

## **Geochemistry of the Zn-Pb Orebodies in the Taebaeksan Metallogenic Belt, Korea**

Jun Hee Lee,\* Bong Chul Yoo, Chan Su Kim, Tong Ha Lee, and Jung Hun Seo

Inha University, Incheon, Republic of Korea, \*e-mail, 312leemar@gmail.com

The Taebaeksan region, located in the northeastern part of South Korea, is an important metallogenic belt for Zn-Pb-W-Mo-Fe deposits. The Zn-Pb orebodies in the region are hosted in an early Paleozoic carbonate sequence and are characterized by skarn, carbonate replacement, and vein or breccia type ores formed by Late Cretaceous to early Paleogene magmatic-hydrothermal activity. We collected sphalerite-bearing samples from the orebodies of 15 areas, including metal deposits, high-Ca marble deposits, and exploration locations, to study the Zn mineralization processes and assist Zn-Pb geochemical exploration in the region.

The composition of sphalerite by microanalyses presents distinct features depending on deposit and mineralization type. Sphalerite from economically significant Zn-Pb deposits is characterized by wide ranges of Zn/Cd ratios (87.6 ~ 201.5) and low ranges of Fe/Mn ratios (6.7 ~ 33.1). Tungsten-bearing deposits are remarkably high in Cd content. Cobalt and In are rich in the high-T skarn type ores, whereas Ga, Ge, and Sn tend to be concentrated in the carbonate replacements and vein or breccia type ores formed at relatively low-T. Lead isotope compositions of sphalerite show a well defined positive linear trend with those of Precambrian basement and Cretaceous igneous rocks in the Taebaeksan region. Major Zn-Pb producers display lower isotopic values close to the igneous rocks and have narrow isotopic variations compared to the minor Zn-Pb deposits. This suggests the magmatic-hydrothermal fluids from the Cretaceous intrusions are significant in formation of the economic Zn-Pb orebodies, whereas minimal fluid-rock interaction has taken place with the Precambrian basement. Zinc isotope analyses of the sphalerites show spatial variations. The features of Zn isotope fractionation and sphalerite composition can be combined to construct an orebody- to regional-scale geochemical model for the hydrothermal Zn-Pb mineralization in the Taebaeksan metallogenic belt, which will be applied to mineral exploration in the future.