

GOLD IN THE HISTORIC COPPER DEPOSITS AT FLATSCHACH, STYRIA

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The project area of this Master thesis (LEITNER, 2012) is located NW of Knittelfeld at Flatschach, Schönberg and Tremmelberg. Copper was mined from several vein type deposits (Brunngraben, Weißenbach, Adlitzgraben) in this abandoned mining district. Currently, these historic deposits are re-investigated by Noricum Gold Ltd. for their gold contents.

Copper-gold mineralisation is hosted in a set of NE-SW to NNE-SSW trending and steeply NW dipping vein structures in medium-grade metamorphic rocks of the Austroalpine basement. The immediate host rocks of the mineralisation include a banded metabasite - biotite gneiss sequence containing relicts of metaultramafic rocks, orthogneisses and granite gneiss. The whole sequence is interpreted as part of the Gaaler Schuppenzone, a tectonically fragmented continuation of the Speik Complex (plus others). Tectonically it is assigned to the Silvretta-Seckau nappe system. Formation of the mineralised quartz-carbonate veins postdates the main stage of ductile deformation (main foliation, flat W plunging folds) and amphibolite facies regional metamorphism of Eoalpine age. Sericite-carbonate alteration has been documented around the veins in gneissose rocks.

Based on ore microscopy and EMPA analyses three paragenetic stages can be distinguished. All three are gold bearing. Stage 1 includes the primary hydrothermal ore assemblage characterised by Fe-rich sulfides such as chalcopyrite, pyrite, arsenopyrite with minor associated alloclasite, enargite, bornite, native bismuth, matildite, sphalerite and galena.

Stage 2 includes Cu-rich Fe-poor sulfides like digenite, anilite, covellite etc. and the rare Cu arsenides domeykite and koutekite. Gold of Stages 1 and 2 has similar chemical composition ranging from pure gold (95% Au) to electrum (~70% Au, ~30% Ag). Stage 3 is characterized by a strongly oxidised alteration assemblage (not yet studied in detail) with hematite, cuprite, and various Cu- and Fe-hydroxide and carbonate minerals (goethite, malachite etc.). Gold of Stage 3 is Ag-rich electrum and has higher Hg contents.

The exact age of the Cu-Au mineralisation is not known. However, from geological reasons the timing of mineralization is constrained between the post-peak metamorphic phase of Late Cretaceous regional metamorphism and deposition of the Neogene sediments of the Fohnsdorf-Seckau basin. The Cu-(Au) deposits in the Flatschach area show some similarities with orogenic lode gold deposits, although they document unusual late stage low-temperature hydrothermal (Stage 2) and weathering (Stage 3) processes. During both of these subsequent stages gold was mobilised.

We thank B. Moser and H.P.Bojar from Universalmuseum Joanneum for providing historic material for this study and Noricum Gold Ltd. for permission to publish results of this study.