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Metallogeny and economic potential of Mo mineralization in the Erzgebirge-Krušné hory (Saxony/Bohemia), central Europe

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Worldwide the most important Mo resources are associated with continental rift-related high F-type Mo (Climax) and continental volcanic arc-related low F-type Mo porphyry-stockwerk (Quartz-Hill) and Cu-Mo(-Au) porphyry deposits (e.g., El Teniente, Erdenet) [1, 2]. Medium and small deposits of skarn ores and quartz-molybdenite veins (possibly related with LCT-pegmatites) with Mo contents of up 1 wt.% cover c. 10 % of the Mo world reserves (e.g., Tyrny Auz, Preissac) [3].

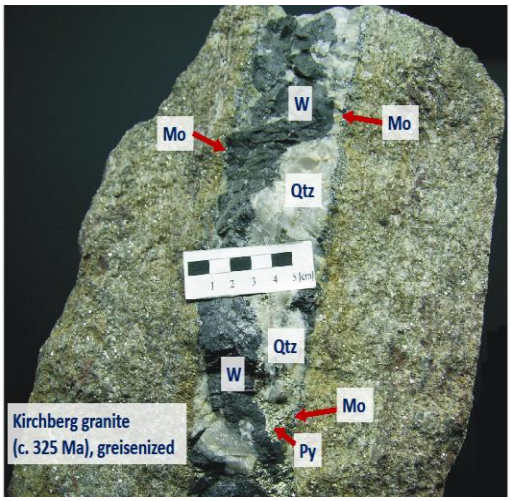

Fig. 1: Wolframite(W)-pyrite(Py)-molybdenite(Mo)-quartz(Qtz) vein hosted by greisenized granite, Pechtelsgrün W-Mo deposit, Erzgebirge, Germany.

Other Mo occurrences are related with breccia-, greisen- and vein-type Sn(-W-Mo)-polymetallic (e.g. Heberton-Mt. Garnet and Wolfram camp, Erzgebirge-Krušné hory) and W(-Mo-Bi) mineralization (e.g. Mt. Pleasant, Erzgebirge-Krušné hory) [1, 4, 5, 6]. One of the most important rare metal metallogenic provinces in Europe is the Erzgebirge-Krušné hory. This region was important for the mining of Ag-, Sn-, Cu-, Co-, W-, U-, and fluorite-barite ore deposits from the 12th century until 1990. In the middle of the 20th century an unknown quantity of Mo was produced from Sn-Mo-deposits in the Erzgebirge-Krušné hory [5, 6, 7]. Three different types of Mo mineralization can be distinguished: 1.) Sn-W-Mo(-As-Bi-Zn-Cu-In) greisen, veins and stringer zones (Altenberg, Sadisdorf, Ehrenfriedersdorf, Gottesberg), 2.) Mo-enriched polymetallic-quartz-topaz-fluorite explosive breccia pipes (Krupka, Sadisdorf), 3.) wolframite(-molybdenite-bismuthinite)-quartz veins (Pechtelsgrün).

The indicated Mo resources in the Erzgebirge-Krušné hory are about 10 kt [5, 7, 8]. The largest Mo concentration is related to the Altenberg Sn deposit with a pre-mining resource of 75 Mt ore @ 0.02 wt.% Mo [7]. The high HFSE (Nb, Ta, Sc, Th, In) concentrations in wolframites (up to 7 wt.% Nb, up to 0.6 wt.% Ta, up to 1.1 wt.% Sc, up to 67 ppm Th), scheelites (up to 0.39 wt.% Sc) and in paragenetic associated cassiterites (up to 0.9 wt.% Nb, up to 0.45 wt.% Ta, up to 1.1 wt.% Sc) and sphalerites (up to 2.5 wt.% In) may reflect the influence of mantle-derived fluids. High formation T and p of the fluids responsible for the formation of W-Mo and Sn-W-Mo mineralization stages are indicated by primary fluid inclusions in cogenetic quartz and cassiterite with T_h 350 °C to 600 °C and p up to 1210 bar [9].

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