



Segnitite from the Kremikovtsi ore deposit

Сегнитит от находище Кремиковци

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Абстракт. Сегнититът, обект на настоящото съобщение е открит в каверни сред баритовото рудно тяло на хоризонт 508 в находище Кремиковци, заедно с хематит, гьотит, лепидокрокит, романешит, малахит и азурит. Образува разнообразни по форма агрегати, изградени от ромбодрични или призматично удължени кристали, завършващи с остър ромбодър и пинакоид. Често се наблюдава секторно-зонално нарастване на стените на острия ромбодър. Сегнититът е рядък, но образците от Кремиковци са между най-добрите в света за този минерал.

Key words: segnitite, crystal morphology.

Introduction

The type locality of segnitite is Kintore opencut, Broken Hill, New South Wales, Australia. This mineral was approved by IMA in 1991 and named after E. Ralph Segnit (1923–1999) for his contributions to Australian mineralogy. Segnitite is a lead-iron arsenate with a chemical formula $\text{PbFe}^{3+}_3(\text{AsO}_4)_2(\text{OH},\text{H}_2\text{O})_6$.

This rare mineral has been found in the oxidation zone of 95 hydrothermal ore deposits of 19 countries all over the world (source www.mindat.org). Segnitite, the subject of the present paper, has been discovered in October 2009, in the barite ore body (NE part of the open pit), level 508 of the Kremikovtsi deposit. The latter is situated some 15 km north-east of Sofia on the southern slopes of Stara Planina Mountain at the border with Sofia valley.

Geology

Damyantov et al. (1996) defined the Kremikovtsi ore deposit as a zonal carbonate-hosted sedimentary exhalative iron (+manganese)-barite-sulfide deposit of the SEDEX type. The number of cavities within the barite ore body, formed during the hydrothermal-metasomatic stage has been partially filled with secondary minerals during the weathering crust formation. Tenantite, though quite rare in the primary ore, seems to be abundant enough to be a source of As for secondary arsenates.

Associated minerals

The cavities in the barite body are filled mainly with hematite and goethite forming botryoidal crusts. Later

on lepidocrocite and romanechite also form botryoidal aggregates. Occasionally lepidocrocite occurs as unique platy crystals up to 5 mm. In some cavities or in the porous barite one can find crystals of azurite or malachite aggregates up to 1–2 cm. Segnitite was formed after the lepidocrocite and romanechite and is quite rare.

Aggregates and morphology of segnitite crystals

Segnitite occurs as: individual segnitite crystals with rhombohedral habitus (Plate I, 1); rosette-type isometric aggregates with short-rhomboidal crystals (Plate I, 2); isometric aggregates with long-prismatic crystals ending with sharp rhombohedron (Plate I, 3, 4); open-work or flattened aggregates of long-prismatic crystals (Plate I, 5). Hexagonal prism, sharp rhombohedra (positive and negative) and pinacoid faces are developed in all the aggregates. One can observe sectorial zonal growth with clearly different morphology on the faces of the positive and negative rhombohedra under high magnification (Plate I, 6).

The crystal size varies from 0.1 to 4.5 mm, among the biggest in the world for this mineral. The size of the aggregates varies from 1–2 to 5–10 mm, sometimes the mineral forms crusts, several millimeters thick.

Properties

Segnitite has a distinct cleavage on {0001} and crystallizes in the trigonal-scalenohedral class. The colour of segnitite varies from yellowish-green to oily dark green. It is transparent, translucent. Lustre is adaman-

