Chemical and Spectroscopic Characterization of Some Phosphates Accessory Minerals from Pegmatites of the Sowie Mts (Owles Mts), SW Poland

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Phosphate accessory minerals were found in pegmatite veins and lenses around 15 meters long in Michałkowa near Walim in Sowie Mts gneissic block, Lower Silesia, SW Poland. Pegmatites intersect paragneisses and migmatites and composed mostly of plagioclase, albite, quartz, biotite, chlorites, phosphate minerals and pyrite.

The main primary phosphate aggregates in pegmatite in Michałkowa consist of sarcopside $(Fe^{2+},Mn^{2+},Mg)_3(PO_4)_2$ and graftonite $(Fe^{2+},Mn^{2+},Ca)_3(PO_4)_2$. The biggest euhedral crystals of sarcopside and graftonite reach up to 2.5 cm in length. Both minerals often contain regularly oriented assemblage of smaller (few to 100 micrometers in diameter) primary and secondary phosphates inclusions of allaudite, apatite, ferrisicklerite, ferroallaudite, ferrowyllieite, hagendorfite, heterosite, kryzhanovskite, maghagendorfite, phosphoferrite, qingheiite?, rosemaryite, simferite?, wolfeite and wyllieite. Some minerals are difficult to identify because are strongly altered, oxidized and hydratized.

Samples were investigated in thin sections by means of an OLYMPUS BX-51 polarization microscope in reflected and transmitted light. Chemical composition of samples were analysed by CAMECA SX 100 electron microprobe in the wave-length mode.

Chemical composition of sarcopside vary from grain to grain e.g.: contain 41.23–42.07 wt% of P_2O_5, 41.45–42.02 wt% of FeO, 10.98–12.78 wt% of MnO, 4.12–5.33 wt% of MgO and traces of F, S and Ca, but are present also variety richer in FeO (up to 43.30 wt%) and MnO (up to 13.67 wt%) and poor in MgO (up to 2.37 wt%). Graftonite also differ in content of FeO, MnO and CaO with average composition: 41.34–41.73 wt% of P_2O_5, 25.28–27.75 wt% of FeO, 20.44–21.96 wt% of MnO, 8.35–9.95 wt% of CaO, 1.46–1.63 wt% of MgO and traces of F, S and Na.

IR spectroscopic measurements were carried out using a Bio-Rad FTS 60 V and Bio-Rad FTS 165 spectrometers. Monocrystals were studied using Raman micro-spectrometer T-64000 Jobin-Yvon equipped with confocal microscope (OLYMPUS).

Good formed, original crystals of graftonite and sarcopside were selected to the MIR analysis. On the MIR and Raman spectra we can't observe any bands connected with H_2O and OH^- groups. The results confirm that the selected crystals didn't become the alteration process. The previous spectroscopic analysis of isolated $[PO_4]^{3-}$ tetrahedrons allowed the precise assignation of bands to the corresponding vibration type. The influence of non-tetrahedral cations on the shape of the spectra and the positions of bands has been analysed and the crystalline field splitting effect has been discussed.