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Chromite alteration in serpentinite bodies from southern Banat region, SW Romania

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Located in the south-western part of Romania, Ielova Metamorphic Sequence (IMS) and Tisovita Ultramafic Massive (TUM), are two important formations, where serpentinites occur.

Lithologically, the IMS consists mainly of amphibolites and gneisses with garnet and biotite. Isolated serpentinites bodies outcrop in its western part, which was affected by a strong retromorphic process. The serpentinite samples from Rudaria region of IMS, represent lizardite-dominated bodies, based on X-ray Powder Diffraction analysis (PXRD). By optical microscopy observations, relicts of clinopyroxene can be identified, associated with grains of asbestos form of serpentine. Magnetite veinlets are developed on grain boundaries. Chromite occurs as accessory phase, showing the signs of strong alteration. The chemical composition (by Energy Dispersive Spectrometry, EDS) for the seemingly unaltered portions yields towards a chromite-hercynite solid-solution with low magnesium content. Back Scattered Electron (BSE) imaging and EDS showed that the grains have magnetite dominant rims and marks of large reaction zones are detectable, as Cr-bearing clinochlore belts with fragments from the original crystals. Inside the grains clinochlore is detectable, building up a network of slim channels, reproducing parallel planes crosscutting mostly at 90˚ and 120˚. The observed tendency is the alternation of zones with several (more dense) channels thinner in diagonal, with that of larger, but fewer channels. This feature leads to the eventuality of an initial, ordered chemical zoning of crystals, with unequally distributed Mg content, and this induced chlorite growth in different amount.

Unlike the serpentinites from IMS, previously scarcely studied, those from TUM were extensively investigated, including the alteration processes on chromites. Many authors describe a similar situation on chromite granules from TUM, showing a stronger transformation, with the presence of chlorite and Fe rich spinell type phases rims. The cores of grains do not exhibit the oriented clinochlore intergrowth structure, and the invasion of chlorite happened on irregular fissures.

Since spinell type components of serpentinites were affected by metasomatic processes, their chemical composition is not useable for discriminating between the evolutions of IMS and TUM serpentinites bodies. Our approach is to show that the differences in alteration state of chromites, from morphological and crystallographic point of view, provide useful data to understand the different evolution of these formations.