Abstract Submitted
for the MAS14 Meeting of
The American Physical Society

OH centers and the conductivity of hydrogen-doped In_2O_3 single crystals[1] WEIKAI YIN, KIRBY SMITHE, PHILIP WEISER, MICHAEL STAVOLA, BEALL FOWLER, Lehigh University, LYNN BOATNER COLLABORATION — Mechanisms for the n-type conductivity of In_2O_3 have been controversial. Recent experiments suggest that O vacancies are the cause of conductivity.[2] However, other recent experiments find that the H-doping of thin films gives rise to shallow donors.[3] Theory also finds that interstitial H and H at an O vacancy are shallow donors in In_2O_3.[4] We have performed a series of IR absorption experiments to determine the properties of OH and OD centers in In_2O_3 single crystals. Annealing In_2O_3 samples in H_2 or D_2 at temperatures near 450°C (30 min) produces an n-type layer ≈0.05 mm thick with an n-type doping of $2x10^{19}$ cm^{-3}. The resulting free-carrier absorption is correlated with an OH center with a vibrational frequency of 3306 cm^{-3} that we associate with interstitial H.[5]

[1]Supported by NSF Grant DMR-1160756.
[2]S. Lee and D.C. Paine, Appl. Phys. Lett. **102**, 052101 (2013).
[3]T. Koida *et al.*, Jpn. J. Appl. Phys. **46**, L685 (2007).
[4]S. Limpijumnong *et al.*, Phys. Rev. B **80**, 193202 (2009).
[5]M. Stavola, J. Appl. Phys., to be published.

Weikai Yin
Lehigh University

Date submitted: 28 Aug 2014 Electronic form version 1.4