

Dr. Shane Ardo

California Institute of Technology

special seminar

thursday, dec. 15 at 3:30 p.m. in 1315

“Transfer of Charge, Ions and Energy at Sensitized Semiconductor Interfaces”

Photovoltaics provide a direct means of converting photons into useful electric power; however, traditional silicon-based technologies are too expensive for global commercialization. Dye-sensitized mesoporous semiconducting thin films, when utilized in regenerative photoelectrochemical cells, are one category of next generation photovoltaics that could eventually circumvent this issue. However, the mechanisms involved in the myriad of molecular processes that occur at these molecular–solid-state interfaces during the “sensitization cycle” shown below, are poorly understood.

The primary goal of my research was to critically investigate mechanisms occurring at molecular sensitizers anchored to sponge-like networks of metal-oxide nanocrystallites. Using transient and steady-state absorption and emission spectroscopies and electrochemistry, various previously unobserved interfacial phenomena were identified. Two of these will be the focus of my seminar and the ramifications of their interactions will be discussed. A molecular-level understanding will enable the design and implementation of improved dye-sensitized technologies.