



Binary mixing model for Palaeoproterozoic PGE-bearing layered intrusions and dating of ore genesis using Sm-Nd method on sulfides and U-Pb on zircon and baddeleyite

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Numerous publications about of primary sources for layered intrusions as conclusions are two main hypotheses, according to which the studied intrusions could be formed either directly from the anomalous mantle source (EM-1) or there are negative parameter ϵNd (T) are related to process of crustal contamination (Bayanova et. al., 2009). To estimate the contribution of crustal component the binary mixing model was used (Jahn, Wu, Chen, 2000), which allows to determine the proportion of the mantle component in the crust-mantle mixture. New obtained data indicate a low level of contamination (3-15% crustal component) for most PGE-bearing layered intrusions of the Fennoscandian Shield - Main Ridge, Fedorovo-Pansky, Burakovskya and Finnish group intrusions (Penikat, Ahmavaara, Kemi et. al.). However, calculations in the binary mixing model for Main Ridge rocks showed that the proportion of crustal component amphibolized gabbros flank is significantly higher (75%) than in the rocks of the central part (about 10%). It is very likely can indicate the interaction of the melt with crustal material of the country rocks.

New minerals-geochronometers such as sulfides – pyrrhotine, pyrite, chalcopyrite, pentlandite et. set.– are improved in Sm-Nd systematics. Sulfides of PGE-bearing layered intrusions are quite important in terms of dating the process of ore origin. Studying the REE distribution in the sulfides of Middle Ocean Ridge hydrothermal sources has shown possible presence Sm and Nd in the sulfide minerals (Rimskaya-Korsakova et. al., 2003).

For the first time sulfide minerals with rock-forming minerals and WR have been dated using Sm-Nd method of impregnated and brecciform ores of Pechenga Cu-Ni deposits (1965 ± 87 Ma). Precise U-Pb dating on baddeleyite reflected the same age 1980 ± 10 Ma. Rock-forming and sulfide minerals of Ahmavaara intrusion (Finland) gave Sm-Nd age - 2433 ± 83 Ma - for impregnated and redeposited (1903 ± 24 Ma) ores. New Sm-Nd age for ore gabbro-norites of Penikat PGE-bearing layered intrusion is 2426 ± 38 Ma (Ekimova, Serov, Bayanova et. al., 2011). Kievey gabbro-pegmatite ores with Pt-Pd reef (Fedorovo-Pansky intrusive) yielded Sm-Nd age 2476 ± 41 Ma, which agrees with U-Pb zircon data - 2470 ± 9 Ma (Bayanova, 2004). New Sm-Nd data for Kievey PGE-bearing gabbro-norites were obtained in 2483 ± 86 Ma and for Fedorova Tundra metagabbroids – 2494 ± 54 Ma.

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