

Yunzhe Chen, University of Alberta, Edmonton, Alberta, Canada for their project: *Nitrogen-isotope constraints on rare-metal enrichment in the Tanco LCT pegmatite, Canada.*



Yunzhe Chen is a Ph.D. candidate in the Department of Earth and Atmospheric Sciences at the University of Alberta. His research applies stable isotope geochemistry, particularly nitrogen isotopes, to investigate the role of volatile elements and fluids in the evolution of continental crust and formation of critical mineral deposits.

The project recognized by the Lipman Research Award focuses on the Tanco lithium–cesium–tantalum (LCT) pegmatite in southeastern Manitoba, one of the world's most important rare-metal deposits. Although LCT pegmatites are the principal source of lithium, cesium, and tantalum, the processes responsible for their exceptional metal enrichment remain actively debated. Yunzhe's research applies nitrogen isotopes as a novel tracer of fluid evolution to distinguish between internally derived magmatic fluids and externally introduced fluids during pegmatite evolution. By integrating nitrogen isotope geochemistry with whole-rock geochemistry, petrography, and mineral chemistry across the internal zones of the Tanco pegmatite, his work aims to evaluate the relative roles of internal and external fluids in controlling rare-metal enrichment and to establish nitrogen isotopes as a new geochemical tool for investigating pegmatite genesis.

More broadly, his doctoral research explores the behavior of nitrogen during crustal melting and differentiation, spanning Archean continental crust formation, Proterozoic A-type granites, and Phanerozoic S-type granites. His work aims to advance our understanding of Earth's deep nitrogen cycle while demonstrating the value of nitrogen isotopes as tracers of magmatic and hydrothermal processes relevant to both fundamental Earth science and critical mineral exploration.