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LETTER

Gold-telluride nanoparticles revealed in arsenic-free pyrite

CRISTIANA L. CIOBANU,^{1,*} NIGEL J. COOK,¹ SATOSHI UTSUNOMIYA,² MASASHI KOGAGWA,² LEONARD GREEN,³ SARAH GILBERT,⁴ AND BENJAMIN WADE³

¹Centre for Tectonics, Resources, and Exploration (TRaX), School of Earth and Environmental Sciences, University of Adelaide, 5005 South Australia, Australia ²Department of Chemistry, Kyushu University, Hakozaki 6-10-1 Higashi-ku, Fukuoka 812-8581, Japan ³Adelaide Microscopy, University of Adelaide, 5005 South Australia, Australia ⁴CODES, University of Tasmania, Private Bag 126, Hobart, Tasmania 7001, Australia

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 Autelluride 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