcocopyrite segregations (3), with alumo-magnesio-chromite inclusions (4) with mackinawite ingrowth (5). Mt. Otdel'naya, Talnakh.



References

- Alferova M.S. Mineralogy of Talnakh locality of grossular, vesuvianite and achtarandite // *New Data on Minerals*. 2007. V. 42. P. 50–61. (In Russian.)
- Spiridonov E.M., Ladygin V.M., Simonov O.N., Anastasenko G.F., Stepanov V.K. Metavolcanites of zeolite and prehnite-pumpellyite facies of the trapp formation of Noril'sk region of Siberian Platform. Moscow: MGU. 2000. 212 p. (In Russian.)
- Takeno S., Zoka H., and Niihara T. Metastable cubic iron sulfide — with a special reference to mackinawite // *The Amer. Mineral*. 1970. V. 5. P. 1639–1649.