Sulfide minerals of industrial PGE deposits - new Sm-Nd geochronometers for ore genesis dating of mafic-ultramafic intrusions

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The Sm-Nd investigations steadily employ new mineralsgeochronometers. Of these, 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 MOR hydrothermal sources has shown possible REE presence in the sulfide lattice [1]. These are difficult to carry out because the concentrations of Sm and Nd isotopes in sulfides are much lower than those in chondrites [1].

For the first time in Russia with sulfide and rock-forming minerals and WR in Sm-Nd method have been dated impregnated and brecciform ores of the following objects - Pilguyarvi Cu-Ni deposits, Pechenga (1965±87 Ma); impregnated (2433±83 Ma) and redeposited (1903±24 Ma) ores of Ahmavaara intrusion (Finland); ore gabbronorites of Penikat PGE-bearing layered intrusion (2426±38 Ma [2]); Pt-Pd gabbro-pegmatite ores (2476±41 Ma, which agrees well with the U-Pb zircon age - 2470±9 Ma [3] and gabbronorites (2483±86 Ma) of PGE Kievei deposit and Fedorova Tundra metagabbroids (2494±54 Ma); Monchetundra gabbronorites – 2489±49 Ma.

In [4] sulfides from two metamorphosed chondrites were studied by instrumental neutron activation analysis (INAA) and ion probe. As shown, the level of REE in the sulfide phase determined by the ion probe is quite similar to that obtained by INAA. Although the concentrations of REE in the enstatite and the Fe, Si, Cr-rich inclusions are comparable to those in sulfide, estimates based on mass balance calculations show that the silicate inclusions would not noticeably contribute to the REE budget in sulfides [4].

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