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SEM and FIB-TEM analyses on nanoparticulate arsenian pyrite: Implications for Au enrichment in the Carlin-type giant Lannigou gold deposit, SW China

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Abstract

Gold in Carlin-type gold ores is commonly hosted in the arsenian pyrite rim, but the formation of arsenian pyrite and its contribution to Au adsorption are poorly understood. Based on our previous NanoSIMS Au mapping, we conducted SEM and HR-TEM analyses to examine the Au deportment and nanoscale texture of individual auriferous arsenian pyrite grains from the giant Carlin-type Lannigou gold deposit, SW China. The results indicate that the arsenian pyrite rim is composed of numerous nanoparticulate pyrite grains (rather than a single crystal), and gold nanoparticles (Au^0) occur mainly in sub-rim with the highest Au content, which are porous and have lower degrees of order. We propose that nanoparticulate arsenian pyrite attachment and aggregation is the main mechanism for the arsenian pyrite rim growth, and such mechanism is crucial for the Au efficient enrichment for this giant gold deposit.

Keywords: Nanoparticulate arsenian pyrite, nano-pore, FIB-TEM, Au efficient enrichment, Carlin-type gold deposits