Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.25547

Geochemistry, rare-metal mineralization potential, and zircon and uraninite geochronology of pegmatites of Ijero area, SW Nigeria

OLAWALE KAYODE AROMOLARAN[1], ANTHONY TEMIDAYO BOLARINWA[2], FRANK TOMASCHEK[3] AND THORSTEN GEISLER[4]

[1]University of Ibadan, Ibadan, Nigeria
[2]University of Ibadan Nigeria
[3]Rheinische Friedrich-Wilhems-Universität Bonn
[4]University of Bonn

The rare-element pegmatites (REPs) of the Ijero area occur within ≈400 km NE-SW trending REP belt that extends from southwestern to northcentral Nigeria. The precise emplacement age and ore genesis of the pegmatites within the belt remain largely unresolved. Field relationships, whole-rock and mineral (K-feldspar, muscovite and columbo-tantalite) chemistry and LA-ICP-MS U-Pb zircon and U-Th-total Pb electron microprobe uraninite (associated with tantalite and columbite) geochronology of the Ijero REPs were investigated to unravel their ore-bearing potential and precise emplacement age, so as to decipher the crustal event responsible for their metallogenesis within the polyphase Pan-African orogeny. Whole-rock and microchemical data show moderate to high rare-alkali (Li, Rb, Cs) and rare-metal (Ta, Nb, Sn, W, Ga, Be) contents, while moderate rare-element fractionation, revealed in the pegmatitic K-feldspar (K/Rb≈108.6, K/Cs ≈336.5, Nb/Ta ≈1.31, Ta/W ≈15.9), muscovite (K/Rb ≈42.2, K/Cs ≈101.2, Nb/Ta ≈1.36, Ta/W ≈5.89), and ferrotantantalite/manganotantalite [Mn/(Mn+Fe) ≈0.32-0.58, Ta/(Ta+Fe) ≈0.48-0.67], indicate modestly evolved REPs. The pegmatites belongs to the beryl-columbite subtype of the Li-Cs-Ta (LCT) petrogenetic family. They gave a discordant, late Pan-African U-Pb zircon age of 581±25 Ma and a chemical U-Th-total Pb uraninite age of 553 ± 2 Ma, which are interpreted as the emplacement age and late stage mineralization of the pegmatites. These new ages along with published data suggest that the pegmatites' ore enrichment is related to the main phase of the post-collisional Pan-African multiphase granitoid magmatisms, which possibly generated highly evolved, rare element-rich residual pegmatite melts from the fractionation of hidden fertile S-type granitoids.