DEPARTMENTS OF CHEMISTRY
Seminar Series

FRIDAY, November 13, 2026 - 12:00 Noon
MC H313

Small molecule activation with low-valent boron: heterocumulenes, ultra-long B-B single bonds, and monatomic boron(0)

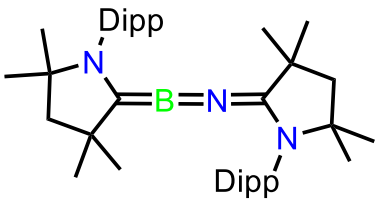


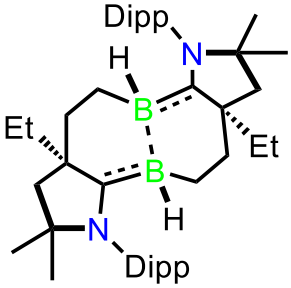
Prof. Conor Pranckevicius

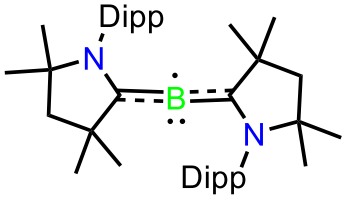
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The isolation of stable, formally zero-valent element complexes has allowed chemists to explore the reactivity of the elements in discrete forms. Within the s- and p-block elements, ligand stabilization of neutral atoms and element clusters has yielded highly-reactive yet bottleable complexes L_nE_m (L = neutral donor ligand) that can participate in atom transfer reactions, inert bond activation, serve as electron-rich ligands for transition metals, and can themselves behave as metal-mimicking catalysts. While the monatomic complexes L_nE are previously known for the even-numbered s- and p-element groups, including L_2Be, L_2C, and the heavier tetrylones, the paramagnetic Group 13 analogues are unknown outside of matrix isolation studies due to their reactive open-shell electronic structure.

Here we describe the first example of a neutral Group 13 atom bound only by neutral donor ligands (L), which has been fully characterized by spectroscopic methods and its structure determined by a single crystal X-ray diffraction study. This two-coordinate paramagnetic L_2B^0 complex can readily be accessed through a facile reduction reaction and is stabilized by π-accepting cyclic (alkyl)(amino)carbene (CAAC) ligands. This species displays unique reactivity, allowing access to novel examples of boron(I) complexes, heterocumulenes, and other reactive products. Our synthetic strategy has also been applied to related ligand systems, allowing access to rare examples of ultra-long B-B single bonds >2 Å. The isolation, characterization, and reactivity of these species will be discussed.







Bio: Conor earned his Ph.D degree from the University of Toronto in 2016 in the group of Professor Doug Stephan, performing carbene-centred research with a focus on designing new efficient catalysts for olefin hydrogenation and metathesis. During this time, Conor visited in the group of Professor Guy Bertrand at University of California San Diego as an exchange student, where he explored the reactivity of new carbene-stabilized carbon(0) species. In 2017, he joined the group of Professor Holger Braunschweig at the Julius-Maximilians University of Würzburg in Bavaria, Germany as an Alexander von Humboldt and NSERC sponsored post-doctoral fellow. In 2021, he joined the faculty at UBC's Okanagan campus in Kelowna, BC where he is an Assistant Professor of Inorganic Chemistry. When not in the lab, Conor can usually be found rock climbing at one of the many cliffs around the Okanagan region.