Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spectroscopy of hot carriers in InAs based multi quantum wells for solar cells applications[1] B. A. MAGILL, M. A. MEEKER, R. H. MUDIYANSELAGE, Virginia Tech, A. MESSAGER, Ecole Polytechnique, France , V. R. WHITESIDE, I. R. SELLERS, S. VIJEYARAGUNATHAN, M. B. SANTOS, University of Oklahoma, G. A. KHODAPARAST, Virginia Tech — In hot carrier solar cells (HCSC), phonons created by incident photons with energies greater than the band gap of the material are reabsorbed by the photo-excite carriers, resulting in an increase in the conversion efficiency of the device. If the phonons are to be reabsorbed the absorber material needs to have phonon lifetime longer than the carrier lifetimes and the contacts need to be energy sensitive, allowing the carriers to be extracted only over a narrow energy range, thus minimizing energy transfer through carrier cooling. In this talk we present PL measurements of $InAs/AlAs_{0.84}Sb_{0.16}$ multi quantum wells (designed to decouple phonon-mediated reaction of the hot carriers through spatial separation of the created charge carriers), as a function of wavelength, intensity, and temperature over a range of 1.4 to 2.1 microns. We compare our results to computational models of the band structure in these materials to answer which layers in the multi quantum well devices the charge carriers reside in, to both refine our current theoretical models for this system and give insight in designing new generations of HCSC based on type II semiconductor transitions.

[1]Supported by AFOSR-grant FA9550-14-1-0376 and NSF ECCS 1610062.

Giti Khodaparast
Virginia Tech

Date submitted: 09 Nov 2016 Electronic form version 1.4