Title: Designing new manganese and iron catalysts for sustainability

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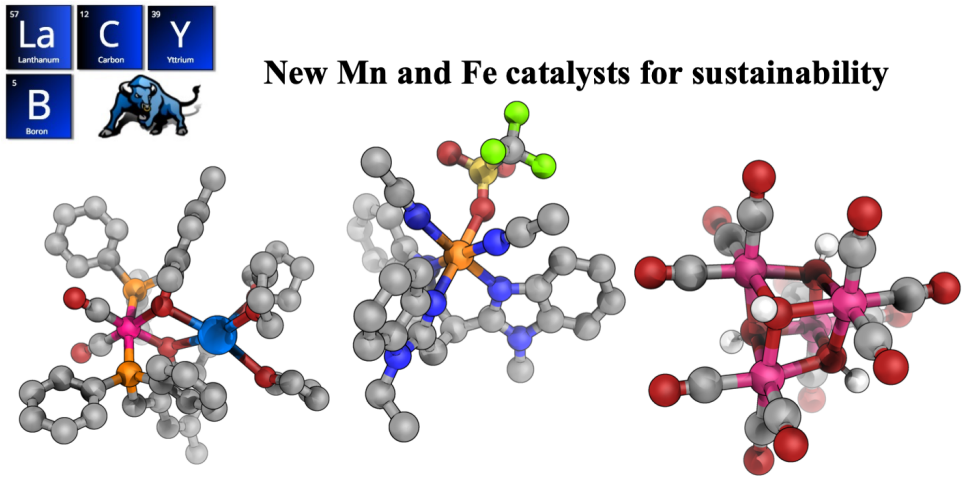
Abstract: An enduring goal identified by chemists is to maximize atom and energy efficiency of chemical transformations. Some promising candidates to achieve this goal are acceptorless (de)hydrogenations,[1] oxidation reactions that incorporate O-atoms from molecular oxygen into the products (e.g., oxygenases),[2] and photochemical production of fuel from water and carbon dioxide.[3] A major impedance towards progress is these areas is a lack of fundamental understanding regarding the mechanisms of the reactions involved. Therefore, we are approaching these transformations with detailed mechanistic studies and are working with known and new catalytic molecules. A considerable effort in our research is the design, synthesis, and characterization of these new catalysts. In some cases, we take direct inspiration from nature where these transformations are already carried out with exquisite control. Importantly, our study emphasizes the use of Mn- and Fe-based catalysts because they are earth-abundant and have recently shown great promise for replacing expensive metals in these two areas. This presentation will focus on summarizing our efforts in understanding these three transformations through fundamental chemical science aiming toward a sustainable future in chemical practice. [4,5,6]



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