**DEPARTMENTS OF CHEMISTRY**
**Seminar Series**

**FRIDAY, January 23, 2026 - 12:00 Noon**
**MC H313**

# Catalysis and New Bonding Motifs in Main Group Metallomimetics


## Prof. Marc-André Légaré

Department of Chemistry
McGill University
e-mail: ma.legare@mcgill.ca


The importance of transition metals (TMs) in modern catalysis cannot be overstated. TM-based catalysts enable processes that are of tremendous human and economic importance; they have innumerable applications in many industrial sectors. The design principles that have allowed the harness TMs to catalysis suggest new attractive avenues for the development also of metal-free catalysts, which could be based on the main group elements.

However, contrary to many catalytically active TM complexes, classical main-group compounds do not possess the combination of empty and filled orbitals that is crucial for the complex electronic processes involved in the elemental steps of catalytic cycles. The development of catalysts based on the p block elements thus requires the design and application of unique strategies and ligand designs. To develop the role of main group elements in the catalysis scene of tomorrow, our group studies both novel metal-free methodologies and unusual bonding motifs of the p block elements.

In this presentation, I will disclose two recent emphases in our research: the development of a boron-based ambiphilic catalyst for nontraditional cross-coupling reactions, and the design of architectures for the stabilization of phosphinidenes. Design principles and bonding analyses, in addition to the reactivity of our main group species will be detailed. Similarities and differences in the reactivity of main-group compounds and TM complexes will also be highlighted.