

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Improved performance due to selective passivation of nitrogen clusters in GaInNAs solar cells¹ MIWA FUKUDA, VINCENT R. WHITESIDE, University of Oklahoma, MOHAMED AL KHALFIOUI, MATHIEU LEROUX, CRHEA-CNRS, France, KHALID HOSSAIN, Amethyst Research Inc., IAN R. SELLERS, University of Oklahoma — While GaInNAs has the potential to be a fourth-junction in multi-junction solar cells it has proved to be difficult to incorporate due to the low solubility of nitrogen in these materials. Specifically, mid-gap states attributed to nitrogen clusters have proved prohibitive for practical implementation of these systems. Here, we present the selective passivation of nitrogen impurities using a UV-activated hydrogenation process, which enables the removal of defects while retaining substitution nitrogen. Temperature dependent photoluminescence measurements of the intrinsic region of a GaInNAs p-i-n solar cell show a classic “s-shape” associated with localization prior to hydrogenation, while after hydrogenation no sign of the “s-shape” is evident. This passivation of nitrogen centers is reflected in improved performance of solar cells structures relative to reference, unpassivated devices presenting a potential route to practical implementation of GaInNAs solar cells.

¹The authors acknowledge support through Oklahoma Center for the Advancement of Science and Technology under the Oklahoma Applied Research Support Grant No. AR12.2-040

Vincent R. Whiteside
University of Oklahoma

Date submitted: 13 Nov 2014

Electronic form version 1.4