Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.11797

Magmatic-Hydrothermal Evolution of the Jianfengling Rare Metal Granite, South China: Geochemisry, Fluid and Melt Inclusion Study

BEIER GUO[1] AND KUIDONG ZHAO[2]

[1]State Key Laboratory of Geological Processes and Mineral Resources, Faculty of Earth Resources, China University of Geosciences

[2]State Key Laboratory of Geological Processes and Mineral Resources, Faculty of Earth Resources, China University of Geosciences,

Presenting Author: guobeier2@cug.edu.cn

The magmatic-hydrothermal evolution history of the rare metal granite (Jianfengling) in south China was reconstructed from melt and fluid inclusion studies. The Jianfengling pluton shows a well-developed zonation consisting of K-feldspar granite, albite granite, greisen, and topaz pegmatite. The petrography and geochemistry data indicate that all lithofacies from the Jianfengling pluton are highly evolved. Most silicate melt inclusions and fluid inclusions investigated in this study were isolated or trapped along the growth zone of quartz and topaz crystals that occur within all lithofacies. Some melt inclusions locally coexist with fluid inclusions indicating the coexisting fluid and melt. One primary fluid inclusion type was recognized in quartz and topaz, which is H_2O–NaCl type fluid inclusion. Fluid inclusions trapped in quartz show a relatively wide salinity range (1.40-11.93 wt% NaCl equivalent) and low temperatures (146-378 °C), which gradually decrease with the magmatic fractionation. Fluid inclusions trapped in topaz have higher salinities (6.88-22.03 wt% NaCl equivalent) and temperatures (320-532 °C) and gradually increase with the magmatic fractionation. The liquid-rich inclusions coexist with vapor-rich inclusions with high temperatures (432-543°C) locally found in the pegmatite, which records the depressurization and boiling processes of the late exsolved magmatic fluid. These characteristics indicate that topaz recorded a more complicated fluid evolution history than quartz. LA-ICP-MS data indicate that the magmatic fluid and melt from all magmatic-hydrothermal stages contain high concentrations of rare metal elements such as Li, B, Be, Rb, Sn, W, Ga, and Cs and systematically increase with the magmatic differentiation. Nb and Ta are mainly partitioned into the melt and strongly enriched in the albite granite. Sn and W are partitioned into the fluid and strongly enriched in the greisen and pegmatite. The magmatic differentiation largely controls the formation of the Nb-Ta-rich albite granite, whether exsolution hydrothermal fluids generate the Sn-rich greisen.