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Enrichment and transport of Cr in magmatic systems in the mantle and crust

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Chromium is one of the most economically relevant critical raw materials. In nature Cr behavior and enrichment is mainly controlled by the stability of chromite. In this study we focus on podiform chromite deposits from the Pindos ophiolite complex in northwestern Greece. The Pindos ophiolite is associated with a supra-subduction zone (SSZ) environment but the genesis of such podiform chromite deposits is still controversial. In order to constrain the Cr-enrichment processes during magma generation in the mantle, a preliminary model of Crbehavior during melting of a depleted peridotite was developed. This model is based on mass balance calculations and considers the partitioning of Cr among Ol, Cpx, Opx and spinel. The model suggests that the Cr-enrichment in the melt increases with the degree of batch or fractional melting. Additionally, a series of pilot experiments on 3 peridotitic samples have been conducted at P-T conditions of 1.0 GPa and 1350 °C. All samples contain Cr-rich melts with concentrations of up to 6500 μ g/g showing a positive correlation with the degree of melting.

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