## Earth Sciences Colloquium Series Presents

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Date: Tuesday, November 14, 2023 Time: 1:30 PM Location: BGS 1065



## Lithium: Leading Canada's Green Revolution

Lithium has fast become the focus of Canada's Green Revolution. The supply chain for electrification of the Canadian economy includes the production of electric vehicles, the manufacturing of batteries that are needed for these vehicles, and refining raw materials to supply components for the batteries, the most important of which is Li. However, all of these are reliant on the discovery and development of Li natural resources. Li exploration programs in turn require and understanding the Li Mineral System, which includes consideration of the sources of Li, tectonic setting, magmatic processes, transport and emplacement of magma, hydrothermal processes, weathering and preservation of deposits. A review of the Li cycle in the mantle and crust will be presented, as it pertains to the Li Mineral System and classification of Li deposits. Currently, the most important source of Li is from pegmatites; these deposits will be examined in more detail.

Pegmatites are magmatic rocks that contain highly variable grain sizes, including exceptionally large crystals. These textures are generally accepted to reflect rapid crystal growth at supersaturated conditions. The two most common models used to explain pegmatite genesis are anatexis (partial melting of the crust) and fractional crystallization. Solubility studies indicate that approximately 5000-10,000 ppm Li in the melt is required for the melt to be saturated in spodumene or petalite (the Li ore minerals). Thermodynamic modelling shows that fractional crystallization is required to attain these Li concentrations. However, the most effective mechanism of concentrating lithium is through multiple episodes of melting followed by fractional crystallization.

