

Repurposing H-bond donors for transition metal catalysis

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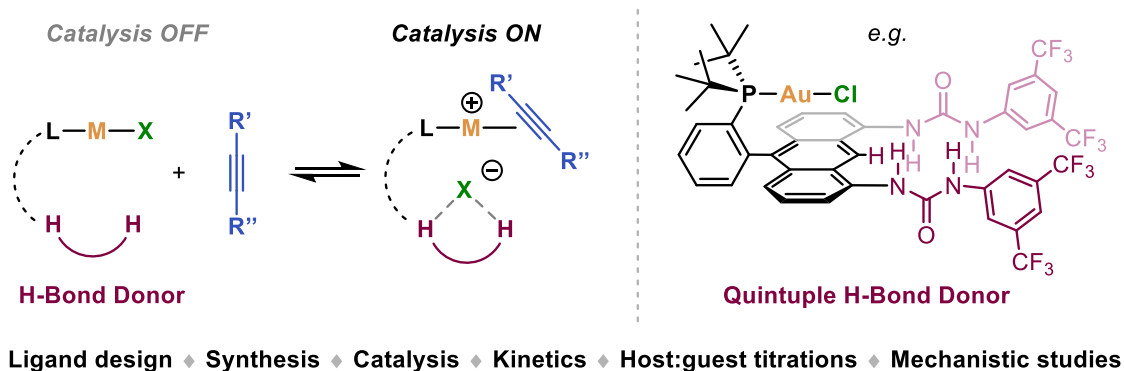
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In this talk, I will describe our efforts to pioneer conceptually new strategies that combine transition metal catalysis (chloride scavenging for precatalyst activation) and supramolecular chemistry (H-bond donors for anion binding).

Gold catalysis provides access to a remarkable array of complex products. However, the use of silver salts to activate gold(I) chloride precatalysts can be problematic, due to Ag(I) light sensitivity, hygroscopicity, redox activity and interference with the desired gold chemistry, which would otherwise be water- and air-tolerant. Self-activating gold(I) chloride complexes have emerged as a promising alternative, but still suffer from much lower activity and narrower applicability than silver salts, as Au–Cl cleavage is rate limiting.^{1,2}

Addressing these limitations, we have recently reported a self-activating Au(I) chloride complex with a modified Buchwald ligand that incorporates a supramolecular chloride receptor: a 1,8-anthracene bisurea quintuple H-bond donor. Detailed mechanistic studies show that, in the presence of a coordinating product, the exceptional chloride binding ability of the bisurea unlocks a zwitterionic catalyst resting state where the Au–Cl bond has been cleaved. This significantly reduces barriers for catalysis and enables for the first time H-bond donors to compete with inorganic chloride scavengers in terms of activity and generality.³

Unpublished results from our group focus on novel multidentate H-bond donors that are no longer tethered to the ligand, able to activate various metal–pseudohalide bonds and applicable to enantioselective reactions.⁴



References:

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