Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Impact of Be-doping on InAs/InAsSb type-II superlattices for infrared detection M. AHOUJJA, S. ELHAMRI, T.J. ASEL, Department of Physics, University of Dayton, OH 45469, E.H. STEENBERGEN, W.C. MITCHEL, SHIN MOU, G.J. BROWN, U.S. Air Force Research Laboratory/RXAN, Wright-Patterson AFB, OH 45433 — InAs/InAsSb superlattices (SLs) are promising materials for mid- and long-wavelength infrared (MWIR, LWIR) photodetectors due to the recently reported longer carrier lifetime than those of InAs/GaSb SLs at 77 K. However, the lifetime results are for unintentionally-doped *n*-type InAs/InAsSb SLs. Photodetectors with *n*-type absorbing regions rely on hole minority carrier transport to generate the current. This can be a disadvantage in SL photodiodes where the hole mobility in the vertical direction is extremely small at low temperatures, making collection of photo-generated minority carriers at varying depths difficult. Therefore, *p*-type SL absorber materials are preferred. However, if there is a high density of trap states or recombination sites due to the intentional dopants that limit the electron recombination lifetime, a longer hole lifetime that is traded for a higher electron mobility may result in a negative effect on the overall electrical properties, depending upon the magnitude of the lifetime and mobility changes. The carrier lifetimes and material properties of *p*-type InAs/InAsSb SLs have not been investigated yet and represent a crucial next step in developing the material for detectors. A systematic study of the impact of varying Be-dopant density levels on the InAs/InAsSb SL optical and electrical properties is performed using photoluminescence, photoconductive response, and Hall measurements.

Mo Ahoujja
Department of Physics, University of Dayton, OH 45469

Date submitted: 15 Nov 2013 Electronic form version 1.4