Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Excitation energy dependence of the photovoltaic behavior of InAs/GaAsSb quantum dot solar cells[1] ALISON ROETH, YANG CHENG, ANTHONY MELECO, VINCENT WHITESIDE, MUKUL DEBNATH, MICHAEL SANTOS, IAN SELLERS, University of Oklahoma — Intermediate band solar cells (IBSC) have been suggested as a potential route to achieve energy conversion efficiencies higher than that of single gap solar cells by harnessing lower energy light usually lost to transmission. Quantum dots have been proposed as a candidate system for the IB due to their localized nature. Here, InAs quantum dots inserted into the GaAsSb intrinsic region of a solar cell are investigated as a candidate system for IBSCs. The photovoltaic properties of this system will be presented under various conditions of optical excitation: both below (directly in the QDs) and above (in the matrix) the GaAsSb band gap to probe the physical properties of this system. The dependence of open-circuit voltage and short-circuit current as a function of temperature and power will be presented. By varying temperature and power, the effects of carrier confinement, escape, and transport, as well as intrinsic defects and the formation of a well localized intermediate band can all be evaluated.

[1]This research has been supported through the state of Oklahoma's Oklahoma Center for the Advancement of Science Technology (ONAP 09-08, AR09.2-019, OARS AR12.2-043).

Alison Roeth
University of Oklahoma

Date submitted: 10 Nov 2016 Electronic form version 1.4