Development of High-Valent Aerobic Oxidation Catalysis

Aerobically generated metal–ligand (M–L) multiply bonded species are critical intermediates in both synthetic and biological C–H functionalization chemistry. The exquisite reactivity of intermediates capable of functionalizing C–H bonds renders these transient intermediates 1) challenging to observe or characterize and 2) difficult to harness for selective intermolecular C–H functionalization, such as during oxidative hydrocarbon upgrading. This talk will discuss progress towards aerobic synthesis of reactive M–L multiply bonded intermediates, the development of new inorganic photochemical methods that enable direct structural characterization of reactive M–L multiply bonded species, and fundamental studies of the diffusional barriers that must be managed during intermolecular functionalization chemistry within porous catalyst materials.

Prof. Powers was born in Allentown, PA and pursued undergraduate education at Franklin and Marshall College. He earned a Ph.D. from Harvard University with Prof. Tobias Ritter and pursued postdoctoral research at the Massachusetts Institute of Technology and Harvard University with Prof. Daniel Nocera. He joined the Texas A&M faculty in 2015 and his research program has been recognized by an NSF CAREER award and a DOE Early Career Award.