

Enrichment of precious metals associated with chalcopyrite inclusions in sphalerite and pyrite

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ABSTRACT

The results of investigations into enrichment of precious metals in sphalerite and pyrite from the Maluntou epithermal gold deposit, China, are reported. The obtained data suggest intimate associations of Au- and Ag-bearing nanoparticles with chalcopyrite inclusions in sphalerite and pyrite. The origins of chalcopyrite inclusions involved different hydrothermal processes, including recrystallization-driven phase separation from parent chalcopyrite-sphalerite solid solutions and replacement of pre-existing pyrite in the presence of Cu-bearing fluids. The chalcopyrite blebs/lamellae follow sphalerite {111} planes, which define a shared sulfur layer for both chalcopyrite and sphalerite. This study indicates that mixing and boiling during the evolution of ore-forming fluids for the Maluntou deposit are key processes for the abnormal enrichment of precious metals in sphalerite and pyrite. The chalcopyrite micro/nano inclusions enhanced enrichment of precious metals in sphalerite provides new insights into the controls on the enrichment of precious metals in sulfides.

Keywords: Chalcopyrite inclusion, precious metal, sphalerite, epithermal gold deposit