POLYPHASE AU-AG-AS-CU-BI MINERALIZATION IN THE OROGENIC GOLD DEPOSIT ROTGÜLDEN, AUSTRIA

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gold deposit, geochemistry, geothermobarometry, sulfosalts

The Alpine gold deposit Rotgülden is situated within the Silbereck Formation in the Eastern Tauern Window. It is bound to dolomite marbles and calcareous schists and comprises of four types of mineralisation: 1) Impregnations within dolomite marbles in the footwall of the main ore body, 2) Stock-work mineralisation bound to the main fault zone rich in chalcopyrite, sulfosalts and gold, 3) Massive arsenopyrite-rich pockets (“Derberzkörper”), and 4) High-grade gold zone poor in arsenopyrite ("Kupferkies Kaverne"), which is the focus of this contribution.

Different ore mineral assemblages can be distinguished: 1) Pyrite veinlets with Fe-rich members of the siderite-magnesite series in fine crystalline dolomite marble, 2) Arsenopyrite, chalcopyrite, pyrrhotite, galena and sphalerite; pseudomorphs of magnetite after hematite formed at the contacts in Fe-bearing marbles, 3) Transition from fine grained (0.05-0.2mm) to coarser grained (5-7mm) marble, where the sulphides crystallised together with quartz and sparry calcite; sulfosalts (gustavite, pavonite, pyrargyrite, stephanite, fahlores), matildite, bismuth, gold and electrum formed along micro-cracks, 4) Late replacement of pyrite by magnetite. During this event the removal of silver took place in the sulfosalts resulting in formation of acanthite in micro-cracks.

Arsenopyrite and chlorite geothermometry have been applied to constrain the formation temperatures. Arsenopyrite yielded a mean temperature of ~370°C, but there exist two different stages based on mineral chemistry. The different calibrations of the chlorite thermometer gave variable results ranging from 240°C up to 360°C. The sphalerite geobarometer gave pressures of ~1.5 kbar.

The sulfosalts studied can be classified as members of the lillianite homologous series, pavonite homologous series, fahlores and others. They are displayed in the ternary system $(Bi,Sb)_2S_3$-PbS-$(Cu,Ag)_2S$ and its subsystems. Gold occurs in different mineral assemblages together with 1) arsenopyrite, 2) chalcopyrite, 3) pyrrhotite and 4) sulfosalts. Gold is normally rich in silver (40-70 at% Ag), but higher gold contents (up to 70 at% Au) were found in cores of gold grains.