Friday-December 2, 2016

12:00-1:00 PM

BECTON SEMINAR ROOM

Light lunch will be served at 11:45 a.m.

Lynne Regan

Department of Molecular Biophysics & Biochemistry, and Department of Chemistry, Yale University

"Building with Proteins"

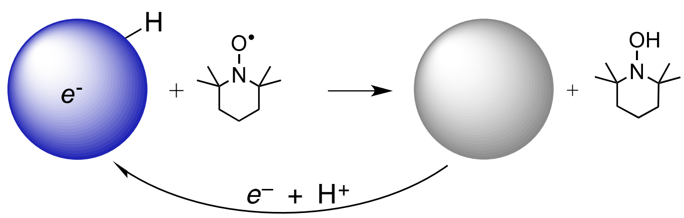
All proteins are made from different combinations of the same 20 amino acids, yet their physico-chemical properties vary tremendously: oxygen transport by hemoglobin; light harvesting and energy conversion by photosystem assemblies; environmental protection by keratin-based hair and hooves; light sensing by photoreceptors; structural support by spider silk. No man-made material comes close to the optimized functionality of these protein-based systems. I will discuss how it is possible to harness the diverse properties of proteins to create new and useful materials and interfaces. I will present examples of how we can use proteins with unique physical and chemical properties to realize novel user-specified supramolecular structures and functional materials. I will also discuss with the audience current challenges in materials science, and consider how it may be possible to address these challenges using proteins.

James M. Mayer

Department of Chemistry, Yale University

Chemical Reactivity at Nanoscale Oxide/Solution Interfaces: it's not just about the electrons

Oxidation/reduction reactions occurring at the interfaces between semiconductors and electrolyte solutions are often described as simply the movement of electrons (and holes). This presentation will argue that the movement of atoms and ions is often critical as well. *Proton-coupled* electron transfer (PCET) is critical to solar fuel production, fuel cells, corrosion, and many other processes. Similarly, batteries inherently involve *cation-coupled* electron transfer. The properties of colloidal ZnO, TiO_2, and CeO_2 nanocrystals will be described as illustrations of the coupling of electrons with protons and other ions in chemical reactions. For instance, the chemical reaction of reduced ZnO and TiO_2 nanocrystals with the nitroxyl radical proceeds by transfer of e^- and H^+ (a hydrogen atom), as shown below.



Host: Professor Eric Altman