

Geochemistry of the Pb-Zn orebodies in the Taebaeksan metallogenic belt, Korea

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The Taebaeksan region, NE of S. Korea, is an important metallogenic belt for W-Mo-Fe-Pb-Zn. It has been the largest domestic Pb-Zn producer. Pb-Zn orebodies in the region are characterized by 1) skarn, 2) carbonate replacement, and 3) vein or breccia type, hosted by the Cambrian-Ordovician carbonate sequence (the Joseon supergroup). We collected sphalerite-bearing ore samples from the orebodies of 11 areas including metal mines, marble mines, and prospecting areas to study the Zn mineralization processes in the region.

Several minor carbonate-replacement Pb-Zn orebodies were found in the undergrounds and drill cores of the Seongwoo high-Ca marble mine, one of the area in the region, showing various sphalerite precipitation features from the lowest to upper levels. Carbonate-hosted breccia filling sphalerite-pyrite ores were found in the lowest drill core level. At the upper underground level, the sphalerites in the lens- or pocket-shaped ores are sequentially associated with 1) arsenopyrite, 2) pyrrhotite, and 3) galena-chalcopyrite. Another sample from the same level is a massive sulfide ore rich in galena, chalcopyrite, and red-colored coarse-grained sphalerite. The ore mineral assemblages in the mine suggest an evolution of Zn-bearing hydrothermal fluids. Fluid inclusions in the red-colored possibly the late stage sphalerite have homogenization temperatures around 260-290 °C.

We hand-picked sphalerite grains in the orebodies of the 11 areas in the Taebaeksan region for the fluid inclusion study and the geochemical analysis. Stable S and Zn isotopes in the sphalerite are studied to construct a geochemical model for the Pb-Zn mineralization in the Taebaeksan metallogenic belt. The model of temporal-spatial Zn-forming processes from the orebody- to regional-scale will be applied for the mineral exploration in the region.