

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Donors and H impurities in SnO<sub>2</sub> studied by IR spectroscopy**<sup>1</sup> F-GEN BEKISLI, MICHAEL STAVOLA, W. BEALL FOWLER, Lehigh Univ, LYNN BOATNER, Oak Ridge National Lab, ERIK SPAHR, GUNTER LUEPKE, College of William and Mary — Theory predicts that SnO<sub>2</sub> is an attractive wide band gap candidate for achieving p-type conductivity. Interstitial H and H<sub>O</sub> are suggested to be shallow donors in SnO<sub>2</sub> [1-3]. We have studied the properties of H in SnO<sub>2</sub> single crystals. An O-H line is observed at 3261 cm<sup>-1</sup> that is polarized perpendicular to the c direction along with weaker features at 3258 and 3272 cm<sup>-1</sup>. When D is introduced into SnO<sub>2</sub> by annealing in a D<sub>2</sub> ambient at 700 °C, a variety of new O-H and O-D lines is produced along with the low-frequency absorption that is characteristic of free carriers. To probe the relationship between H and the free carriers it introduces, we have examined the thermal stabilities of the O-H and O-D lines and their relationship to the thermal stability of the free-carrier absorption.

- [1] A.K. Singh *et al.*, Phys. Rev. Lett. **101**, 055502 (2008).
- [2] J.B. Varley *et al.*, Phys. Rev. B **79**, 245206 (2009).
- [3] W.M. Hlaing Oo *et al.*, Phys. Rev. B **82**, 193201 (2010).

<sup>1</sup>Supported by NSF grant DMR-0802278.

Michael Stavola  
Lehigh Univ

Date submitted: 15 Dec 2010

Electronic form version 1.4