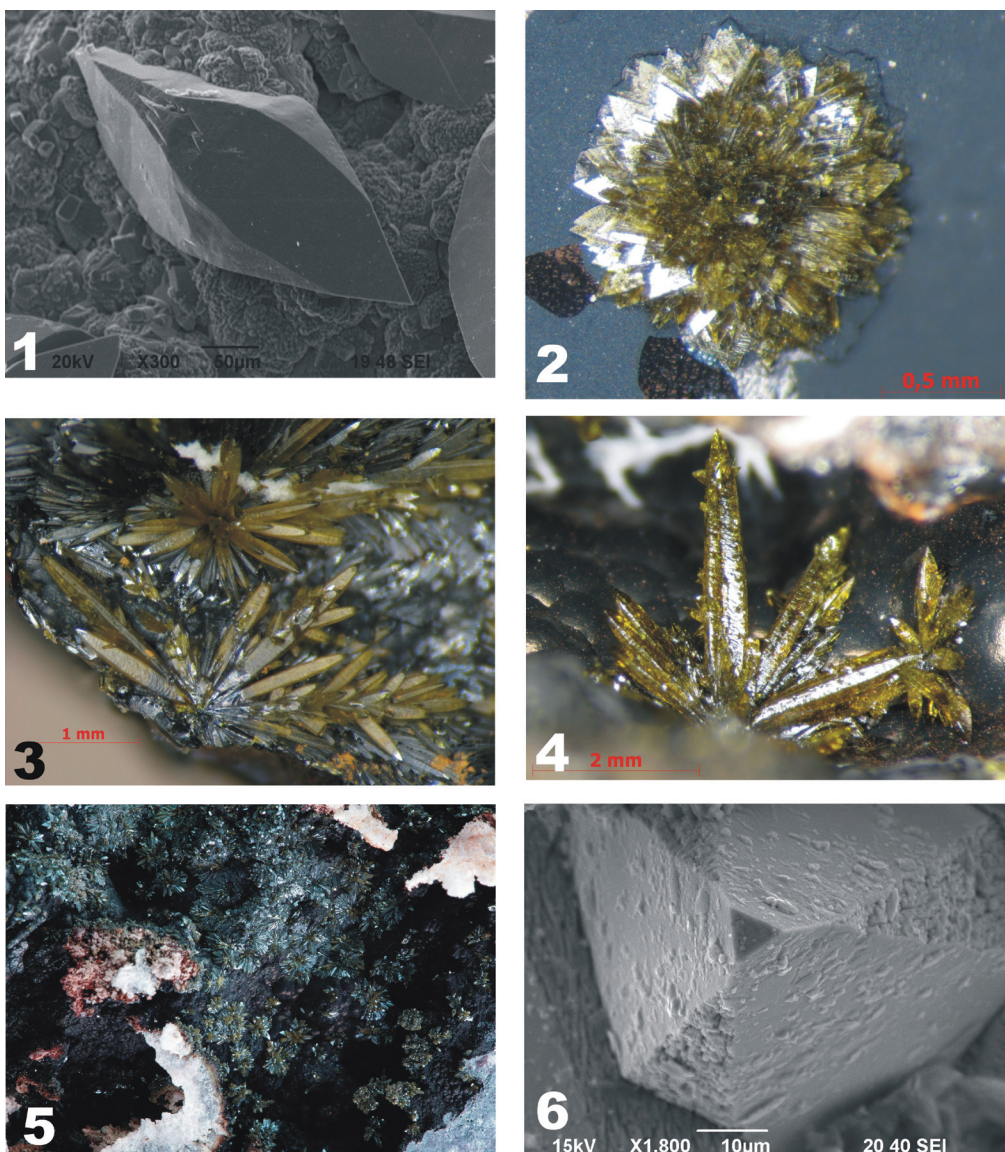


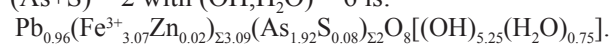
PLATE I

1. Rhombohedral habitus of segnitite crystals. SEM $\times 200$.
2. Rosette-type isometric aggregates with short rhombohedral crystals.
- 3, 4. Aggregates of long prismatic segnitite crystals.
5. Different segnitite aggregates filling a cavity in the barite. 10 cm field of view.
6. Sectorial-zonal growth with clearly different morphology on the faces of the positive and negative rhombohedra. SEM $\times 1800$.

tine, vitreous. Measured density is 4.29 g/cm^3 and calculated density is 3.99 g/cm^3 .

Chemical composition

The chemical composition of the segnitite from Kremikovtsi is (in wt.%): PbO – 28.13; ZnO – 0.21; Fe_2O_3 – 32.04; As_2O_5 – 28.83; SO_3 – 0.86; $\text{H}_2\text{O}_{\text{calc}}$ (7.94). Total – 98.01 (electron microprobe, H_2O is calculated by stoichiometry). The formula calculated based on $(\text{As}+\text{S}) = 2$ with $(\text{OH}, \text{H}_2\text{O}) = 6$ is:



The unit cell parameters (\AA , single-crystal X-ray diffraction data) are: $a = 7.937(9)$, $c = 17.086(19)$.

In the authors' opinion, segnitite from Kremikovtsi is in the world top list for museum quality specimens of this mineral.

References

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