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## Petrogenesis and PGE Abundances of High-Cr and High-Al Chromitites and Peridotites from the Bulqiza Ultramafic Massif, Eastern Mirdita Ophiolite, Albania

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### Abstract

The Bulqiza ultramafic massif, which belongs to the eastern Mirdita ophiolite of northern Albania, is world renowned for its high-Cr chromite resource. The high-Cr chromitites commonly host in the mantle section, while high-Al chromitites also present in massive dunite of the mantle-crust transition zone (MTZ) in this massif. Chromian-spinel in the MTZ high-Al chromitites and MTZ dunites have much lower Cr# values [ $\text{Cr}/(\text{Cr}+\text{Al})\times 100$ ] (47.7–55.1 and 46.5–51.7, respectively) than those of chromian-spinel in the high-Cr chromitites (78.2–80.4), harzburgites (72.6–77.9) and mantle dunites (79.4–84.3). The high-Cr chromitites are rich in IPGE relative to PPGE with 0.10–0.45 PPGE/IPGE ratios, whereas the high-Al chromitites have higher PPGE/IPGE ratios between 1.20 and 7.80. The partial melting degrees of parental magmas for the high-Cr chromitites are beyond the critical interval (> 25%) and thus prevented sulfide saturation and diluted Pt and Pd in melts, producing high-Cr chromitites barren of Pt and Pd. However, the degrees for the high-Al

chromitites just enter the critical interval (20–25%) for the effective extraction of PGE from mantle sulfides, which may account for the enrichments of PPGE in high-Al chromitites. The parental melts of the high-Cr chromitites have  $\text{Al}_2\text{O}_3$  and  $\text{TiO}_2$  contents of ~10.6–11.4 wt.% and 0.14–0.31 wt.%, whereas the calculated  $\text{Al}_2\text{O}_3$  and  $\text{TiO}_2$  for the high-Al chromitites are ~14.9–15.9 wt.% and 0.07–0.61 wt.%, respectively. The calculated melts in equilibrium with the high-Cr chromitites are boninitic-like, and those with high-Al chromitites are MORB-like but with hydrous, oxidized and  $\text{TiO}_2$ -poor affinities. To make a compromise between the inconsistency above, we proposed that coexistence of both types of chromitites in the Bulqiza ultramafic massif may reflect that their magma compositions transited from MORB-like to boninitic-like in a proto-forearc setting during subduction initiation. Key words: Chromian-spinel, Platinum-group elements, high-Cr and high-Al chromitite, Mirdita ophiolite, Albania.

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