

Northern Fennoscandian komatiite-hosted Ni-Cu-PGE deposits: geochemistry and trace element composition of sulphides and oxides

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Magmatic Ni-Cu-PGE deposits are important resources of nickel, copper and platinum group elements (PGE). Experimental works and empirical observations have shown that the magmatic sulphide deposits are products of the segregation of an immiscible sulphide-rich liquid from a silicate melt. The sulphide liquid sequesters chalcophile metals from parental silicate melt, this process may lead to the formation of important ore deposits. One aspect addressed in this work, which has not been sufficiently studied in Finland, is the Re-Os isotope geochemistry and trace element contents of sulphides and oxides in magmatic Ni-Cu-PGE mineral systems

The main research targets of this study are the Ruossakero Ni-(Cu) deposit, Lomalampi PGE-(Ni-Cu) deposit, Tulppio dunite massive and related Ni-PGE mineralisation, Hietaharju Ni-(Cu-PGE) deposit, Vaara Ni-(Cu-PGE) deposit and Tainiovaara Ni-(Cu-PGE) deposit.

Analysis of sulphides and oxides provides information on the composition and origin of these minerals and conditions of ore formation. We have characterised trace element contents in oxides by using electron microprobe (EPMA). Our preliminary results show that the nickel contents in magnetite grains are elevated in mineralised samples, especially in magnetites associated with deposits with a high Ni content in the sulphide fraction. We propose that the occurrence of magnetites with more than 0.10 wt% Ni in moraine sample could be a good provenance-scale indicator of possible Ni sulphide-bearing source rock.

Analysis of Re-Os isotopes in the sulphide-bearing systems provides new insights into the ore-forming processes, including indications of country rock assimilation and new age constraints of the magmatic events. Chromite and sulphide separates from the studied deposits have been prepared and currently, the analytical work is being carried out. Results will be published later.