

ORE PETROGRAPHIC AND GEOCHEMICAL ANALYSIS OF THE POLYMETALLIC COPPER DEPOSIT WALCHEN NEAR ÖBLARN, STYRIA

Brandner, P.¹, Melcher, F.¹, Onuk, P.², Skrzypek E.²

¹Montanuniversität Leoben, Leoben, Lehrstuhl für Geologie und Lagerstättenlehre, Peter-Tunner-Straße 5, 8700 Leoben, Austria

²Universität Graz, Graz, Austria, Institut für Erdwissenschaften, Universitätsplatz 2, 8010 Graz, Austria
e-mail: brandner.peter@live.at

The stratiform sulfide deposit Walchen is an Fe-rich, polymetallic sedimentary-exhalative mineralization, which occurs in greenschist facies metamorphic sedimentary host rocks. The east-west trending orebodies are located in a transition zone between the Wölz Micaschist complex and the Ennstal phyllite zone. A total of five ore types can be distinguished, i.e. pyrite, pyrrhotite, chalcopyrite, sphalerite impregnation ore, and massive pyrrhotite ore. The main ore minerals, in decreasing order of frequency, are pyrite, pyrrhotite, chalcopyrite, sphalerite, and galena. Minor and trace minerals are arsenopyrite, stannite, Ag-bearing fahlore, boulangerite, bournonite, ullmannite-willyamite, jamesonite, cassiterite, ilmenite, gudmundite, Bi-Sb alloys, and Ag-Au-Hg phases.

The gangue is composed of non-sulfidic minerals with the majority being quartz, alkali feldspar, phyllosilicates and carbonates (dolomite-ankerite, siderite). Monazite and xenotime-group minerals, rutile, ilmenite, uraninite and zircon are accessories. The host rock generally consists of the same minerals except of Fe-rich carbonates. Whereas only minor mineralogical and geochemical differences are found between footwall and hanging wall rocks of the orebody, a significant difference is visible in the trace element contents (i.e. Cr, Ni).

LA-ICP-MS trace element analyses of pyrite, pyrrhotite, chalcopyrite, and sphalerite were evaluated. Pyrite shows a strong accumulation of Co (543 ppm) and As (1099 ppm). Chalcopyrite reveals increased median contents for Ag (190 ppm) and In (51 ppm). In sphalerite Fe (8.4 %), Cd (0.16 %), and In (111 ppm) are accumulated. Preferred accumulation of trace elements in a certain ore type could not be recognized. However, sphalerite and chalcopyrite in massive ore samples (Ph-DE) often show elevated trace element concentrations.

Mineral chemical analyses indicate that the metamorphic overprint of the deposit took place at temperatures of at least 350 °C at pressures around 3.8 kbar. Uranium-lead measurements with the electron microprobe on micro-uraninites from the impregnation ores show a mean age of 93 Ma which is interpreted as the age of the last metamorphic overprint.