West Virginia University

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Moving Beyond the Metal: Assisted Small Molecule Activation

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The design of reagents and catalysts that are capable of selective bond activation of small molecules has been a longstanding target of the synthetic community. The current paradigm for the development of new homogenous catalysts primarily focuses on a single active metal site with ligands that impart steric and electronic tunability to achieve substrate binding and activation, with limited attention paid to the secondary interactions of appended groups. Taking inspiration from biological systems, our group is working to develop strategies to exploit acidic and basic groups (hydrogen bond donors, Lewis acids/bases) to promote cooperative interactions. In addition to ground-state stabilization, the acidic/basic groups can also participate to bias catalytic reactivity. This presentation will emphasize how ligand design principles that include secondary sphere groups can be used to regulate the reactivity of polar bonds and delineate key contributors that are required for efficient catalysis/reactivity. Specific examples will be described that include cases where the mechanism of a given catalytic reduction reaction (hydrogenation, hydroboration, etc.) is changed, resulting in concommitant differences in chemoselectivity. Additional emphasis will be placed on systems where an appropriately selected Lewis acid serves a primary role for substrate activation/transfer.

Date: Wed, Oct 18, 2017

Time: 4:30-5:30 pm

Location: 208 Clark Hall

Students, meet the speaker over coffee and cookies in the Bennett Conference room at 3:30 pm