

## 1C1a

## Synthesis of Boryl-ligated Transition Metal Complexes

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The concept of Frustrated Lewis Pairs (FLP) has attracted much attention over the last two decades and significantly impacted across main group chemistry. FLP react with a wide range of small, unsaturated organic molecules. More remarkably, FLP have been shown to reversibly activate dihydrogen, opening pathways to non-metal-mediated catalytic hydrogenation of a wide range of organic substrates (Figure 1).<sup>1</sup>

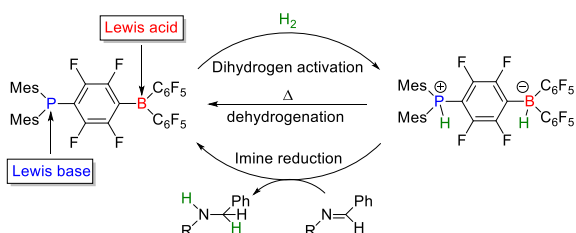
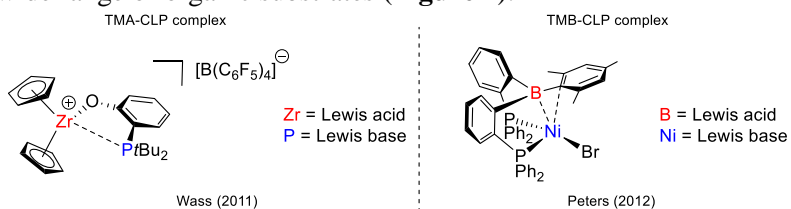
Figure 1. Stephan's FLP for H<sub>2</sub> activation and imine reduction

Figure 2. Recent examples of TMA-CLP and TMB-CLP complexes  
(TMA = Transition Metal Acid, TMB = Transition Metal Base, CLP = Cooperative Lewis Pair)

Systematic studies of transition metal containing FLP (also referred to as Cooperative Lewis Pairs, CLP) only started to emerge recently. Among the few reported examples, the metal centers are often employed as the Lewis acid, and their e<sup>-</sup>-donating ligands, the Lewis base.<sup>2</sup> More recently, the opposite design featuring TMB with ligand-bound Lewis acid (TMB-CLP) attracted growing interests (Figure 2).<sup>3</sup> We are interested in

design and synthesis of novel TMB-CLP complexes. Our project targets the synthesis and reactivity of a boron-chelated ligand system (Figure 3). The chelating boron atom B<sup>1</sup> covalently bonds to the metal center, while the second boron center B<sup>2</sup> serves as the Lewis acid, and the metal center serves as the Lewis base. This design is unique from all the currently available ligands. The synthesis, structure and reactivity of some of these complexes will be discussed.

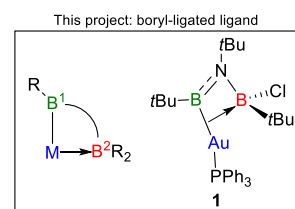
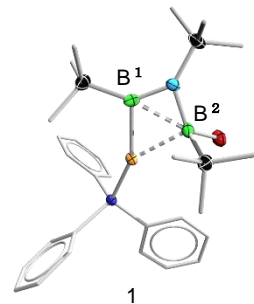


Figure 3. Novel TMB-CLP complexes



## References:

- [1] Welch, G. C.; San Juan, R. R.; Masuda, J. D.; Stephan, D. W. *Science* **2006**, *314*, 1124-1126.
- [2] Chapman, A. M.; Haddow, M. F.; Wass, D. F. *J. Am. Chem. Soc.* **2011**, *133*, 18463-18478.
- [3] Harman, W. H.; Peters, J. C. *J. Am. Chem. Soc.* **2012**, *134*, 5080-5082.