



CHEMISTRY/PHYSICS SEMINAR SERIES

Dr. Peter Sues

Assistant Professor, Department of Chemistry, Trent University

Wednesday, November 5th, 2025

11:00 a.m. to 11:50 a.m. in ENW 115

From Solutions to Surfaces: Manipulating the Secondary Coordination with Calixpyrrole Ligand Architectures

ABSTRACT

Stockpiling the energy harvested from renewable power sources in chemical bonds is an integral part of creating a sustainable energy economy. The activation of abundant small molecules (H_2 , N_2 , CO_2 , O_2 , etc.) will play a pivotal role in this regard, but current technologies rely on platinum-based catalysts, or require forcing conditions/large overpotentials. Biological systems, on the other hand, utilize earth-abundant metals to efficiently activate small molecules. Multiple metal centers work in concert to provide a large pool of electrons/holes, while amino acid sidechains control the secondary coordination sphere. Taking key lessons from nature, we envision utilizing ligand architectures that can support multiple metal centers, control the secondary coordination sphere, and optimize the orientation of small molecule binding. To this end, modular calixpyrrole ligand frameworks were investigated for small molecule activation reactions. In particular, the synthesis and reactivity of calixpyrrole ligands with pendant functionalities, similar to “hangman” porphyrins, and unsymmetric co-facial calixpyrrole systems with chemically distinct binding sites, similar to “pacman” porphyrins, were explored.

BIOGRAPHY

Peter Sues

Dr. Peter Sues received an Honours Bachelor of Science at the University of Toronto while majoring in Chemistry and Biochemistry. As an undergraduate student, he worked in the laboratory of Prof. Douglas W. Stephan exploring the chemistry of Frustrated Lewis Pairs. He continued his education at the University of Toronto earning a doctorate under the mentorship of Prof. Robert H. Morris. His Ph.D. research focused on a variety of projects including the development of iron-based hydrogenation catalysts and the chemistry of ruthenium complexes with highly strained phosphine ligands. Dr. Sues subsequently joined the laboratory of Prof. Richard R. Schrock at the Massachusetts Institute of Technology as a postdoctoral research associate. There, he expanded his chemical knowledge while working on tungsten- and molybdenum-based olefin metathesis catalysts. Using his skills as an inorganic and organometallic chemist, Dr. Sues started his independent career at Kansas State University where he was Terry C. Johnson Cancer Center Affiliate and was awarded the Ervin W. Segebrecht Award. His laboratory explored novel phosphinimine-based olefin metathesis catalysts and calixpyrrole-based electrocatalysts. In 2025, Dr. Sues moved back to Canada and joined the faculty at Trent University as an Assistant Professor, where he hopes to continue his research in the fields of small molecule activation and organometallic catalysis.