GOLD AND SILVER AT ROTGÜLDEN DEPOSIT - WHERE ARE THEY HOSTED?

Wallner, D.[1], Raith, J.G.[1] & Paar, W.H.[2]

[1] Chair of Resource Mineralogy, Montanuniversität Leoben, Peter Tunner Straße 5, 8700 Leoben, Austria
[2] Pezoltgasse 46, 5020 Salzburg, Austria
dani.wallner@gmail.com

Rotgülden is the largest known Au-Ag-As-Cu-Bi deposit in the eastern Tauern Window and a special type of gold mineralization within the Hohe Tauern area. The host rocks of the stockwork, massive and disseminated ores are Mesozoic metacarbonates of the Silbereck Series and calcareous shales of the Brennkogel Formation. Mineralization is structurally controlled by a shear zone partly forming massive replacement ores linked to a large-scale Alpine fold structure (HORNER et al., 1997).

The different ore types record a poly-phase formation related to the retrograde pressure-temperature-time evolution of Young Alpine regional metamorphism and exhumation of the Tauern Window. Three paragenetic stages are to be distinguished: Stage I) Main sulfide stage (c. 375° - 425°C), Stage II) Gold and sulfosalt stages (>400° (?) - c. 200°C), and Stage III) Low temperature (<200°C) "transformation" stage under rather oxidizing conditions.

Gold is mainly found in the chalcopyrite- and arsenopyrite-rich massive ores. During an exploration campaign in 2013 up to 51.5 g/t Au over 3.9 m and more than 200 g/t Ag were encountered (PAAR, W.H., pers.comm). It occurs in different mineral associations, but is commonly inter-grown with chalcopyrite and various sulfosalts in the paragenetic stages postdating the main sulfide (pyrrhotite, arsenopyrite, pyrite) stage. Gold is normally rich in silver (40 - 70 at.% Ag), but higher gold contents (>70 at.% Au) were found in the cores of some grains. Gold shows a chemical within-grain (growth?) zonation of Au-rich and Ag-rich inner zones. The gold grains are often surrounded by a µm-thin Ag-rich rim.

Gold is commonly associated with Ag-Bi-Pb-sulfosalts, which are important carriers of silver in the deposit. The sulfosalts studied can be classified as members of the galena-matildite solid solution series, the lillianite and pavonite homologous series, and Ag±Cu-rich phases. The most common Ag-rich sulfosalts are gustavite, pavonite, freibergite, stephanite, and matildite. Three types of sulfosalt associations are distinguished: Type 1 sulfosalts are present in symplectitic intergrowths, Type 2 are lath- to prismatic-shaped sulfosalts, and Type 3 sulfosalts are low-temperature decomposition and reaction products of the earlier formed sulfosalts. The minerals of the Type 1 sulfosalt association are characterized by rather higher silver, selenium, and antimony contents compared to the other sulfosalt associations.

The final paragenetic stage is characterized by formation of Ag-bearing sulfides such as acanthite, Ag-rich galena (<10 at.% Ag) and Ag-rich chalcopyrite (<4.5 at% Ag).

HORNER, J., NEUBAUER, F., PAAR, W.H., HANSMANN, W., KOEPPEL, V., ROBL, K. (1997): Mineralium Deposita 32, 555–568.