European Mineralogical Conference
Vol. 1, EMC2012-279, 2012
European Mineralogical Conference 2012

Mineralogy of the Medieval Ag-Au ores in the Banská Štiavnica ore district (Slovakia)

K. Berkh (1), J. Majzlan (1), M. Chovan (2), J. Kozák (2), and F. Bakos (3)

(1) Department of Mineralogy, Institute of Geoscience, Friedrich-Schiller-University, Jena, Germany (khulan.berkh@uni-jena.de), (2) Department of Mineralogy and Petrology, Comenius University, Bratislava, Slovakia, (3) EMED Slovakia, Banská Štiavnica, Slovakia

The investigated sites Banská Belá, Treiboltz, and Kopanice are epithermal Ag-Au occurrences that belong to the Banská Štiavnica ore district (∼150 km east of Bratislava, Slovakia). The Banská Štiavnica ore district is one of the largest in the Carpathian arc and has been mined since prehistoric times. However, the mineralogy of the ores exploited in the Medieval times is largely unknown because the richest ores were exhausted three centuries ago. We focus specifically on these historic occurrences and investigate them from polished sections from drill core samples, heavy mineral concentrates, and chemical analysis.

The mineralisation is hosted by partially hydrothermally brecciated, silicified and sericitized andesitic-dacitic subvolcanic rocks. Precious metals occur with base-metal sulfides in extensional or stockwork-like veins and as disseminations or breccia cement. The base-metal sulfide association is dominated by pyrite (up to 6 wt.% As), arsenopyrite, and marcasite. Minor phases are chalcopyrite, sphalerite, galena and very rare pyrrhotite. Sphalerite contains locally up to 0.4 wt.% Cd, similar to the Rabenstein occurrence near Banská Hodruša, Slovakia (Majzlan, 2009).

The precious metal ores comprise silver-rich sulfides and sulfosalts, such as acanthite (Ag_2S), polybasite-pearceite [$(Ag,Cu)_{16}(As,Sb)_2S_{11}$], pyrargyrite ($Ag_3SbS_3$), stephanite ($Ag_5SbS_4$), rare proustite ($Ag_3AsS_3$) and freibergite ($(Ag,Cu,Fe)_{12}(Sb,As)_4S_{13}$). Polybasite-pearceite is the most common Ag-mineral and contains more antimony than arsenic. Gold occurs as Au–Ag alloy (electrum) and uytenbogaardtite (Ag_3AuS_2). Precious metals are clearly restricted to relatively shallow depths but the base-metal mineralization extends to the deeper portions of the mineralized structures.

Uytenbogaardtite is always associated with acanthite. Electrum with 50 to 60 wt.% gold content occurs principally as inclusions in pyrite, quartz and sometimes in acanthite or chalcopyrite. According to the bulk chemical analysis, the Au grades reach locally >20 g/t.

Some difference were encountered at the historical Treiboltz site, where galena is the major base-metal sufide and contains inclusions of hessite (Ag_2Te) and benleonardite $Ag_8(Sb,As)Te_2S_3$. Except for freibergite, no silver-rich sulfosalts are observed there and the principal Ag carrier is hessite.

The ore mineralisation formed probably in multiple stages. Pyrite is the oldest ore mineral, followed by the base-metal sulfides. Ag-Au minerals appear to be younger than the base-metal sulfides although the precipitation of these two groups of minerals could have partially overlapped in time. Overall, precious metal minerals are comparatively abundant, if base-metal sulfide minerals are minor, and *vice versa*.

Reference

MAJZLAN, J. (2009): Mineralia Slovaca, 41: 45-54.