



## **DISSERTATION DEFENSE**

September 2, 2020

2:00 PM

Zoom Link

<https://ucr.zoom.us/j/92939440757>

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### **Low-Valent, High-Spin Iron Chemistry and Late Transition Metal**

#### **Complexes of Benzannulated Boron Heterocycles**

Transition metal catalysis is largely dominated by two electron transformations, often performed by third row, late transition metals. Herein we have largely concentrated on the opposite, using iron in a weak ligand field (via trispyrazolyl borate, Tp ligands) to access low-valent, high-spin species and utilized steric bulk to access new and interesting low coordinate species. Herein we report the first high-spin  $\eta^2$ -arene metal complexes and their properties. While the arene is bound weakly, spin density is conferred to it upon binding. Using this same strategy at iron, we report a novel C–H activation mechanism by combining our low-valent, high-spin iron center with a bulky phenoxyl radical. This enabled the activation of  $sp^3$ ,  $sp^2$ , and  $sp$  C–H bonds in 2-butyne, ethylene, and phenylacetylene. In a digression from iron, we've also designed ligands that incorporate boron into the ligand scaffold to stabilize highly reduced metals, allowing us to isolate and characterize the first molecular dianionic platinum compound.