

Multi-stage scheelites from the Weondong W-deposit, south Korea: Indicator of ore-forming fluid evolution

WOOHYUN CHOI¹, CHANGYUN PARK², DONGHOON CHUNG³, YUNGOO SONG⁴

¹Yonsei Univ. BK21+ institute of Earth, Atmosphere, Astronomy, Seoul, Korea., woohyun16@yonsei.ac.kr

²Yonsei Univ. BK21+ institute of Earth, Atmosphere, Astronomy, Seoul, Korea., changyun@yonsei.ac.kr

³Yonsei Univ. BK21+ institute of Earth, Atmosphere, Astronomy, Seoul, Korea., dongh21@yonsei.ac.kr

⁴Yonsei Univ. BK21+ institute of Earth, Atmosphere, Astronomy, Seoul, Korea., yungoo@yonsei.ac.kr

Scheelite (CaWO₄) occurs both in massive skarn zone (Type-I) and porphyry fracture zone (Type-II) of the Weondong W-deposit, south Korea, as a typical solid solution with powellite (CaMoO₄). We tried to reveal the relationship between evolution of ore-forming fluid and the multi-stage scheelites, based on the micro-textural and geochemical characterization. Type-I scheelites can be divided into the ones precipitated in the prograde and the retrograde stages, respectively. Prograde scheelite is characterized by the complex internal textures of oscillatory zoning dissolution and recrystallization, whereas retrograde one shows W-rich in composition with no internal texture, strongly indicating the reduced condition during the late retrograde stage. Type-II scheelite in the early stage also shows the complex internal textures like the prograde type-I scheelite, normally occurs along microfractures. Coexistence with fluorite (CaF₂) in the early stage refers F-rich fluid origin, and sulfides in the late stage confirms retrograde.

Trace and REE chemistry of both scheelites are distinctly different in the early stage, but their REE patterns both become flat in the later stage. This strongly indicates that the scheelites were formed by the different W-mineralization processes, and affected by dynamic fluid fluctuation in each early stage (magmatic-to-hydrothermal fluid in the open system and residual fluids in the closed system). But during the retrograde process, meteoric water mixing results into decrease of REE and reduced condition. The geochemical characteristics of both scheelites were well matched with their micro-textural features, and provide crucial evidences to understand the fluid evolution history of skarn in the Weondong W-deposit.

Keyword: scheelite, powellite, W-mineralization, skarn, REE, fluid evolution