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Chromites from the Gogołów-Jordanów Serpentinite Massif (SW Poland) - evidence of the arc setting magmatism

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The Gogołów-Jordanów Serpentinite Massif (GJSM) is a peridotitic member of the Variscan Ślęża Ophiolite (SW Poland). Chromitite veinlets and pockets occur in the central part of the massif in the Czernica Hill area within completely serpentinized rocks.

Chromitites consist of rounded chromite grains up to 4 cm and chlorite filling the interstices. The veins are embedded in serpentine-olivine-chlorite aggregates. Chemical composition of chromite occurring in chromitites defines two varieties. Chromite I (Cr# = 0.49 - 0.58) contains 23.32 - 28.36 wt.% $Al2O_3$, 40.29 - 48.10 wt.% $Cr2O_3$, 15.10 - 15.50 wt.% FeO, 14.50 - 15.50 wt.% MgO and $\sim$0.1 wt.% TiO_2. Chromite II (Cr# = 0.71 - 0.73) contains 13.83 - 15.24 wt.% $Al2O_3$, 54.85 - 56.65 wt.% $Cr2O_3$, 16.71 - 18.04 wt.% FeO, 10.62 - 11.59 wt.% MgO and 0.1 wt.% TiO_2. Chromite grains are composed mostly of chromite I. Chromite II forms irregular spongy domains up to 150 μm, located at fissures or forming grain rims. The bulk chromitite composition of the massive ores reveals Rb, Ba, Pb and Sb enrichment relative to primitive mantle; Pt and Pd (up to 36 ppb) are also enriched relative to primitive mantle. Other phases coexisting with chromite are chlorite and olivine. Chlorite (Fe# = 0.02) contains 17.5 - 23.0 wt.% $Al2O_3$, 0.6 - 1.8 wt.% $Cr2O_3$ and 31.8 - 34.2 wt.% MgO. Olivine (Fo93.5-96.2) contains 0.44- 0.51 wt.% NiO. Olivine grains are zoned - the low-forsteritic cores are surrounded by high-forsteritic domain. Chromite II and chlorite are secondary phases and were probably formed due to greenschist facies metamorphism.

Chromitites are cumuletes of melt blocked during its flow through peridotitic host. Low TiO_2 content and moderate chromian number of the GJSM chromitites is typical for chromian spinels originated from melt derived from back arc depleted source (cf. Python et al., 2008, Gonzalez-Jimenez, 2011). The GJSM chromitites are rich in Al and poor in Pt and Pd what is typical for chromitites occurring in the relatively shallow back arc sub Moho environment (Gonzalez-Jimenez, 2011). The whole rock data from basaltic member of the Ślęża ophiolite unequivocally show their MORB origin (Pin et al., 1988). Thus, our data suggesting back arc origin of chromitites require further examination.

References

Gonzalez-Jimenez, J.M., Proenza, J.A., Gervilla, F., Melgarejo, J.C., Blanco-Moreno, J.A., Ruiz-Sanchez, R., Griffin, W.L., 2011. High-Cr and high-Al chromitites from the Sagua de Tanamo district, Mayari-Cristal ophiolitic massif (eastern Cuba): Constraints on their origin from mineralogy and geochemistry of chromian spinel and platinum-group elements. Lithos 125, 101-121.

Pin, C., Majerowicz, A., Wojciechowska, I., 1988. Upper paleozoic oceanic crust in the Polish Sudetes: Nd-Sm isotope and trace elements evidence. Lithos 21, 195 – 209.

Python, M., Ceuleneer, G., Arai, S., 2008. Chromian spinels in mafic–ultramafic mantle dykes: Evidence for a two-stage melt production during the evolution of the Oman ophiolite. Lithos 106, 137–154.