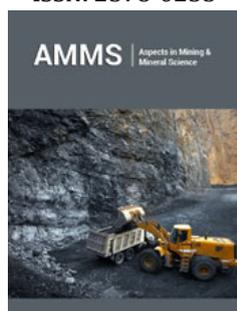


Role of Fluids in Origin PGE Mineralization's in the Pansky Tundra Layered Intrusion, Kola Peninsula, NW Russia

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Opinion

The Pansky Tundra layered intrusion belongs to a group of the Paleo Proterozoic layered intrusions (2.45-2.50Ga) located in the north-eastern Fennoscandian Shield, Kola Peninsula (Russia). The intrusions were emplaced during just that epoch of intracontinental rifting. This intrusion consists of norite-gabbro-norite-gabbroic megacycles and contain rhythmically layered horizon (up to 200-300m thick). This last includes thin "layers" of norite, olivine-gabbro-norite, melanonorite, troctolite and sill-like pyroxene anorthosite. Namely the pyroxene anorthosite lenses host low sulphide Ni-Cu and PGE mineralization and strongly metasomatic altered. The U-Pb ages of gabbro-norite by zircon is 2470 ± 9 Ma and anorthosites by baddeleyite is 2449 ± 12 Ma. Ore-bearing pyroxene anorthosite lenses have 10-100 meters long and 10-30cm thick. Nonaltered rocks consist of plagioclase (75An) accumulate with intercumulus pyroxene (up to 5%) and quartz. With ore-bearing anorthosites associate «mixed» rocks which consist of plagioclase accumulate and dark irregular plagioclase-bronsite cumulate and have similar features to the "raisin pudding" anorthosite in the J-M Reef or PGE reef in the Penikat intrusion, Finland. Ore-bearing altered pyroxene anorthosites are composed by two successively-formed metasomatic association: 1) replacement of pyroxene by tremolite and magnetite; 2) epidote-zoisite-chlorite-albite-sericite-quartz association in the paragenesis with the sulphide-PGE mineralization. The PGE (tellurides, bismutides and sulphides of Pd and Pt) minerals closely associate with chalcopyrite and pentlandite and are rarely hosted within pyrrhotite and bornite grains. Comparing with host gabbro-norites, the REE patterns of ore-bearing anorthosites are characterized by positive Eu-anomaly and lower contents of HREE. Mineralised rocks are clearly enriched by Te, Au, Se, Ir, Cu, Ag, Ni and especially of Br, Cl (neutron-activation analysis) in the relation to an average gabbro-norite of the Pansky Tundra intrusion. Simultaneously for these rocks are typical a sharp depletion in Cr content. Mass-spectrometric thermion-emission study of fluid phases in altered anorthosites and gabbro-norites shows that most part of H₂O, N₂, SO₂ and CO, CH₄ gases were extracted within temperature interval 800-1200 °C as well as its higher content comparably with host gabbro-norites.

The occurrence PGE minerals and sulphides in the paragenesis with hydroxyl-bearing silicates in metasomatic altered anorthosites can indicate high temperature hydrothermal origin of the PGE mineralization in the Pansky Tundra layered intrusion. Such correlations are typical also for large layered plutons, such as Sudbury or even for Alpine-type ultramafic intrusions. The data do not support a simple «magmatic model», but rather argue in favour to late magmatic high temperature hydrothermal origin of PGE ores and sulphide mineralization close to crystallisation of most later vapour-saturated anorthosite within rhythmically layered horizons.

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