# The influence of chromite on the fractionation of Os, Ir, Ru and Rh

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Our new results from in situ analysis of chromite by LA-ICP-MS confirm that Os, Ir, Ru and Rh are present in chromite from volcanic rocks from several geological settings including MORB, boninite, komatiite, picrite and Hawaiian tholeiite. This enrichment (from 20 to 300 ppb) therefore appears to be a common phenomenon observed in chromite from volcanic rocks. Mass balance calculations indicate that chromite phenocrysts from volcanic samples account for <40%, <25% and <30% of Os, Ir and Rh whole rock budgets, respectively, and they are not the major hosts for these elements. It is different for Ru since chromite phenocrysts from volcanic samples account for ≥30% of its whole rock budget suggesting that chromite crystallization causes the Ru negative anomalies commonly observed on whole rock PGE profiles of moderately evolved volcanic rocks.

In contrast, in situ analysis of plutonic chromites show that they generally contain low concentrations of IPGE and Rh (ΣPGE < 25 ppb). As in the case of volcanic chromites, plutonic chromites do not have a great influence on Os, Ir and Rh whole rock budget in accounting for <25%, and even less for Ru in accounting for ≤10% of its whole rock budget. These new results show that chromite from rapidly cooled environments can act as the main Ru-carrier phase but has a minor role in hosting Os, Ir and Rh. Overall, plutonic chromite has a minor role in hosting IPGE and Rh. This clearly indicates a change in Os, Ir, Ru and Rh behavior between rapidly cooled and slowly cooled environments.

Chromites from Bushveld ultramafic sills and from Bushveld chromitites have also been analyzed. The IPGE and Rh contents of the chromites from the Bushveld sills and the chromites from the Bushveld chromitite are surprisingly different. The IPGE and Rh contents of chromites from the marginal sills contain significant amounts of IPGE and Rh and the IPGE and Rh contents and ratios resemble chromite phenocrysts from plume related volcanic rocks (komatiite and picrite) whereas chromites from Bushveld chromitites show low IPGE and Rh concentrations like other chromitite samples despite the fact that they crystallized from magmas of similar composition. The contrast observed between volcanic and plutonic chromites leads us to suggest that the laurite inclusions commonly observed in plutonic chromite could form by subsolidus processes.