Abstract Submitted
for the OSF17 Meeting of
The American Physical Society

Investigations into sensitizing GaP photocathodes with CdSe quantum dots[1] DESISLAVA DIKOVA, MOLLY MACINNES, SUDARAT LEE, STEPHEN MALDONADO, University of Michigan, MALDONADO LAB TEAM
— Quantum dots (QDs) have gained interest due to their interesting and highly tunable optoelectronic properties. In particular, CdSe QDs have widespread applications including biological fluorescence, LEDs, lasers, and solar cell sensitization. The purpose of this project is to photosensitize single crystal GaP photocathodes with CdSe QDs possessing a larger band gap than that of GaP. Sensitizing a solar cell surface is a relatively cheap way to increase the efficiency of the cell, by generating more power than unsensitized cells. Additionally, as a polycrystalline material, GaP is inherently more expensive than Si solar cells, so increasing GaP efficiency is a step towards implementing it as a commercial solar cell. In this work, CdSe QDs of varying sizes have been synthesized using a highly reproducible procedure. The quality of the QDs and their physisorption onto GaP have been monitored using fluorimetry, uv-vis absorption spectroscopy, x-ray photoelectron spectroscopy, and transmission electron microscopy. During the synthesis process, CdSe QDs are capped with long, insulating ligands; the ligand exchange is a crucial aspect of facilitating charge transfer between QDs and GaP. Ligand exchange methods are investigated in this work; however, photosensitization has not yet been observed. Further study will be conducted on depositing a usefully thick layer of QDs that doesn't insulate or protect the GaP surface, using different ligands or a ZnSe shell.

[1]We acknowledge the U.S Department of Energy for funding.

Desislava Dikova
University of Michigan

Date submitted: 12 Oct 2017 Electronic form version 1.4