

Nové údaje o supergenných mineráloch z ložiska Banská Štiavnica (Slovenská republika)

New data on supergene minerals from the Banská Štiavnica deposit (Slovak Republic)

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Abstract

An interesting association of recently formed supergene minerals represented by brianyoungite, brochantite, cerussite, linarite, serpierite, sulphur and uranophane was identified at the Banská Štiavnica deposit, Slovakia. Brianyoungite is relatively abundant mineral at the small occurrence of uranium mineralization, which is situated close to the Ferdinand shaft on the 12th level of Nová shaft. Minor amounts of brianyoungite were also observed at the occurrence located on the 3rd level of Nová shaft. It forms thin, finely crystalline coatings with white colour and silky to pearly lustre, which consist of individual thin tabular to platy crystals up to 30 µm in size. Occurrence of brianyoungite is at the both places strictly restricted to accumulations of sphalerite and gypsum is only directly associated supergene phase. Brianyoungite was identified by PXRD and its refined unit-cell parameters (for the monoclinic space group $P2_1/m$) are: a 15.714(10) Å, b 6.242(8) Å, c 5.422(9) Å, β 89.2(1) and V 532(1) Å³. Brochantite occurs as bright to emerald green, finely crystalline coatings associated with linarite and cerussite (from the abandoned stope on Bieber vein in the Michal adit, which is located behind the Berggericht building) or gypsum, linarite and serpierite (from the 3rd level of Nová shaft). Its unit-cell parameters refined from the powder X-ray data (for the monoclinic space group $P2_1/a$) are: a 13.090(4) Å, b 9.840(2) Å, c 6.015(2) Å, β 103.36(3)° and V 753.8(4) Å³. Cerussite is relatively common mineral in the abandoned stope located on the Bieber vein in the Michal adit, which is situated behind the Berggericht building. It was found as white acicular crystals up to 1.5 cm in size on fractures and in the cavities of quartz-sulphide gangue, often together with brochantite and linarite. The unit-cell parameters of cerussite refined from the powder X-ray diffraction data (for the orthorhombic space group $Pm\bar{c}n$) are: a 5.176(3) Å, b 8.491(4) Å, c 6.143(3) Å and V 270.0(2) Å³. Linarite occurs as bright blue coatings or aggregates of well-developed prismatic crystals up to 3 mm in size on fractures of quartz-sulphide gangue from the abandoned stope in Michal adit. Microscopic aggregates of linarite were also observed together with brochantite, gypsum and serpierite on the 3rd level of the Nová shaft. It was identified by PXRD and its refined unit-cell parameters (for the monoclinic space group $P2_1/m$) are: a 9.6960(15) Å, b 5.6501(9) Å, c 4.6876(6) Å, β 102.63(2)° and V 250.57(6) Å³. Serpierite was found as relatively common mineral on the walls of tunnel, which is following Terézia vein on the 12th level of Nová shaft. It forms pale to sky blue crystalline crusts, which consists of well-developed, thin tabular crystals up to 1 mm in size, associated with aragonite and gypsum. It also occurs as sky blue radial aggregates up to 3 mm in size on the 3rd level of Nová shaft together with brochantite, gypsum and linarite. The unit-cell parameters of serpierite (from the 12th level of Nová shaft) refined from the powder X-ray diffraction data (for the monoclinic space group $C2/c$) are: a 22.180(8) Å, b 6.251(2) Å, c 21.846(6) Å, β 113.4(6)° and V 2781(1) Å³. Serpierite from the 12th level of Nová shaft has variable Zn content (from 0.99 to 1.23 *apfu*, with Zn/Cu ratio ranging from 0.32 to 0.43) and it also contain minor amounts of Mn (up to 0.05 *apfu*) and As (do 0.01 *apfu*). Serpierite from the 3rd level of Nová shaft has slightly lower content of Zn (0.78 - 0.84 *apfu*, with Zn/Cu ration ranging from 0.24 up to 0.26), but slightly higher content of Mn (up to 0.07 *apfu*) and locally also Mg (up to 0.02 *apfu*). Sulphur is very rare mineral at the small occurrence of uranium mineralization located on the 12th level of the Nová shaft, not far from the Ferdinand shaft. It forms pale yellow rounded crystals up to 0.1 mm in size resting on crystalline jarosite or goethite inside of the cavity of quartz-sulphide veinlet. Its unit-cell parameters refined from the powder X-ray data for the orthorhombic space group $Fddd$) are: a 10.469(4) Å, b 12.870(4) Å, c 24.493(9) Å and V 3300(2) Å³. Uranophane was rarely observed at the small occurrence of uranium mineralization located on the 12th level of the Nová shaft as irregular aggregates of acicular crystals up to 80 µm in size, which are replacing collomorph aggregates of coffinite with uraninite relicts. Its average (n=6) empirical formula is corresponding to $(\text{Ca}_{0.93}\text{Na}_{0.04}\text{K}_{0.02}\text{Zn}_{0.01})_{\Sigma 1.00}(\text{UO}_2)_{2.01}[(\text{SiO}_3\text{OH})_{1.98}(\text{SO}_4)_{0.02}]_{\Sigma 2.00} \cdot 5\text{H}_2\text{O}$ based on $(\text{Si}+\text{S}) = 2$ *apfu*.

Key words: supergene minerals, brianyoungite, brochantite, cerussite, linarite, serpierite, sulphur, uranophane, Banská Štiavnica, Slovak Republic

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