The first discovery of donnayite-(Y) in a gold deposit

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As of now the rare hydrocarbonate of strontium and yttrium donnayite ($Sr_3CaNaYC_6O_{18}\cdot 3H_2O$) was known only in rocks from the alkaline complexes (St-Hilaire, Canada; Khibina and Vishnevogorsky, Russia) and in carbonatites and phoscorites from the massifs Vuoriyarvi, Seblyavr, Sallanlatvi, Khibina in Kola Peninsula, Russia. (Chao et al., 1978; Khomyakov, 1990; Pekov et al., 1996; Subbotin et al., 2000; Yakovenchuk et al., 1999). In such environments donnayite-(Y) associates usually with Ca-Ba-Sr-REE carbonates (including F-carbonates), natrolite, microcline, aegirine, and some others minerals.

New discovery of donnayite-(Y) in the Albyn gold deposit (Far East, Russia) is interesting, because this mineral was detected in quite another geological situation where it associates with untypical minerals. Donnayite-(Y) was revealed as thin veinlets (from 5-7 up to 30 μm, in very rare cases – up to 90 μm) inside the scheelite crystals which were occurred in carbonate-hydromuscovite-albite and ankerite-chlorite metasomatites.

The mineral composition of these rocks have been investigated by means of optical microscopy and X-ray phase analysis. X-ray diffraction data has been obtained on diffractometer X'Pert PRO, Philips (CuK_α monochromatic radiation, voltage 50 kV, current 40 mA). Basides the scheelite was diagnosed by bright sky-blue luminescence induced by nitrogen laser (λ_{exc} = 337.1 nm). It should be noted that in consequence of very strong scheelite fluorescence, own luminescence of donnayite-(Y) ulrtramicroscopic segregations was not visually detected.

The chemical composition of donnayite-(Y), scheelite, and minerals of the above-mentioned rocks was determined on electron microprobe JXA-8100 Superprobe. Standard samples for investigated elements were represented by natural minerals of definite composition, synthetic compounds, and metals. The obtained results (14 analyses, wt. % – Na_2O 1.69-2.67, CaO 5.04-7.61, SrO 26.08–33.83, Y_2O_3 12.46-14.26, Ba 2.58-4.88, La_2O_3 0.00-1.71, Ce_2O_3 0.00-2.30, Pr_2O_3 0.00-0.63, Nd_2O_3 0.00-1.06, Sm_2O_3 0.00-0.57, Eu_2O_3 0.00-0.57, Gd_2O_3 0.09-0.82, Dy_2O_3 0.90-2.24, Ho_2O_3 0.00-0.70, Er_2O_3 0.23-1.43, Yb_2O_3 0.46-1.29) testify that in composition and content speciation and trace components donnayite-(Y) being founded by us essentially corresponds to previously studied samples. However it should be pay attention to considerable variations of REE contents in nearby parts of mineral that can indicate to their profound fractionation in the process of crystallization.

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