Physics
AT QUEENS COLLEGE

Colloquium Notice

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Mechanistic Understanding of Proton-Coupled Electron Transfer In Artificial Photosynthesis

Artificial photosynthetic systems exploit a variety of photochemical transformations with the ultimate result of efficient conversion of the photon energy into chemical bonds. The efficiency of these transformations strongly depends on how successfully proton-coupled electron transfer (PCET) processes are implemented. In our research program we focus on a mechanistic understanding of the role of PCET in reactions such as: (1) photochemical formation and reactivity of NADPH-like transition metal complexes; (2) hydrogen atom transfer (HAT) in the excited states of transition metal systems; (3) transition-metal complexes as photo- and electro-catalysts for proton reduction; and (4) light-driven water oxidation catalyzed by transition metal complexes.

In my presentation I will cover the basic principles of artificial photosynthesis and will explain how simple synthetic models may be used to mimic the action of natural photosystems. I will follow with several examples of catalytic transformations relevant to the production of solar fuels such as water oxidation and the reduction of protons and carbon dioxide. In each of these examples the importance of coupling the movement of multiple equivalents of electrons with proton transfer will be emphasized. Also, the modern time-resolved spectroscopy techniques such as pulse radiolysis and laser flash photolysis will be presented as experimental tools for unraveling complex mechanisms of PCET transformations which take place during catalytic cycles.

Monday
September 21, 2015
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326