UCLA College | Physical Sciences Chemistry & Biochemistry

Chem 218: Student Exit Seminar

Exploration of Chemical Functionality of Self-Assembled Carborane Derivatives

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ABSTRACT: Understanding the correlations between nanoscale architectures and their microscopic and macroscopic function provides important insights into the development of next-generation electronic and photonic devices. Integration of functional molecular materials into structured devices requires in-depth understanding of the structure, reactivity, and acid-base properties of the adsorbed molecules on the surface. Self-assembled monolayers (SAMs) have been used extensively to probe and to tune the properties of these interfaces. Here, we examine different SAMs of diverse carborane derivatives. Due to the high axial symmetry and robustness of these molecules, many of the common defects observed in *n*-alkanethiolate monolayers are eliminated, enabling controlled platforms to study properties at substrate/environment interfaces. In addition to the presentation of relatively pristine and defect-free monolayers, the carborane scaffold offers many synthetic opportunities to alter other physical and chemical characteristics. These characteristics include, but are not limited to, dipole magnitude and direction, a multiplicity of additional functionalizations, and diversity among anchoring groups. Therefore, we tested these three properties and the effects conferred on the substrate/monolayer interface, the interaction between adsorbate molecules, and the interactivity between the monolayer and environmental interface. With an array of techniques, such as scanning tunneling microscopy (STM), X-ray photoelectron spectroscopy (XPS), and contact angle goniometry, we elucidate the roles of the monolayer, substrate, and environmental conditions, and their effects on the mechanisms of self-assembly.

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12:00 p.m.
Via Zoom

For questions, please contact: jzabala@chem.ucla.edu