SILVER MINERALIZATION OF BARITE VEINS, BOGUSZÓW, POLAND

Sławomir MEDERSKI[1], Jaroslav PRŠEK[1] and Żaneta NIEMASZ[1]

[1]*AGH University of Science and Technology, Faculty of Geology, Geophysics and Environmental Protection, Department of Economic Geology, al. Mickiewicza 30, 30-059 Krakow, Poland; mederski@agh.edu.pl*

Introduction

The Boguszów barite deposit is located in the Wałbrzych Depression, which is part of the Intra-Sudetic Depression. The depression is filled with Carboniferous sediments: Kulm facies, Wałbrzych and Biały Kamień Beds, sequences of sedimentary rocks are divided by Upper Carboniferous Chełmiec rhyodacite laccolith. Several barite veins formed as a result of the epithermal activity in late stage of the subvolcanic movement, veins cut Chełmiec laccolith and surrounding sedimentary units (Gruszczyk et al. 1970). Mining activity in the Boguszów area dates back to the 15th century, when Ag-rich galena-tetrahedrite ores were exploited. Since the 18th century only barite has been exploited in the area. Ore mineralization from Boguszów has been described by Paulo (1994). 5 main mineralization stages are distinguished: first one is associated with - quartz + Zn, Ag, Cu, Pb (minor As, Fe, Ni, Bi) sulphides. Another stages are associated mostly with barite, quartz and carbonates. Pyrite, sphalerite, tetrahedrite, chalcopyrite, galena, cobaltite and uraninite were recognized in porphyry and barite veins by Migaszewski (1972). No quantitative results about Ag-mineralization are available in the literature, only proustite was noticed (Traube 1888) without precise identification as well as tetrahedrite with 3 wt. % of Ag (Migaszewski 1972).

Samples and methods

Ore samples with Ag mineralization were sampled in the old dumps close to Segen Gottes Mine in Boguszów. Main ore minerals (galena and sphalerite) form tiny veinlets up to 1 cm in laminated barite, as well as aggregates up to several cm in barite breccia. Ag minerals and Ag-rich tetrahedrite group minerals mostly form inclusions in galena. Additionally, löllingite and gersdorffite occur as inclusions in galena and tetrahedrite aggregates. Silver minerals, main sulfides and sulfarsenide were measured in the Laboratory of Critical Elements at Faculty of Geology Geophysics and Environmental Protection, AGH-UST, Kraków Poland using the JEOL Super Probe 8230. 20 kV of accelerating voltage and beam current 20nA (for galena, sphalerite, bournonite, löllingite, gersdorffite) or 10 nA (for silver minerals) were used for measuring.

Results

The main ore minerals of barite-sulphide ore are galena and sphalerite with small amount of chalcopyrite, tetrahedrite, pyrite, bournonite. Freibergite, pyrargiryte and polybasite, as well as löllingite and gersdorffite form inclusions in galena crystals. Galena forms autonomous aggregates up to several cm and series of parallel veinlets in barite veins. Some of the aggregates are enriched with Ag minerals inclusions. Sphalerite is overgrown with galena and chalcopyrite Intensive brown internal reflections are observed, which are related to the Cd admixture (from 0.66 to 4.2 wt. %). There are four generations of the tetrahedrite group minerals defined by silver content: low-Ag tetrahedrite (1.45 to 3.87 wt.% Ag), Ag-tetrahedrite I (6.20 to 9.08 wt.% Ag), Ag-tetrahedrite II (17.81 to 22.68 wt.% Ag) and freibergite (29.75 to 32.77 wt.% Ag). Low-Ag tetrahedrite is observed as fresh idiomorphic crystals or aggregates up to 3 mm without any mineral inclusions. Ag-tetrahedrite I occurs and as overgrowths with galena and chalcopyrite and as a separate irregular aggregates up to 0.5 mm. Ag-tetrahedrite II forms elongated inclusions up to 100 µm along galena cleavage lines often with Ag minerals inclusions. Some of the Ag-tetrahedrite II is characterized by enrichment in Hg content (up to 7.5 wt. %). Freibegite from the Boguszów with approximate formula $(Ag_{5.53}Cu_{4.44}Fe_{1.88}Zn_{0.08}Bi_{0.01}Hg_{0.01})_{\Sigma=11.95}$ $(Sb_{0.04}As_{7.51})_{\Sigma=4.05}S_{12.54}$ occurs as a zonal rims up to 20 µm around pyrargiryte. The investigated pyrargiryte forms inclusions up to 50 µm in galena crystals, as well as aggregates intergrown with chalcopyrite up to 100 µm. Pyrargyrite crystals are characterized by homogenous chemical composition. Polybasite with approximate formula $(Ag_{14.88}Cu_{1.27}Bi_{0.01})_{\Sigma=16.16}Sb_{1.84}S_{10.42}$ occurs as tiny rounded inclusions up to 50 µm in galena. On the other

hand löllingite and gersdorffite inclusions up to 10 μm are observed in galena and tetrahedrite aggregates. Significant cobalt content in löllingite (up to 7.2 wt.%) and gersdorffite (up to 12.7 wt.%) are present. Gersdorffite aggregates differs mainly in Ni content (from 18.0 to 26.4 wt.%).

