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Chemistry

Artificial Photosynthesis with Surface Immobilized Molecular Species

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Sunlight offers an abundant supply of energy, but the sun is not always shining when and where energy is needed. Capturing sunlight and converting it to a form that can be stored and transported is essential. Artificial photosynthesis is a promising approach to produce solar fuels. Oxidative and reductive chemistry must both occur and multiple electron transfer processes are required. Light driven oxidation of water can serve as a source of electrons to reduce protons or carbon dioxide to fuels, but it is challenging. Four oxidative equivalents must be delivered sequentially, a kinetically sluggish O---O bond forming step must occur, and the environment is hostile to many molecular species required to facilitate water oxidation. Assemblies consisting of molecular species immobilized on metal oxide surfaces will be presented. These systems have been investigated spectroscopically and electrochemically to address some of the challenges in producing fuels from light, carbon dioxide, and water. The results that will be presented include an artificial photosynthesis charge transport chain that transfers oxidative equivalents from a chromophore to a redox intermediate on the picosecond timescale, stable photoanodes which can withstand conditions of water oxidation, and surface immobilized copper(I) species for photoinduced electron transfer within confined environments.

Feb 7th| Lopez Hall | Room 106 | @ 12pm