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Scheelite deposits in the Taebaeksan region, Korea

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The Taebaeksan region is in the eastern part of the Korean Peninsula. The region includes an economically significant ore district for W-Mo-Fe-Pb-Zn mineralization. Ore deposits in the region are hosted by Cambrian-Ordovician carbonate-rich sedimentary formations of the Josun Supergroup, which were subsequently overprinted by a series of hydrothermal events associated with Late Cretaceous intrusions of the Bulkugsa orogeny. This formed numerous skarn, carbonate replacement, and high-Ca calcite marble deposits.

The Sangdong W-Mo-Bi deposit is the largest tungsten deposit in the region. The deposit is hosted by the skarn-bearing intercalated carbonate-rich layers in the Cambrian shale of the Myobong Formation. The skarns have been subsequently crosscut by a series of hydrothermal quartz veins with surrounding alteration of amphibole → mica (biotite + muscovite) → muscovite. Major scheelite-molybdenite ore deposition in the Sangdong deposit is associated with the mica alteration. A muscovite Ar-Ar age for the ore-bearing veins is 87-86 Ma. Fluid inclusions in the quartz veins are dominantly liquid–rich aqueous inclusions with salinities of 2 - 8 wt% NaCl eqv. and homogenization temperatures of 150 - 350 °C. Redox–sensitive trace elements and REE patterns in the Sangdong scheelite indicate that a host rock-controlled redox change in the hydrothermal fluids might have controlled the major molybdenite precipitation. We further analyzed trace elements in scheelite grains form scheelite-bearing samples from skarns, replacements, and hydrothermal veins in the Taebaeksan region to establish a geochemical tool for a scheelite exploration in the region. We compared REE patterns and concentrations of incompatible elements in the scheelites between relatively tungsten-poor areas and the tungsten-rich Sangdong area, and this has been used to determine the ore-forming potential in areas in the Taebaeksan ore district.