Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Kolloquium der Physikalischen und Theoretischen Chemie

Dienstag, 17.12.2013 **Hörsaal D, Chemiezentralgebäude, 17:15 Uhr**

Sprecher: **Josef Wachtveitl**
(Universität Frankfurt)

Titel: **Ultrafast interfacial electron transfer in nanoscale systems**

Abstract:

Dynamics at molecule / solid state interfaces offer promising perspectives in research areas from high speed molecular electronics to novel solar cells. Due to the special energetic situation, these systems exhibit extremely fast electron transfer (ET). I will discuss the electron injection in strongly coupled dye/TiO2 systems which can occur on a sub 10 fs timescale and its description beyond classical ET theories. The observation of reaction induced wavepacket-dynamics demonstrates the persistence of vibrational coherence after electron injection and the generation phonons upon formation of a polaron.
Due to their unique properties semiconductor quantum dots (QDs) have been under intense study in various application fields such as lasing, microscopy and photovoltaics. In a photovoltaic environment, charge extraction from the photoexcited QDs is a main challenge for their applicability. Ultrafast processes such as intraband relaxation and charge trapping can act as energy loss channels after photoexcitation of the QD. I will present the correlation between generation of phonons in CdSe QDs and the ultrafast interfacial electron transfer (ET) to the electron acceptor methylviologen (MV2+). Coherent phonons in CdSe QDs have been studied in time domain experiments by ultrafast transient absorption (TA) spectroscopy. In these experiments the longitudinal optical (LO) and the longitudinal acoustic (LA) phonon modes have been observed at ~210 cm-1 and ~18 cm-1. Moreover, time domain experiments allow characterizing the ET reaction between photoexcited QDs and suitable acceptors by monitoring the exciton dynamics. Our results demonstrate that photoinduced coherent phonons in the pure QDs lead to a frequency modulation of the quantum dot excited-state spectrum. In contrast to that the observed oscillations in the ET system are induced by a chemical fundamental reaction (ET) in the product ground state reflecting the ultrafast nature of the ET.

Organisation: V. Engel

Kontakt: *Prof. Dr. Tobias Hertel, Institut für Physikalische u. Theoretische Chemie*
tobias.hertel@uni-wuerzburg.de

Weitere Informationen unter:
http://www.phys-chemie.uni-wuerzburg.de/startseite/veranstaltungen/