



Olivines from ore-bearing and barren basic-ultrabasic intrusions of the Noril'sk region (Russia)

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Intrusions of basic to ultrabasic composition are the main sources of unique Pt-Cu-Ni ores in the Noril'sk region of the Siberian Traps large igneous province. Here we report the compositions of host olivines and trapped magmatic inclusions from Talnakh and Kharaelakh massifs with unique Pt-Cu-Ni ores and from Low-Talnakh and Zelenaya Griva weakly mineralized intrusions. The data were obtained by EPMA, SIMS and LA ICP-MS techniques.

Olivines from barren intrusions have higher and less variable Fo 79-83 contents than those from ore-bearing intrusions - Fo 56-82. Simultaneously, they contain low NiO concentrations reaching 0.1 wt. %, whereas olivines from ore-bearing intrusions contain up to 0.3 wt. % NiO. Usually there is a strong correlation between Fo and NiO contents in different rocks of the basic-ultrabasic intrusions in the Noril'sk region except the horizons containing sulfides where this correlation is absent. This may suggest redistribution of Ni between olivine and sulfide phases as was previously pointed out by V.V. Rybov [3] and C. Li et al. [2].

There is no difference between ore-bearing and barren intrusions in concentrations of Li, Na, Sr and Al in olivines. However, there is a distinct diversity in Ti and V contents among olivines from these two types of intrusions. Barren massifs are characterized by high V (22-34 ppm) and low Ti (180 ppm) contents in olivines. According to this parameter, these intrusions are similar to picritic basalts of the Gudchikhinsky formation. Low V (14-20 ppm) and high Ti contents (up to 350 ppm) are typical of the olivines from ore-bearing intrusions.

The distribution of heavy rare earth elements and Y in olivines from different magmatic rocks of the Noril'sk region represents the most interest. Olivines from barren

intrusions and picritic basalts of Gudchikhinsky formation have low concentrations of these elements. Olivines from ore-bearing intrusions show unusual enrichment in HREE, Y (up to 3 ppm of Y) and Pd (up to 25 ppb) which can not be a result of simple fractional crystallization (as was tested by modeling with the help of “KOMAGMAT-3.5” software [1]). Perhaps, this is a result of percolation of evolved melt through Ol cumulus horizons in the intrusive camera or in the channels. It is necessary to emphasize that the highest enrichment was established in olivines from intrusion with the largest ore bodies (Kharaelakh and Talnakh massive). This study was supported by Russian Foundation for Basic Researches (project № 03-05-64578).

Literature: [1] Ariskin A.A., Barmina G.S. Modeling phase equilibria at crystallization basalt magmas. Moscow, MAIK “Nauka/Interperiodica”. 2000. 363 p.; [2] Li C., Ripley E., Naldrett A. Compositional variations of olivine and sulfur isotopes in the Norilsk and Talnakh intrusions, Siberia: implication for ore-forming processes in dynamic magma conduits / Economic Geology. V.98.2003.pp. 69-86.; [3] Ryabov V.V. Olivines from magmatic rocks of the Noril'sk region as an indicator of petrogenesis. Novosibirsk, Nauka. 1988. 100 p.