

Timing and ore genesis of the giant Renli Ta-Nb deposit in South China

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The newly found Renli Ta-Nb deposit is located in the NE Hunan province, which is the largest pegmatite Ta-Nb deposit found so far in South China. Limited previous researches suggest that the local biotite monzogranite shows a close spatial relation to pegmatites and could be the parental granite of Nb-Ta mineralization, whereas we found muscovite monzogranite has a close spatial relationship to Nb-Ta pegmatites.

Here we present new U-Th-Pb ages of coltan, monazite and zircon, which place a precise constraint on the timing of Nb-Ta mineralization and related magmatism. LA-ICP-MS U-Pb dating of coltan grains from pegmatite yielded a weighted mean $^{206}\text{Pb}/^{238}\text{U}$ age of 140.18 ± 0.84 Ma. Selected zircon grains from the biotite monzogranite and muscovite monzogranite yield two stages weighted mean $^{206}\text{Pb}/^{238}\text{U}$ age of 154.08 ± 0.98 Ma and 141.03 ± 0.84 Ma, whereas monazite grains from muscovite monzogranite yields weighted mean Th-Pb age of 140.72 ± 0.5 Ma. Geochemistry of the biotite monzogranite, muscovite monzogranite and coltan suggests the Nb-Ta mineralization is likely related to highly evolved granite, whereas the muscovite monzogranite shows highly evolved features.

The obtained ages by this study combined with geological and geochemical evidence indicate that the Nb-Ta mineralization is genetically related with the Early Cretaceous (K1) muscovite monzogranite rather than the Late Jurassic (J3) biotite monzogranite. The muscovite monzogranite formed in Early Cretaceous could be a new target for Nb-Ta exploration in South China.