

Obszańska-8 are represented by middle and thick granular quartzites and argillie and slime lithofacies. Quartzites have mild and mosaic texture. Their development point out to high-energy environment of sedimentation. In these sediments dominate cracks which angle of pitch oscillate between: 70°-90° (high-pitched, subvertical, vertical) -D₁. Younger, subhorizontal cracks (D₂) which displace older cracks rarely appear. On surfaces of cracks there are lots of minerals of iron and sometimes in places where sandstone contact with argillie beds there are horizontal cracks with slips. Dominant role in the Cambrian sediments perform argillie and slime sediments within which appear very thin laminas of light gray sandstones which course is very perturbed (disrupted and folded). Within these sediments dominate interlaminar, horizontal and subhorizontal cracks. In the exploration borehole Książpol-12 are dominate cracks younger, subhorizontal D₂. Subhorizontal cracks often displace vertical cracks. On surfaces of cracks there are lots of minerals of iron. Sometimes in place where sandstone contacts with argillie beds there are horizontal cracks with slips.

In works of the centre Cambrian the following structural result was stated (for example the exploration borehole – Dzików 17) : 1 - coming into existence of sedimentary areas of S₀ and diagenetic structures, 2 – being formed in conditions subhorizontal of countermove of the macrocrease, into which steep wing an analysed hole was carried out, 3 – activity of susceptible-brittle normal-slip faults, which transfers stole according to previously steeply adjusted lamellose areas, 4 – developing in reversed conditions occur of complementary teams of cutting, of chaps extraction and low-inclined reverse faults with tectonic breccias accompanying them, of which crumbs stayed locally combined through rust-coloured carbonate veins, 5 – being formed in conditions extraction mezofaults of normal or normal-slip and of breccias accompanying them of tectonic and rust-coloured and white carbonate veins, 6 – activity very steep or threshold downthrow mayofaults of rust-coloured carbonate veins causing wide-radiant bending earlier incurred.

The mudstone sediments generally characterize smudge structure and banded structure – of generate confluence. Locally in their area appear structures with buried all group current ripples marks, which were line of true dip.

However in interval, where thin layers claystone, mudstone and sandstone appear opposite is disturbance bearing of still characterize. Above into thin layers light gray sandstone there is older primeval structures of characterize cross lamination and isolation structures, drop structures and buried structures.

In thick beds sandstones appear initiator tension fissures generate of diagenesis and intracell of mudstones. In other place of sediments the Upper Cambrian are thin layers intraformation conglomerate – light gray sandstone with much intracell darkgray mudstones.

Chromites from Vourinos complex mines and their alteration

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Chromite ore deposits have been largely exploited in Greece and the presence of tens of abandoned mines witnesses the important role of the country in the chromite mining industry past scenario.

Numerous studies about the geochemical and textural features have been carried out so far of different ores. With this contribution we attempt to summarize the main geochemical and textural features of Vourinos ophiolite complex chromite deposits focusing our attention on new data on the later alteration processes occurring in almost all ores.

Vourinos complex covers 400 km² and in spite of predominating mantle outcrops it shows a full ophiolite sequence with a well exposed petrographic Moho. The crustal sequence comprises mafic and ultramafic cumulates, gabbro, dykes, some pillow lavas and a carbonatic sedimentary cover. All chromite bodies are set in dunite bodies or in dunite enveloped by harzburgite and are concentrated within the metalliferous zone. Geochemically, Vourinos chromite presents quite homogeneous features, among the different mines, with Mg# and Cr# ranging between 0.45 and 0.64 and between 0.75 and 0.83 respectively. Cr₂O₃ contents range between 57 and 60 wt%. No differences in primary chromite between the different mines

were detected except for a generally lower Cr# for Rizo mine. All chromitite bodies independently of their texture (massive, schlieren or disseminated) are made of euhedral to subeuhedral chromite crystals with size varying mainly between 0.1 and 2 mm, with some rare nodular textures showing crystals of up to 5 mm in size.

Chromite from all studied mines shows some important features highlighting the presence of Fe-chromite and magnetite alteration. Sometimes completely altered chromites where only the shapes of the habits were preserved were detected. Fe-chromites show a wide range of compositions. They are characterized by an increase in Cr# and/or a decrease in Mg# compared to their chromitic cores. In spite of the low range of primary chromite compositions, Fe-chromite can span over the full range of possible Cr# increase and Mg# decrease. Extreme compositions comprise virtually MgO-free Cr-magnetites and virtually Al₂O₃-free chromites s.s. Anomalous compositions were also detected in few samples with high NiO and MnO contents. MnO content of primary chromite is very low and no MnO has been detected in silicate phases. Cr₂O₃-free magnetites are often found as small crystal within the serpentinite matrix and are not a product of alteration of chromite but are related to release of iron during serpentinization.

Fe-chromite always grows at the expenses of primary chromite as chromite and Fe-chromite together, drawing the shape of the original chromite crystal. The close association of Fe-chromite and chromian-chlorite (kammererite) independent of the degree of serpentinization of chromitite silicate matrix and peridotite host rock suggests that alteration of chromites pre-dates serpentinization.

Preliminary data on an anomalous chrome-spinel assemblage from Amanos Mountains serpentinites (Turkey)

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The present work deals with an anomalous spinel assemblage detected within serpentinite rocks, whose peculiar textural and geochemical patterns can provide new information on spinel genesis and transformation within mantle peridotites and serpentinites.

Spinel is an important accessory phase in mantle peridotites and serpentinites. It shows a wide range of compositions related to different processes and has been largely used as a petrogenetic indicator. Due to its refractory character spinel has long been considered to reflect magmatic conditions of its formation, but in the last years studies pointed out changes in its composition also related to metasomatism, metamorphism and alteration.

Spinel occurring as an accessory phase within mantle peridotites is dominated by a strong Cr-Al trend, from Al-rich spinel ss. in high-pressure lherzolite to Al-poor chromite in massive chromitite bodies. The main controls on magmatic spinel composition are Cr exchange with pyroxene and re-equilibration with olivine. During metasomatic and metamorphic events the most common change in spinel composition is a depletion in Al associated with enrichment in Fe and/or Cr. When this process affects Cr-rich spinel (chrome-spinel or chromite) it leads to the formation of ferritchromite, usually as alteration rims around chromite grains. Ferritchromite can further evolve to chrome-magnetite and magnetite, always associated with the formation of kammererite (chromian-chlorite) in the silicate matrix.

The spinels described in this study were found during exploration for chromite ore in the Amanos Mountains, about 15 km NE of Iskenderun, Southern Turkey. There ophiolite slices crop out below Mesozoic carbonates and cherts. Ophiolitic rocks are mainly composed of a serpentinite melange with some strongly tectonized gabbros. Serpentinites host several small chromitite lenses that underwent limited exploitation in the last century.

All but one of the chromitite bodies detected show a massive to densely disseminated texture with 30 to 80% modal spinel and the composition of a typical chromite from podiform chromitite bodies within ophiolite peridotite. Alteration to ferritchromite is widespread even if it never completely obliterates primary spinel composition at the crystal cores.