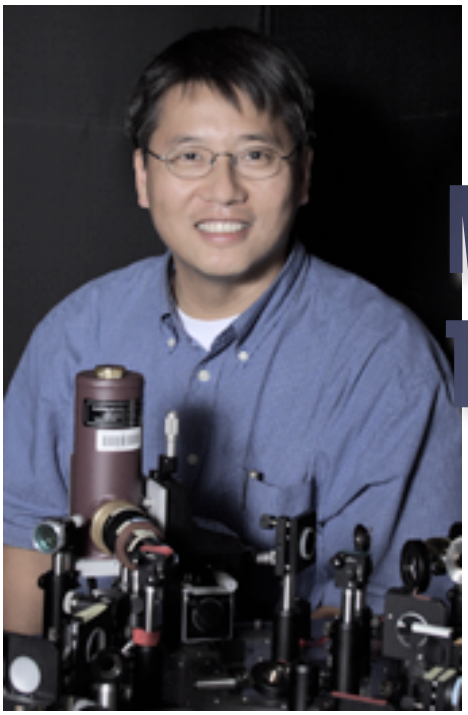
Physical Chemistry Seminar

Tuesday, October 27, 2009 | **11:00 a.m.** | **Room 1315 Chemistry Building**



Ultrafast Charge Transfer at Molecule/Quantum dot Interface – Towards Multi-Exciton Dissociation

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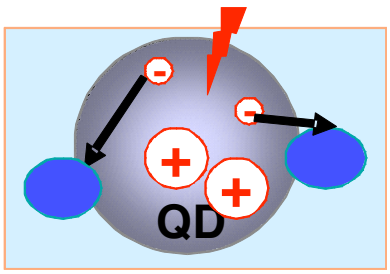

Charge transfer to and from quantum dots (QDs) is of intense interest because of its important roles in QD-based devices, such as solar cells and light emitting diodes. Recent reports of multiple exciton generation (MEG) by one absorbed photon in some QDs offer an exciting new approach to improve the efficiency of QD-based solar cells and to design novel multi-electron/hole photocatalysts. However, the application of the MEG process requires ultrafast exciton dissociation by charge transfer to electron donors and acceptors before the exciton-exciton annihilation process, which occurs on the 10s to 100s ps time scale. In this presentation we report a series of studies of exciton dissociation dynamics in quantum dots by electron or hole transfer to adsorbed electron or hole acceptors, respectively. We showed that excitons in CdS and CdSe could be dissociated on the a few picosecond timescale to various adsorbates. As a proof of principle, we demonstrated that multiple excitons (generated by multiple photons) per QD can be dissociated by electron transfer to adsorbed acceptors. We will discuss the dependence of these rates on the size and the nature of the quantum dots and possible approaches to optimize the multiple exciton dissociation efficiency.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students may meet with the speaker at 1:15 p.m. in Room 8305f