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LETTER

Gold-telluride nanoparticles revealed in arsenic-free pyrite

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ABSTRACT

Pyrite, the most abundant sulfide on Earth and a common component of gold deposits, can be a significant host for refractory gold. This is the first documentation of pore-attached, composite Au-telluride nanoparticles in "arsenic-free" pyrite. Trace elements mapping in pyrite from an intrusion-hosted Au deposit with orogenic overprint (Dongping, China) shows trails of tellurides overlapping Co-Ni-zonation. Intragranular microfracturing, anomalous anisotropy, and high porosity are all features consistent with devolatilization attributable to the orogenic event. The pyrite-hosted nanoparticles are likely the "frozen," solid expression of Te-rich, Au-Ag-Pb-bearing vapors discharged at this stage. Nanoparticle formation, as presented here, provides the "smallest-scale" tool to fingerprint Au-trapping during crustal metamorphism

Keywords: Arsenic-free pyrite, nanoparticles, Au-(Ag)-tellurides, devolatilization