INORGANIC SEMINAR

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12:30 PM, BRWN 4102

"Molecular-Scale Electronics and Moore: From Interfacial Reactivity to Band Structure Design"

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Abstract: Junctions comprising individual molecules "wired" between nanoscale electrodes approach the limit of miniaturization for electronic circuits used in computation and data storage. While studies of these atomically precise systems expose molecular structure-charge transport property relationships critical for the development of useful electronic components (e.g., wires, switches, or diodes), the wider capabilities of such junctions, for example, to form and break chemical bonds, remain understudied. We are applying glovebox-based scanning tunnelling microscope-based break-junction (STM-BJ) methods to probe single-molecule junctions formed from reactive molecules and functional electrode metals such as Ag, Cu, and Co. Through STM-BJ conductance measurements of appropriate molecular models, we are also exploring an alternative "bottom-up," approach to electronic (band) structure design in extended ordered polymers such as covalent organic and metal-organic frameworks (COFs and MOFs). Together, our work aims to develop a deeper understanding of molecular assembly, heterogeneous catalysis, and charge transport processes from the nanoscale to bulk that can be applied in the design of new devices and materials with improved properties.

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