**Understanding the Properties and Reactivity of Bio-inspired Manganese Complexes.**

Manganese-dependent enzymes are involved in biological process ranging from the detoxification of reactive oxygen species in humans to the conversion of water to dioxygen, protons, and electrons in all plants.1-2 The proposed mechanism for each of these enzymes involves the formation and decay of manganese-oxygen intermediates (such as manganese-oxo and manganese-hydroxo species).3-4 The goal of this project is to combine synthetic, spectroscopic, and kinetic methods to understand the physical properties and chemical reactivities of model complexes that mimic proposed enzymatic intermediates (Figure 1). REU participants will receive training in i) synthesis of organic ligands,5 ii) generation of air-sensitive transition-metal complexes,6 iii) spectroscopic methods to characterize transition-metal complexes,7-8 and iv) kinetic techniques.9-10 Past undergraduates have applied methods such as magnetic circular dichroism,7 electron paramagnetic resonance,11 and 1H NMR spectroscopy12 to characterize manganese-oxygen complexes. These research experiences greatly expand the range of inorganic methods to which an undergraduate is typically trained.

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**Figure 1.** Representative examples of MnIII-hydroxo (left) and MnIV-oxo (right) model complexes.

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