GEOCHEMICAL COMPOSITION OF CHROMITE – AN EFECTIVE TOOL FOR THE CHROMITE ORE EXPLORATION (CASE STUDY: ULTRAMAFIC MASSIF OF BULQIZA, ALBANIA)

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The ultramafic massif of Bulqiza belongs to the eastern belt of the Jurassic ophiolites in Albania. Its geological section, from the bottom to the top, consists of three rock sequences: (a) tectonic sequence (harzburgite and dunite); (b) transitional zone (massive dunite) and (c) magmatic sequence (wehrlite, pyroxenite and gabbro). The Bulqiza massif is the most noted due to its chromium-bearing potential. Four main podiform occurrences of chromite have been distinguished which are associated from the bottom to the top with: basal harzburgites (lower tectonite sequence) (a_1), dunitic lens-bearing harzbugites (middle-upper tectonite sequence) (a_2), layered chromitite-bearing dunites of transitional zone (b), and the stratigraphically lowermost part of the magmatic section (c) (CINA, 1987; BEQIRAJ *et al.,* 2000).

The most economically important chromite ore bodies, which belong to the metallurgical type, are found in the upper part of the tectonite sequence (a_2) and in the transitional zone (b). Chromite compositions similar to those of other podiform chromites are bimodal (BEQIRAJ *et al.,* 2000). Thus, chromites from occurrences (b) and (c) are richer in Cr than chromites from the other two occurrences.

Accessory chromite disseminated throughout the massif display ranges of the Cr/(Cr + Al) (0.40–0.83) and Mg/(Mg + Fe^{2+}) (0.35–0.68) similar to that of orebody chromites from the type-III Alpine peridotites (DICK & BULLEN, 1984). In addition, accessory chromite is richer in Fe than ore body chromite, due to the subsolidus re-equilibration with olivine (IRVINE, 1967; LEHMAN, 1983), where olivine is enriched in magnesium and nickel there chromite became richer in iron and manganese.

Both ore bodies and accessory chromites show compositional ranges correlating with host-rock compositions, i.e., the Cr-rich chromites are hosted by the most refractory ultramafic rocks, that is, with the most depleted tectonic sequence rocks, which suffered high partial melting.

The Cr/(Cr + Al) ratio of chromite seems to reflect the position of the sample in the sequence (CINA, 1987; BEQIRAJ *et al.,* 2000) and it can be assumed to characterize the stratigraphic level of the various chromite occurrences. Thus, the lower this ratio is, the deeper the chromitite occurs in the tectonite section and, vice-versa in the magmatic section. On the other hand, as the variation of the Cr/Fe^{tot} and Mg/Fe^{tot} ratios is controlled by ore abundance (LEHMAN, 1983), these ratios correlate positively with ore grade and, to some extent, with tonnage at a given stratigraphic level. Therefore, these ratios can be useful for exploration of high-grade, metallurgical chromite ore at Bulqiza and in other massifs of similar geodynamic setting.

References

BEQIRAJ, A., MASI, U. & VIOLO, M. (2000): Exploration and Mining Geology, 9: 149–156.

CINA, A. (1987): Bulleti i Shkencave Gjeologjike, 4: 99–131.

DICK, H.J.B. & BULLEN, T. (1984): Contributions to Mineralogy and Petrology, 86: 54–76.

IRVINE, T.N. (1967): Canadian Journal of Earth Sciences, 4: 71–103.

LEHMAN, J. (1983): Earth and Planetary Science Letters, 64: 123–138.