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# Zircons from the ore-bearing Talnakh intrusion (Russia): a combined morphological, compositional and U-Pb isotopic study

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World-class platinum-group-element (PGE)-Cu-Ni Talnakh deposit closely linked to the ultramafic-mafic Talnakh intrusion is located in the northwestern corner of the Siberian craton, Russia. In spite of its significant metallogenic potential, no age constraints for the rocks from the Talnakh intrusion are available. Similarly, timing and duration of the ore concentration responsible to form an economic deposit has been rarely evaluated quantitatively.

This report presents the first results of trace element data and uranium-lead ages for 140 grains of zircon, which were extracted using *ppm-mineralogy* technique (NATI Research JSC, St. Petersburg, Russia) from drill core samples of the Talnakh intrusion. Rocks investigated include (from top to bottom) gabbro-diorite, olivine-free gabbro, olivine-containing gabbro, olivine gabbro, plagiowehrlite, plagioolivinite and taxitic varieties of mafic rocks. Isotope geochemical data were determined with secondary ion mass spectrometer SHRIMP-II at the Centre for Isotopic Research, VSEGEI.

In the *Pupin* diagram (*Pupin*, 1980), type D crystals predominate (76 %) among the investigated grains. Petrographic inspection, however, revealed at least two groups of zircon (i.e., ZR 1 and ZR 2). Grains of ZR 1 represent corroded *cores*, whereas ZR 2 occur as (1) subhedral to euhedral rims on ZR 1 and (2) solitary subhedral or unhedral crystalline parts. Both zircon groups yield solid mineral inclusions, but ZR 2 host inclusions that also contain glass.

Th, U and total REE concentrations in the zircons vary in the wide range (89 – 49220, 75-18348 and 416-20890 ppm, respectively). On the binary Th-U diagram, the zir-

cons at Talnakh (Th/U = 0.8-5.5) are clearly distinct from majority of zircons derived from various geological settings, but partly match zircons from mantle metasomatic derivates (MARID, *Kinny and Dawson*, 1992) and overlap zircons from two other PGE-Cu-Ni economic deposits (i.e., Kharaelakh and Noril'sk-1, *Petrov et al*., 2006 a, b).

In contrast to U-Pb ages of zircons from the Noril'sk-1 and Kharaelakh intrusions (*Petrov et al*., 2006 a, b), zircons at Talnakh are dominated by relatively "old" grains. Concordant U-Pb ages were determined for zircons from diorite (257.0 $\pm$ 4.1, 237 $\pm$ 3.0 and 221 $\pm$ 3.3 Ma), olivine-free gabbro (259.7 $\pm$ 4.3 Ma), olivine-bearing gabbro (256.2 $\pm$ 0.9, 231 $\pm$ 3.1 and 222.0 $\pm$ 4.0 Ma), olivine gabbro (255.7 $\pm$ 2.8 Ma) and plagiowehrlite (261.0 $\pm$ 1.6 Ma). A significant time gap represented by different groups of zircon ages likely represents the timing of magmatic crystallization of distinct zircon populations.

Our new findings are in a good agreement with assumption about the interaction of distinct magmas and a prolonged duration of component fractionation in the magmatic system. Consequently, these processes could lead to high degrees of separation and concentration of ore elements and formation of specific ore magma of unique scales and concentrations.

**References:** Kinny, P.D. & Dawson J.B. (1992) Nature **360**, 726-728. Petrov, O.V. et. al. (2006a) Geophys. Res. Abstr. **8**, 09205 EGU (CD-ROM). Petrov, O.V. et. al. (2006b) GCA **70**, 18S, A486. Pupin, J.P. (1980) Contrib. Mineral. Petrol. **73**, 207-220.