**Leveraging Ligand Design to Enable Challenging Reactions**

**with Iron and Platinum**

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Ligand design plays a pivotal role in modulating the reactivity and stability of transition metal catalysts. By tuning the electronic and steric properties of ligands, one can control metal activation, reactivity, and selectivity in complex catalytic cycles. This talk explores two systems where ligand design is central: iron-mediated multi-electron transformations and platinum-catalyzed hydrosilylation.

For iron, multi-dentate ligands with hydrogen bonding moieties in the secondary coordination sphere facilitate reactivity with oxyanions, traditionally considered inert. These ligands enable iron to engage in oxidation and reduction processes with these challenging species. In platinum catalysis, we focused on developing platinum complexes as dormant precatalysts for hydrosilylation. Ligand modifications were explored to enhance stability and promote rapid activation upon exposure to a trigger, resulting in efficient hydrosilylation catalysis.

Both systems highlight how ligands can influence transition metal reactivity, unlocking new catalytic possibilities for multi-electron transformations and industrial processes.