ПОТЕНЦИАЛЬНО НОВЫЙ МИНЕРАЛ ГРУППЫ АПАТИТА $Ba_5(PO_4)_3F$ – ФТОРОВЫЙ АНАЛОГ АЛФОРСИТА ИЗ КОМПЛЕКСА ХАТРУРИМ, ИЗРАИЛЬ

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POTENTIALLY NEW APATITE GROUP MINERAL, $Ba_5(PO_4)_3F$ -FLUORINE ANALOGUE OF ALFORSITE FROM THE HATRURIM COMPLEX, ISRAEL

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Potentially new mineral species, fluorine analogue of alforsite - $Ba_5(PO_4)_3F$, belonging to the apatite group (Pasero et al., 2010) was found at the two localities in vein-like bodies of schorlomite-gehlenite-pseudowollastonite paralavas, hosted by melilite hornfels of the Hatrurim Complex, Israel: Zuk Tamrur and Gurim anticline of the Hatrurim Basin. This Complex is predominantly present in the peripheries of the Jordan-Dead Sea transform fault (Gross 1977, Novikov et al. 2013). The main mineral association of studied paralavas is represented by garnets of andradite-schorlomite series, melilites of gehlenite-alumoåkermanite solid solution, rankinite, pseudowollastonite, wollastonite, cuspidine, minerals of the fluorapatite-hydroxylapatite and fluorellestadite-hydroxylellestadite series, hematite, magnesioferrite. Ba-bering minerals are represented by the following accessory minerals: barioferrite, baryte, hashemite, celsian and hexacelsian, fresnoite, gurimite, sanbornite, walstromite, zadovite and aradite. Fluorine analogue of alforsite forms small crystals rarely exceeding 30 μm in size. They are confined to small enclaves within fine-grained Ba-minerals aggregate (Fig. 1). Gurimite, zadovite, walstromite, tenorite, fluorapatite, baryte and secondary Ca hydrosilicates are typical minerals occurring in these enclaves.

An empirical formula of fluorine analogue of alforsite yielded by mean of 7 analyses is $(Ba_{3.93}Ca_{0.88}Sr_{0.11}Na_{0.06}K_{0,02})_{\sum 5}[(PO_4)_{2.15}(VO_4)_{0.42}(SO_4)_{0.22}(SiO_4)_{0.12}(AlO_4)_{0,08}]_{\sum 3}(F_{0.66}Cl_{0.01}OH_{0.22})_{\sum 0.89}$. Raman spectrum of F-analogue of alforsite is similar to the one of synthetic phase (Meegoda et al., 1999). In the Raman spectra of fluorine analogue of alforsite the main bands related to $\nu_1(PO_4)^{3-}$ vibrations at 940 cm^{-1} and to $\nu_1(VO_4)^{3-}$ vibrations at 855 cm^{-1} are observed. The presence of S and Si in composition of studied mineral is reflected in appearance of additional Raman bands at 993 $cm^{-1}\nu_1(SO_4)^{-2}$ and shoulder at 842 $cm^{-1}\nu_1(SiO_4)^{-4}$.

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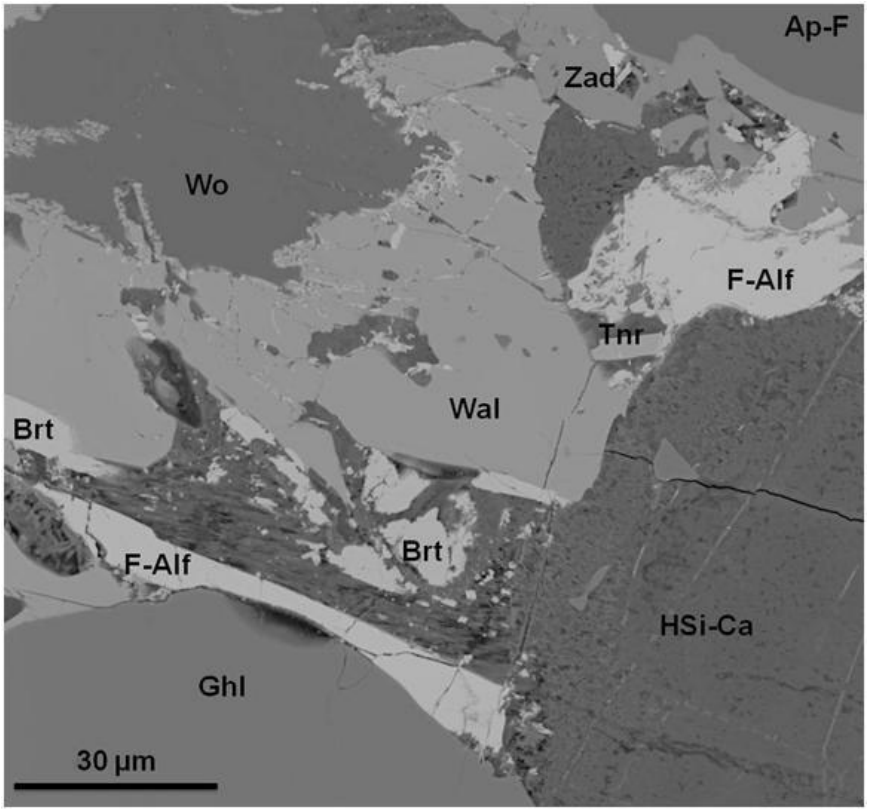

