

INORGANIC CHEMISTRY STUDENT EXIT TALK



Vicki Rubio

The Spokoyny Lab

“From Acids to Armor: Harnessing Boron Clusters for Lewis Acidic Sb Centers and Carbon-Based Material Stability”

Abstract: The Lewis acidity of group 15 organometallic compounds has traditionally relied on fluorinated, carbon-based electron-withdrawing groups. In this talk, I present an alternative, complementary strategy that harnesses the electron-withdrawing C-vertices of 3D icosahedral carboranes. Through the synthesis of C-bound *ortho*-carborane-bridged Sb(III) species and their convenient oxidation to Sb(V) using o-chloranil, we push Lewis acidity beyond that of the perfluoroaryl analogues. To further enhance the Lewis acidity of these Sb(V) sites, we halogenate the boron cluster cage at the 9-12 positions, draining electron density from the Sb center and producing more potent Lewis acids. Comparing the parent and halogenated clusters across this series reveals a tunable trend in Lewis acidity. Binding studies with small molecules, supported by computational analysis, confirm this enhancement and show the reactivity of the accepting σ^* orbitals, or σ -holes. I will also discuss how the 3D aromaticity of boron clusters lay the groundwork for robust, durable materials. We aim to tackle the question: because oxygen plasma rapidly degrades carbon-based materials, can a boron cluster shield them from oxidative degradation? Together, these two stories outline how carboranes can serve as strong electron-withdrawing groups for heavy pnictogen centers, and how boron clusters can act as protective molecules in extreme oxidative environments.

Wednesday, June 10th, 2026

4:00 p.m. | YH4222C - Collaboratory

**Dongwon Yoo Seminar
& Conference Hall**

UCLA College | Physical Sciences
Chemistry & Biochemistry

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