Magmatic-hydrothermal processes in Haman, Gunbuk and Daejang Cu deposits, Korea

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Hydrothermal Cu deposits in Haman, Gunbuk and Daejang area are located in south-eastern part of Korean Peninsula. Cretaceous shale in the area are intruded by series of Cretaceous plutonic-porphyritic granodiorites. The shale around the intrusions are metamorphosed to hornfels. The three Cu deposits have common veining and alteration features: (1) early barren stage of pervasive propylitic alteration, cut by (2) ore-bearing quartz veins with amphibole-potassic alterations, and (3) the latest barren calcite veins. While chalcopyrite-pyrite-pyrrhotite are commonly occur in the three deposits, tourmaline-magnetite are predominant in the Haman and sphalerite-galena are abandunt in the Daejang.

Quartz veins contain three types of fluid inclusions: (1) aqueous inclusion, (2) vapor-rich inclusion, and (3) brine inclusion. Occurrences of coexisting vapor-brine inclusion in the assemblage indicates fluid phase separation. The homogenization temperatures (T_h) are 190-590, 200-470, and 320-460 ℃ in the Haman, the Gunbuk, and the Daejang, respectively. Paleo-depths estimated by hydrostatic pressure condition are about 5, 3 and 3 km in the Haman, the Gunbuk, and the Daejang deposits, respectively.

Similar Al concentrations in the quartz of the Haman and the Gunbuk indicate comparable hydrothermal pH conditions. Similar Ti concentrations in the quartz of the Gunbuk and the Daejang indicate similar hydrothermal *T* conditions, in good agreement with the result from microthermometry. Metal concentrations in fluids stay constant with changing *P-T* condition, suggesting that metal precipitation may not be significant at the current exposure.

We suggest that the Haman deposit might be formed near deep intrusion center with focused high-*T* fluid flow. The Gunbuk and the Daejang deposits, on the other hand, might be formed at relatively shallower periphery. Based on the reconstructed magmatic-hydrothermal processes in the three deposits, we speculate that a higher-grade orebodies, if any, might not be existing because of denudation.