

Depositional Environment of Auriferous Colloform Banded Veins in the Low-Sulfidation Khan Krum Deposit, East Rhodope Mountain, SE Bulgaria

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ABSTRACT

The styles of gold mineralization in the Khan Krum deposit, Krumovgrad Goldfield include: 1) low-angle layer-like pervasive silicifications with disseminated electrum replacing clastic sediments; 2) stockwork bodies with disseminated electrum cross-cutting the low-angle silicifications and 3) bonanza high-angle veins of open-space filling. The main textures of the high-angle veins are massive, banded and colloform-banded ones. The latter contain electrum in economic grades. The objective of the present abstract is to outline the main outcomes of mineralogical study of colloform-banded textures from some auriferous high-angle veins with respect to their depositional environment.

The studied textures came from auriferous high-angle veins cropping out on the summit of Ada Tepe ridge. The colloform-banded textures reach 50 cm in width, but commonly the first few cm, and characterize with botryoidal surfaces of the bands. There is macro- and micro-scale banding. The width of macro-scale bands varies from the first few mm to some cm. The micro-scale banding reaches 1-2 mm in width but commonly is of sub-millimetre range. This finest banding appears bonanza electrum ore. The colloform-banded macro- and micro-textures are represented by alternating milky, water clear, pale grey, pale beige (due to abundance of pale beige adularia) and brown in colour bands. The bands differ in quartz/adularia ratio, grain size, porosity, quantity of opaque microinclusions, and electrum and pyrite contents. Some bands have comb texture, but bands of random mineral growth on the substrate predominate. Other bands are entirely composed of bladed texture – presumable replacement of quartz and adularia after platy calcite (Dong et al., 1995).

The colloform-banded macro-textures are mainly composed of microcrystalline quartz and adularia. They also contain dispersed electrum and pyrite. Micro-scale sericite and chalcedony are rarely met. Quartz and adularia are commonly subhedral to anhedral and sized to about 20 μm ; their coarsest grains are subhedral and reach 200-300 μm , rarely 500 μm . Adularia commonly forms rhombic outlines and in places columnar ones. It reaches 50 vol. %. Generally, chalcedony does not exceed 1-3 vol. %; in places reaches 3-5 vol. %. Pyrite is less than 1 vol. %, occasionally up to 3 vol. %. Electrum forms dispersed grains less than 20-30 μm in size, interstitial to and intergrown with quartz and adularia.

The millimetre- and submillimetre-scale bands contain to around 20 bands of minimal width about 50 μm . They are composed of micro- to cryptocrystalline anhedral quartz and adularia grains sized below 5-3 μm , and in some cases of virtually isotropic silica. Adularia abundance is in the range of 50-80 vol. %. The bands are highly enriched (up to 50 vol. %) in electrum, which is visible under the microscope and more rarely - by naked eye. It forms dendrite-like aggregates developed transversely and obliquely to the banding and comparatively coarse clots. In places the bands contain dispersed fibrous chalcedony, commonly to 5 vol. %, and pyrite grains and aggregates to 30 vol. %.

Widespread rhombic adularia and quartz pseudomorphs after platy calcite provide mineral evidence of boiling (Browne, 1978; Dong et al., 1995, etc.). The increased abundance of adularia, smaller grain size and exclusively anhedral outlines of quartz and adularia in the electrum-rich microbands compared to the colloform-banded macro-textures we relate to more intense boiling of hydrothermal fluids during the formation of former accompanied by higher supersaturation of silica and higher rate of nucleation. The presence of microcrystalline, cryptocrystalline and virtually isotropic silica in the electrum-rich microbands from different veins is an indication of different levels of silica supersaturation, which in some cases have reached the saturation levels of amorphous silica.

Key words: auriferous colloform banded texture, quartz, adularia, electrum, low-sulfidation Khan Krum gold deposit, Krumovgrad Goldfield