Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Conductivity of MgZnO nanoparticles as a function of gas exposure and temperature CHRIS BERVEN, JOSEPH DICK, LEAH BERGMAN, JESSE HUSO, JOHN MORRISON, University of Idaho — Changes in the current-voltage (I-V) characteristics of $Mg_xZn_{1-x}O$ (x = 0.15) nanoparticles as a function gas exposure and temperature are reported. The nanoparticles were prepared using wet chemical techniques on insulating thermally grown SiO_x Si substrates. Contact to the nanoparticle film was by gold wires laid across about 2 mm apart. The experiments were performed in a custom-built environmental chamber with the ability to evacuate or introduce various gases. For these experiments, the temperature was tuned over a range of about 300 K to 420 K. Our measurements showed a possible history-dependant behavior in changes of the conductance of the nanoparticle film. When the device was heated to ∼120 K in vacuum or in an Ar the current increased by the same amount. When repeated with H_2, the current increase was less. Initially, the effect was quite pronounced with a relative change by a factor of 20. With repetitions of the experiments, the same effect was observed but to a lesser degree suggesting a saturation phenomena. When the experiment was modified so that the H_2 gas was introduced at a high temperature to an evacuated chamber the current dropped but not by the same degree as before. A similar response to exposure to H_2 was found for exposure to O_2. Possible explanations for the observations will be presented.

Chris Berven
University of Idaho

Date submitted: 14 Dec 2007 Electronic form version 1.4