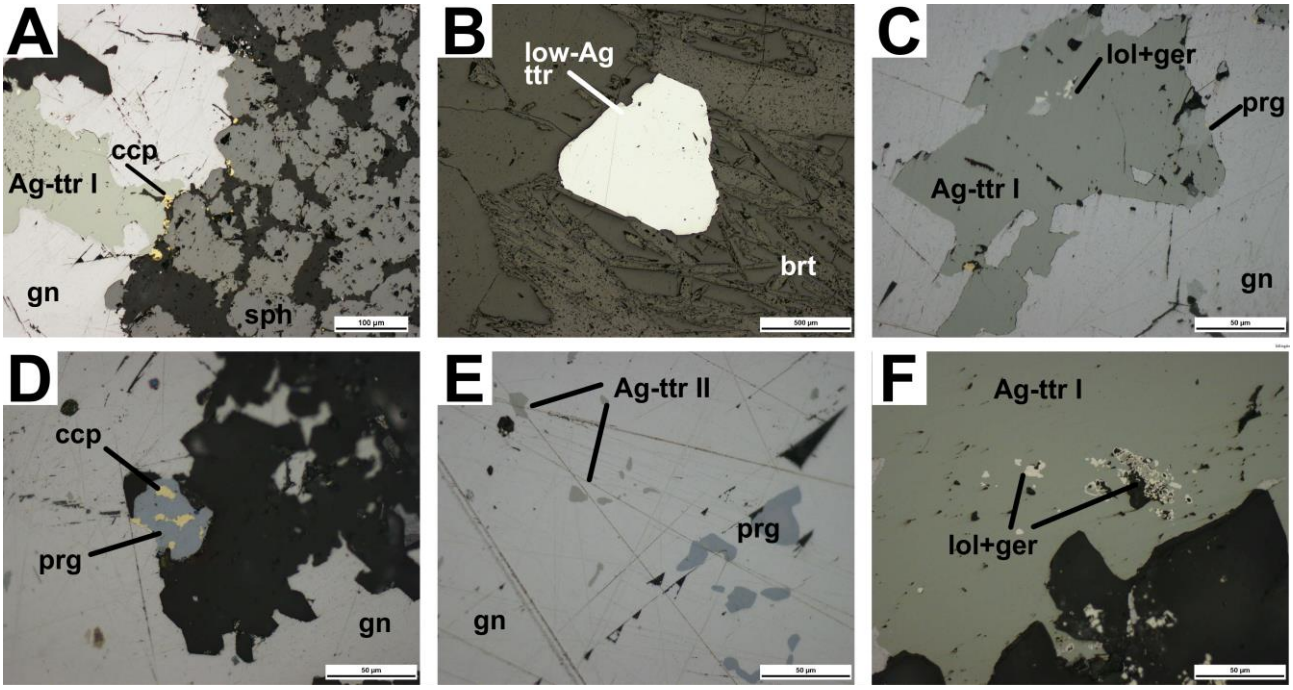

Figure 1. *Reflected light photomicrographs demonstrating ore paragenesis. A. Galena (gn) – Ag-tetrahedrite I (Ag-ttr I) – sphalerite (sph) aggregate with chalcopyrite (ccp). B. Separate idiomorphic low-Ag tetrahedrite crystal (low-Ag ttr) in barite (brt). C. Galena – Ag-tetrahedrite I aggregate with pyrargiryte (pyr) and löllingite, gersdorffite (lol+ger) inclusions. D. Pyrargiryte – chalcopyrite aggregate. E. Ag-tetrahedrite II (Ag-ttr II) and pyrargiryte inclusions in galena. F. Löllingite-gersdorffite crystals in Ag-tetrahedrite I aggregate.*

Conclusions

Interesting silver mineral paragenesis was identified in the barite veins from Boguszów. This is the first mineralogical description of this mineralization of barite veins from Poland. Tetrahedrite group minerals are typical for many hydrothermal veins and mineralization and host Ag. Moreover, other Ag minerals: pyrargyrite and polybasite were recognized.

References

Gruszczyk H., Paulo A., Smolarska J., 1970. Obecny stan wiadomości o budowie złoża barytu w Boguszowie na Dolnym Śląsku. Prace Instytutu Geologicznego, 59, 69-84.

Migaszewski Z., 1972. Mineralizacja kruszcowa w złożu barytu w Boguszowie. Rudy i Metale Nieżelazne, 9, 425-428.

Paulo A., 1994. Geology of Barite Veins in the Polish Sudetes. [In:] Seltman, Kämpf, Möller (eds.). Metallogeny of Collisional Orogens. Czech Geological Survey, Prague, 383-390.

Traube H., 1888. Die Minerale Schesiens. JU Kern.