Fig.1. Fluorine analogue of alforsitein association with walstromite, zadovite, baryte, wollastonite, gehlenite, fluorapatite and calcium hydrosilicates. BSE image (Ap-F – fluorapatite, Brt – baryte, HSi-Ca – calcium hydrosilicate, F-Alf – fluorine analogue of alforsite, Ghl – gehlenite, Tnr – tenorite, Wal – walstromite, Zdv – zadovite).

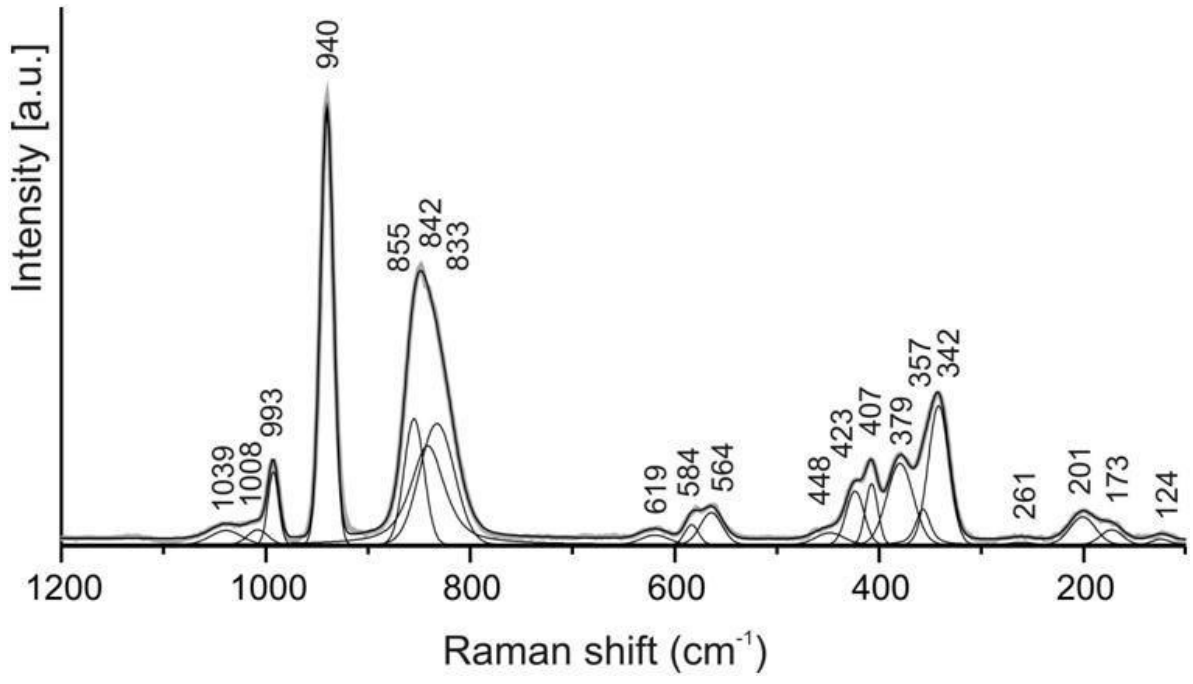

Fig.2. Raman spectrum of fluorine analogue of alforsite from Gurim Anticline, Israel.