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Preliminary mineralogical data on epithermal ore veins associated with Rosia Poieni porphyry copper deposit, Apuseni Mountains, Romania

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Rosia Poieni is the largest porphyry copper (±Au±Mo) deposits associated with Neogene magmatic rocks from the South Apuseni Mountains, being located approximately 8 km northeast of the town of Abrud.
During a recent examination of some epithermal mineralized veins, crosscutting the porphyry mineralization from the Roşia Poieni deposit, two species of tellurides and one tellurosulfide minerals were identified.
The studied samples were collected from the + 1045 m level, SW side of the open pit and are represented by epithermal veins, crosscutting the porphyry copper mineralized body. The thickness of the veins is almost 4 cm.
Following reflected-polarized light microscopy to identify the ore-mineral assemblages, the polished sections were studied with a Scanning Electron Microscope (SEM) equipped with a back-scattered electron (BSE) detector to study fine-sized minerals. Quantitative compositional data were determined using a Cameca SX 50 electron microprobe (EMP). Based on optical microscopy, SEM and EMPA three mineral associations have been separated inside the epithermal vein, from the margins to the centre:
1. quartz+tennantite-tetrahedrite+goldfieldite+pyrite+sphalerite;
2. quartz+pyrite+tellurobismutite;
3. chalcopyrite+hessite+vivianite.
Goldfieldite occurs in anhedral grains and it is associated with tennantite-tetrahedrite and quartz. The electron microprobe analysis gave a variable content in Te between 13.28-13.39 wt.%, 43.34 wt.% Cu, 0.1 wt. % Fe, 0.2 wt.% Zn, 14.68 wt.% As, 4.35 wt.% Sb and 24.84 wt.% S. The calculated formula for the goldfieldite is Cu11.8Te1.8(Sb,As)4S13.4.
The EPM analyses on tetrahedrite-tennantite revealed a low content in Te (0.02-0.03 wt.%) and 42.23 wt.% Cu, 2.67 wt.% Fe, 7.34 wt.% Zn, 0.04 wt.% Sb, 19.28 wt.% As and 28.4 wt.% S. The calculated formula is Cu9.8(Fe,Zn)2.4(Sb,As,Te)3.8S13.
The variable ratio of the Te content may reflect a variable content of Te in the hydrothermal fluids from which the tellurian tetrahedrite precipitated.
Hessite lies close to the grain boundary between the calchopyrite grains, which is associated with vivianite. Electron microprobe analysis gave 57.73 wt.% Ag and 42.27 wt.% Te with calculated stoichiometric formula Ag1.9Te1.1 .
Tellurobismuthite it forms irregular grains and it is associated with quartz and pyrite. Electron microprobe analysis gave 57.20 wt.% Bi and 42.80 wt.% Te with calculated stoichiometric formula Bi2.2Te2.8.
Based on the mineral assemblages separated inside the ore vein and on the ratio of the Te content for the different identified tellurium bearing minerals, we can conclude that the Te content of the fluids from which they precipitated, increased from the margins to the centre of the vein.
In summary, this study of specimens from Rosia Poieni porphyry copper deposit, has resulted in the recognition of some tellurium-bearing minerals, not reported by previous workers. These minerals are represented by tellurobismutite, hessite and goldfieldite and they are associated with epithermal vein mineralization (pyrite, chalcopyrite, sphalerite, tennantite-tetrahedrite, quartz, vivianite). The presence of tellurium indicates the transition between porphyry-style mineralization to epithermal vein mineralization.
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