Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.23909

Two Gold Mineralization Events in the Manaoke Gold Deposit, West Qinling Orogen, Central China: Evidence from the Scheelite U - Pb Chronology and Trace Elements

HUAN TAO[1], SI-YUAN LI[2] AND JIAN-WEI LI[1]

[1]China University of Geosciences

[2]Tianjin Center of China Geological Survey

Presenting Author: huantao@cug.edu.cn

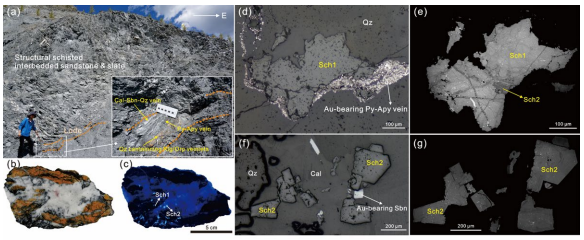

Fig. 1. Photographs of the lode (a), ore hand specimen (b-c), and scheelite microstructures (d-g) of the Manaoke gold deposit. (a) The lode of two occurrences of scheelite was collected, in which hydrothermal quartz (Qz) was first cut by pyrite (Py)- arsenopyrite (Apy) veins and then by calcite (Cal)- stibnite (Sbn)- quartz veins. (b) Ore hand specimen taken from (a). (c) Two scheelite occurrences (Sch1 & Sch2) were visible in sample (b) under ultraviolet light at a wavelength of 254 nm. (d) Sch1 is associated with quartz, cut by a pyrite-arsenopyrite vein (reflected light). (e) Scheelite grain in (d) under cathodoluminescence (CL), showing Sch2 (dark colour) cutting through Sch1 (light colour). (f) Sch2 and stibnite coexist in calcite vein (reflected light). (g) Scheelite grain in (f) under cathodoluminescence (CL).

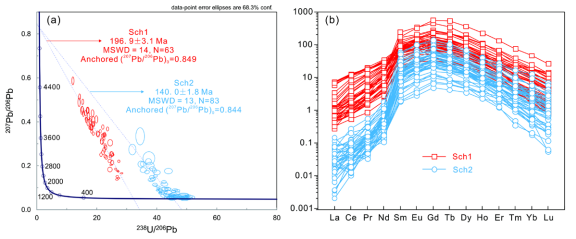

Fig. 2. (a) In situ U-Pb anchored Tera-Wasserburg concordia plot for Sch1 and Sch2 in the Manaoke gold deposit. Errors are reported at 1σ. (b) Chondrite-normalized REE patterns for Sch1 and Sch2 in the Manaoke gold deposit. All data are normalized using the chondrite values of McDonough and Sun (1995).

The West Qinling orogen experienced complex tectonic evolution and associated geological processes (e.g., regional metamorphism, magmatism), in which large varieties of gold mineralization formed, accounting for the second largest gold metallogenic belt (total Au endowment over 2,000 tons) in China. Manaoke is a representative gold deposit in the southern margin of West Qinling orogen. However, its age remains poorly constrained, hampering understanding of metallogenesis and the tectonic regime in which they formed. Here, we integrate paragenesis, geochemistry, and in situ U-Pb geochronology of scheelite to constrain the timing and possible tectonic setting of the Manaoke gold deposit.

Two occurrences of scheelite (Sch1 and Sch2) are recognized based on petrographic observations, paragenetic relations, and interior texture (Fig. 1). The anhedral Sch1 grains are textually homogeneous in cathodoluminescence (CL) images (Fig. 1e) and closely associated with hydrothermal quartz, crystallized slightly earlier than or contemporaneously with auriferous As-bearing pyrite and arsenopyrite (Fig. 1d). The euhedral and subhedral Sch2 grains show oscillatory zones in CL images (Fig. 1g) and coexist with Au-bearing stibnite and realgar/orpiment in calcite veins, which cut early crystallized quartz (Fig. 1c, f). The Sch1 and Sch2 yielded different Tera-Wasserburg lower intercept ages of 196.9 ± 3.1 Ma and 140.0 ± 1.8 Ma (Fig. 2a), respectively, by LA-ICP-MS. In addition, the total REE contents of the Sch1 grains are notably higher than those of the Sch2 grains (Fig. 2b).

In conclusion, Sch1 and Sch2 may record two different tungsten-containing hydrothermal events or probably two discrete gold mineralization events. The early mineralization event coincides with the widespread Late Triassic to Early Jurassic gold deposits in the West Qinling Orogen and might be genetically associated with orogenic deformation and regional metamorphism of the West Qinling orogen during the Yangtze Craton-South Qinling terrane post-collision extension (210-200 Ma). Several other Early Cretaceous orogenic gold deposits (e.g., Daqiao, Maanqiao) have been recently recognized in the region, coeval with the younger mineralization event in the Manaoke gold deposit, implying there might be an extensive Early Cretaceous gold event in West Qinling Orogen that might genetically related to the subduction of the Tethys Ocean.