

Platinum group and chalcophile elements in sulfides from picrites of ophiolite complex from Kamchatsky Mys peninsula (Kamchatka, Russia)

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We have studied sulfide inclusions in picrites from the Cretaceous ophiolite complex of the Kamchatsky Mys peninsula (Russia). Picrites have a cumulative nature and are enriched in olivine phenocrysts. Sulfides occur as rounded inclusions in olivine and as droplet-shaped or shapeless clouds (up to 0.3 mm) in the groundmass. Temperatures of parental magma crystallization, estimated with the help of Al-in-spinel thermometer, range from 1230 to 1270 °C at Fo_{87.5-89.7}, that is similar to primitive MORB. The volcanic rocks from the ophiolite complex are presumably related to the Cretaceous Hawaiian mantle plume activity [1].

The sulfide globules are inhomogeneous and consist of pyrrhotite, pentlandite, chalcopyrite and phases of complex composition with the exsolution textures. Micron-sized particles (“nuggets”) of noble metals and intermetallics of 0.5-1.5 microns were determined in sulfide globules using scanning electron microscopy. These “nuggets” are represented mainly by grains of paalovite (Pd₂Sn), Au and Au+Ag as well as by Pt, Pt+Au and microparticles of complex composition Pd+Sn+Pt+Au+Ag+As.

The concentrations of PGE, Au, Ag and some chalcophile elements in the various phases of sulfide globules were determined by Laser Ablation ICP-MS. Copper-rich phases are enriched in Ag, Zn, Cd, In, Sn and Te, whereas nickel-rich phases are enriched in Re, Os, Ir, Rh. Enhanced contents of Pt, Pd and Au (produced by native and intermetallic microparticles) are found in both major types of sulfide phases. It implies that the separation of the noble-metal-rich phase occurred prior to separation of sulfide phases during cooling. Our research provides constraints on the processes of sulfide liquid fractionation during magma crystallization and on the characteristics of PGE sources in the volcanic rocks of the studied ophiolite complex.

[1] Portnyagin et al. (2008) *Geology*, **36** (11) 903-906.