S and Pb isotopic composition of the high-sulfidation epithermal copper-gold deposit in Zijinshan, South China

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The Zijinshan high-sulfidation epithermal Cu-Au deposit is situated in the middle of the Zijinshan orefield (South China), which is a porphyry - epithermal Cu-Au-Mo-Ag ore system and located in the interior Cathaysia Block, at the intersection of the Xuanhe Anticlinorium and Shanghang-Yunxiao Fault zone, and at the northeastern margin of the Cretaceous Shanghang Volcanic Basin. The mineralization and zonation of the Cu-Au deposit are related to the emplacement of Early Cretaceous volcanic rocks. The copper and gold orebodies are separate, with gold in the upper zone and copper in the lower zone. The gold-bearing minerals are oxidized ores, mainly containing limonite, hematite, goethite and covellite, with little pyrite, native gold, galena, bornite and digenite. Gangue minerals are mainly quartz. Gold orebodies tend to pinch out above the modern water table near the 650-m level, and are thought to be formed by secondary enrichment as the result of later circulation of modern surface waters through permeable breccia ores. Copper orebodies occur in the alunite alteration zone, below the 650-m level and occur as veins and stockworks, filling in or replace the hydrothermal breccias, altered granite and dacite porphyry.

The early stage pyrites have $\delta^{34}S$ near 0‰, indicating sulphur derived from deep source- mantle. While the late stage pyrites have large range of variation, from -20.35‰ to 3.96‰, due to the influence of tempreture, oxygen fugacity, and acidity, sulfur isotopes experienced large fractionation. $^{207}Pb/^{204}Pb$, $^{208}Pb/^{204}Pb$ and $^{206}Pb/^{204}Pb$ compositions of sulfides are consistent with contemporaneous granites and have a linear relationship, indicating that the lead are mainly from granite. Sulfur and lead isotopes show that ore-forming fluids are exsolved from the granitic magma which are mainly derived from the mantle.