Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.37880

Occurrence and distribution of titanite as a proxy for fluid–rock interaction processes at the Dibs Pegmatite, Manitoba, Canada

MANJU SATI[1], ROBERT L LINNEN[2], TANIA MARTINS[3] AND CHRIS RM MCFARLANE[1]

[1]University of New Brunswick
[2]Western University
[3]Manitoba Geological Survey

The Dibs pegmatite is a highly fractionated lithium-cesium-tantalum (LCT) body located in southeastern Manitoba, Canada. This pegmatite intrudes the metabasite of the Bernic Lake Formation and spodumene is the primary lithium-mineral present. The primary mineral assemblage comprises quartz, albite, mica and tourmaline, whereas the adjacent altered rocks are characterized by a mineral assemblage of K-feldspar, quartz, albite, titanite, mica, calcite, tourmaline, and spodumene. Titanite is susceptible to fluid-rock interaction, and so can be used as a sensitive tool to trace hydrothermal process and couple these with U-Pb geochronology. In this study we are targeting titanite from the country rock adjacent to the Dibs pegmatite. The hydrothermal titanite occurs as randomly distributed, anhedral-subhedral, along the fractures of the country rock, as trails, and size varies from 10-60 µm. Most titanite grains are homogeneous but some show patchy zoning. Titanite associated with Li-mineralized pegmatites is enriched in Li, Nb, Ta, and Sn. This compositional characteristic demonstrates that the hydrothermal fluids were intrinsically rare-metal-fertile and sourced from the crystallizing or crystallized, rare metal-rich pegmatite melts. The contribution of hydrothermal fluids in pegmatite petrogenesis is still up for debate. Therefore, the findings of the current study employing hydrothermal titanite will serve as a crucial guide for rare-metal exploration, emphasizing the role of magmatic-hydrothermal fluids in metal enrichment in LCT pegmatites. An integrated analytical technique that combines petrography, micro–X-Ray fluorescence energy dispersive spectroscopy (µXRF-EDS), and laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) is used to investigate titanite from the country rock of the Dibs pegmatite. These techniques enabled the characterization of mineral assemblages, textures, and mineral chemistry to constrain magmatic-hydrothermal processes and influence of fluid–rock interactions on pegmatite petrogenesis.