Hydrothermal processes in Sangdong W-Mo deposit, Korea

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Sangdong W-Mo deposit located in NE of S. Korea consists of stratabound orebodies mostly in the intercalated carbonate layers in the Cambrian Myobong slate. The scheelite-molybdenite ores are associated by the Upper Cretaceous hydrothermal activity (82-83 Ma) [1], while no exposed outcrops of associated intrusions. The major ore-bearing layers consist of 'footwall orebody', 'main orebody', and 'hangingwall orebody'. Each layers are skarnized earlier hosting minor scheelite, and the central part of the skarns are subsequently crosscut by the swarms of quartz veins hosting major scheelite-molybdenite ores. Two types of alterations around the quartz veins overprint the earlier garnet-pyroxene skarn, 1) amphibole alteration and 2) quartz-mica (biotite-muscovite) alteration. Recent drill core exploration located the molybdenite-bearing quartz veinlets with sericite alteration in the Jangsan quartzite underneath the Myobong slate [2].

Fluid inclusions in the quartz veins from the footwall orebody, the main orebody, and the deep quartz-molybdenite veins are mostly liquid–rich aqueous inclusions having bubble size of 10-20 vol.%, salinities of 2-8 wt% $NaCl_{eqv.}$, and homogenization temperatures of 150-350 °C. Densities of the aqueous inclusions are 0.70-0.94 g/cm^3. No brine inclusions were observed in the vein, which indicates no phase separation of the hydrothermal fluids. The fluid isochore are combined with Ti-in-quartz geothermometry to constrain the *P-T* conditions during the ore formations.

The fluid inclusions were subsequently analysed by the LA-ICP-MS. The similar Rb/Sr ratios in the in fluid inclusions of the respective orebodies indicate same fluid or igneous source, while changing Cs concentrations in the fluids indicate a batholith-scale fractionation of the associated magma. REE patterns and the concentrations of the redox–sensitive trace elements such as Mo, U, and Th in the scheelite suggest a redox change in the hydrothermal ore-forming fluids, which might control the molybdenite precipitation in Sangdong deposit.

[1] Farrar E. *et al*. (1978) *Econ. Geol*. **73**, 547-566.
[2] Moon K.J. (1991) *J. Geochem. Explor*. **42**, 205-221.