W-SN MINERALISATION IN CALC-SILICATE ROCKS OF THE BASAL AMPHIBOLITE UNIT AT MESSELINGSCHARTE (FELBERTAUERN AREA, AUSTRIA)

Ordosch, A.[1], Raith, J.G.[1]

[1]Chair of Resource Mineralogy, Montanuniversität Leoben, Peter-Tunner Straße 5, 8700 Leoben, Austria
alexander.ordosch@icloud.com

An unusual W-Sn mineralisation occurring at Messelingscharte in Early Palaeozoic amphibolites of the Basal Amphibolite unit in the Tauern Window was re-investigated as part of an ongoing exploration programme by WBH AG. Four types of scheelite mineralisation are distinguished. (1) Scheelite-bearing calc-silicate pods, (2) Discordant, deformed scheelite-quartz veins, (3) Scheelite in concordant mylonitic quartz-amphibolite layers, (4) Scheelite on joint surfaces. Type 1 and 2 are assumed to be pre-Alpine (Variscan?) formations.

The mineralised calc-silicate rocks occur as metre-sized irregular shaped pods. They are composed of major clinozoisite, quartz, and plagioclase with minor to accessory scheelite, titanite and chlorite. Bulk geochemistry reveals high concentrations of W (≤7.74 mass% WO_3), Sn (≤1254 ppm SnO_2), Be (≤41 ppm) and transition metals (Cu, Pb, Zn; ∑≤2500 ppm) in these rocks.

Three scheelite generations are distinguished based on micro-textures, zoning, Mo-content and luminescence colour. The first generation is coarse-grained and Mo-rich (0.82-1.7 mass% MoO_3) and normally preserved in the cores of large scheelite porphyroblasts. It is interpreted as primary pre-Alpine (Variscan?) scheelite. Scheelite generations 2 and 3 are Mo-poor/free and are interpreted as metamorphic mobilisations and recrystallisation products formed during Variscan (?) and/or Young Alpine regional metamorphism. Hence, similar to Felbertal scheelite deposit (Scheelite 1 and 2 there), pre-Alpine Mo-rich scheelite was overprinted by two stages of metamorphism.

A unique feature of scheelite mineralisation at Messelingscharte is the association of W with Sn. Clinozoisite and titanite were identified as the main Sn-bearing phases (clinozoisite ≤3.00 mass% SnO_2, =0.09 apfu; titanite ≤6.48 mass% SnO_2). Sn-bearing clinozoisite (large anhedral grains with irregularly shaped Sn-rich lamella) was also affected by metamorphic recrystallisation; the later formed fine-grained, euhedral metamorphic clinozoisite is Sn-free. Substitution of $(Al, Fe)^{3+}$ by $(Sn, Ti)^{4+}$ in clinozoisite is explained by simultaneous incorporation of divalent cations like Fe^{2+}. Titanite shows patchy irregular zoning defined by Sn-content and rarely hosts very small (<3 µm), roundish cassiterite grains.

Mineralogy, bulk geochemistry and mineral chemistry point to a magmatic hydrothermal source of fluids causing calc-silicate alteration (cf. ALDERTON & JACKSON, 1978). The studied calc-silicate rocks clearly differ from metamorphic clinozoisite segregations known in the Tauern Window and from clinozoisite-rich calc-silicate patches in the Felbertal tungsten deposit. Future exploration and research must test the hypothesis that Messelingscharte is a type of distal skarn associated with a so far unidentified granite (Felbertauern augengneiss?).

ALDERTON, D.H.M., JACKSON N.J. (1978): Mineralogical Magazine, 42, 427-434.