Intrusion-related gold deposits of Korea

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Contrasts in the style of the gold-silver mineralization in geologic and tectonic settings in Korea, together with radiometric age data, reflect the genetically different nature of hydrothermal activities, coinciding with the emplacement age and depth of Mesozoic magmatic activities. It represents a clear distinction between the plutonic settings of the Jurassic Daebo orogeny and the subvolcanic environments of the Cretaceous Bulgugsa igneous activities. During the Daebo igneous activities (about 200~130 Ma) coincident with orogenic time, gold mineralization took place between 197 and 127 Ma. The Jurassic deposits commonly show several characteristics : prominent association with pegmatites, low Ag/Au ratios in the ore-concentrating parts, massive vein morphology and a distinctively simple mineralogy including Fe-rich sphalerite, galena, chalcopyrite, Au-rich electrum, pyrrhotite and/or pyrite. During the Bulgugsa igneous activities (120~60 Ma), the precious-metal deposits are generally characterized by such features as complex vein morphology, medium to high Ag/Au ratios in the ore concentrates, and abundance of ore minerals including base-metal sulfides, Ag sulfides, native silver, Ag sulfosalts and Ag tellurides. Vein morphology, mineralogical, fluid inclusion and stable isotope results indicate the diverse genetic natures of hydrothermal systems. The Jurassic Au-dominant deposits were formed at the relatively high temperature (about 300 to 450℃) and deep-crustal level (>3.0 kb) from the hydrothermal fluids containing more amounts of magmatic waters ($\delta^{18}O$; 5~10 ‰). It can be explained by the dominant ore-depositing mechanisms as CO_2 boiling and sulfidation, suggestive of hypo/mesothermal environments. In contrast, mineralization of the Cretaceous Au-Ag type (108~71 Ma) and Ag-dominant type (98~71 Ma) occurred at relatively low temperature (about 200 to 350℃) and shallow-crustal level (<1.0 kb) from the ore-forming fluids containing more amounts of less-evolved meteoric waters ($\delta^{18}O$; -10~5 ‰). These characteristics of the Cretaceous precious-metal deposits can be attributed to the complexities in the ore-precipitating mechanisms (mixing, boiling, cooling), suggestive of epi/mesothermal environments. Therefore, the differences of the emplacement depth between the Daebo and the Bulgugsa igneous activities directly influence the unique temporal and spatial association of the deposit type.

Key words : gold-silver mineralization, Mesozoic granitoids, gold-dominant deposit, gold-silver deposit, silver-dominant deposit

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