Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Ultrafast carrier dynamics of CdSe quantum dots prepared by pulse laser deposition for photovoltaic applications[1] MEG MAHAT, BAICHHABI YAKAMI, Department of Electrical and Computor Engineering, University of Wyoming, QILIN QILIN DAI, JINKE TANG, Department of Physics, University of Wyoming, JON PIKAL, Department of Electrical and Computor Engineering, University of Wyoming — Quantum-dot sensitized solar cells are a promising alternative to existing photovoltaic technology. Over the last decade solution based colloidal quantum dots (QDs) have been extensively studied. Here we have carried out ultrafast transient absorption measurements on CdSe QDs fabricated using pulse laser deposition (PLD) in order to understand the carrier relaxation dynamics in these nanostructures. The differential transmission measurements show that the PLD QDs have a very fast decay process resulting in a recovery time of less than 10 picoseconds. This is in stark contrast to the colloidal QDs that show a decay process of more than 4 nanoseconds. We also find that the fast decay process observed in the PLD QDs is a function of the carriers density generated in CdSe QDs. To understand these carrier relaxation processes and improve the optical properties of the QDs we perform transient absorption measurements on PLD QDs prepared in different media (e.g. water, methanol, ethanol), under different growth conditions, and with and without ligand. We present a comparison study of the carrier relaxation dynamics in these PLD grown QDs to provide insight into the competing relaxation effects and guide their use in Quantum-dot sensitized solar cells.

[1]DOE

Meg Mahat
University of Wyoming

Date submitted: 20 Nov 2012 Electronic form version 1.4