Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.16588

Fluid Processes of Wolframite-Quartz Vein Systems: Progresses and Challenges

PEI NI

Nanjing University

Presenting Author: peini@nju.edu.cn

Wolframite-quartz vein-type tungsten deposits constitute the world's major tungsten resources and are integral to tungsten production. A major share of this mineralization product is found in Southeast China, with other significant resources in the Central Andean belt, the East Australian belt, the Karagwe-Ankole belt and the European Variscan belt. The ore minerals mainly comprise wolframite, cassiterite, scheelite and pyrite, with minor molybdenite, arsenopyrite and chalcopyrite. In the past few decades, extensive studies on wolframite-quartz vein-type tungsten deposits have been conducted, but many key questions concerning their ore-forming fluid and metallogenic mechanism remain unclear. Additionally, a summary work on the global distribution and fluid characteristics of these wolframite-quartz vein-type tungsten deposits is still lacking. In this contribution, recent progress regarding several major issues related to the fluid processes involved in the forming of these veins are overviewed, and challenges in terms of future research are proposed. These issues include the nature of ore-forming fluids, their sources, and their transportation and wolframite deposition mechanisms. In particular, the affinity between veins and the exposed granitic intrusion from the Zhangtiantang-Xihuashan ore district, where an as-yet undiscovered deep intrusion, rather than the exposed granitic intrusion, was probably responsible for the formation of the wolframite-quartz veins, is reevaluated. Importantly, recent quantitative analysis of wolframite- and quartz-hosted fluid inclusions by laser ablation inductively-coupled plasma mass spectrometry shows enhanced advantages in revealing fluid evolution, tracing the fluid source and dissecting the ore precipitation process. Therefore this study also reviews the existing fluid and melt inclusion composition data from several tungsten deposits to address whether the mineralization potential of the magmatic-hydrothermal systems was directly correlated with the metal contents in the granitic melts and the exsolving fluids.