

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Characteristics of top-gate ZnO thin film transistors grown on glass substrate by pulsed laser deposition TOSHIHIKO MAEMOTO, KENJI FUJIWARA, TAICHI YOSHIDA, SHIGEHICO SASA, MASATAKA INOUE, Osaka Institute of Technology — We report on the fabrication and characterization of top-gate ZnO thin film transistors (TFTs) using glass substrates. High quality ZnO epitaxial films were grown on glass substrates (Corning #1737) by pulsed laser deposition. The thickness of the films was in the range of 50-100 nm. The growth temperature was set to 380°C. These films were characterized by x-ray diffraction, and Hall effects measurements. Highly c-axis oriented ZnO(0002) reflections corresponding to the wurtzite-phase were observed for all the films, indicating that these films grow epitaxially as a crystalline single phase on a glass substrate. The Hall effects measurements show that we have succeeded in fabricating a ZnO film with an electron mobility of 36 cm²/Vs on a glass substrate. Top-gate ZnO TFTs were fabricated by photolithography and wet chemical etching. The ohmic contact metal Ti/Au was deposited by electron beam evaporation. The top gate electrodes and the gate insulator SiO₂ were finally deposited by electron beam evaporation. A room temperature characteristic of ZnO TFT with 50 μm gate length was an n-channel depletion type with a transconductance of 5.4 mS/mm. The off current was less than 10⁻⁹ A and the on/off current ratio was about 10⁶ at V_{DS}=5V.

Toshihiko Maemoto
Nanomaterials Microdevices Research Center,
Osaka Institute of Technology

Date submitted: 30 Dec 2008

Electronic form version 1.4