Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**OH centers and the conductivity of hydrogen doped $In_2O_3$ single crystals**[1] MICHAEL STAVOLA, WEIKAI YIN, KIRBY SMITHE, W. BEALL FOWLER, PHILIP WEISER, Lehigh University, LYNN BOATNER, Oak Ridge National Lab — 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 2x$10^9$ $cm^{-3}$. 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.
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Date submitted: 14 Nov 2013 Electronic form version 1.4