Abstract Submitted
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The Effect of Gate –Bias Stress and Light illumination on the performance of ZnO Thin-Film Transistors.[1] PRAKASH GAJUREL, Department of Physics and Astronomy, West Virginia University, MICHAEL ALDRIDGE, Department of Biology, West Virginia University, YURI GLINKA, PAVEL BORISOV, Department of Physics and Astronomy, West Virginia University, KEVIN DALY, Department of Biology, West Virginia University, DAVID LEDERMAN, Department of Physics and Astronomy, West Virginia University, Department of Physics, University of California,Santa Cruz — We have investigated the stability of ZnO thin film field effect transistors (TFFTs) grown on Si/SiO_2 under the application of positive gate bias stress and light illumination at room temperature. ZnO TFFT devices where a gate voltage is applied over a few seconds are known display a positive shift in the threshold voltage after measurement. This bias stress remains unchanged even if a negative gate voltage stress is applied. Threshold voltage shifts are believed to be a consequence of charge trapping at or near the conducting channel / insulator interface. A negative shift of the transfer curve was achieved exposing the transistor to light in the presence of a small source voltage. The negative shift in threshold voltage depended on the photon energy and exposure time. Our experimental results indicate that the trapped charges responsible for the shift of transfer characteristics are approximately 2.0 eV below the bottom of the ZnO conduction band with an energy distribution width of 3.40 eV. Stressed devices recovered their original characteristics with the photon energy of UV light (365nm, $3.6 mW/cm^2$) within 1818s.This approach could be used to reset stressed TFFTs using light sources.

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