

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The growth of non-polar ZnO and ZnO/Mg_{0.25}Zn_{0.75}O epi-films by radio-frequency magnetron sputtering BI-HSUAN

LIN, Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan, WEI-REIN LIU, Division of Scientific Research, National Synchrotron Radiation Research Center, Taiwan, SHAO-TING HSU, Department of Photonics and Institute of Electro-Optical Engineering, NCTU, Taiwan, CHIA-HUNG HSU, Division of Scientific Research, NSRRC, Taiwan, WEN-FENG HSIEH, Department of Photonics and Institute of Electro-Optical Engineering, NCTU, Taiwan, NCTU TEAM, NSRRC TEAM, NCKU TEAM — High quality non-polar ZnO and ZnO/Mg_xZn_{1-x}O (x = 0.15, 0.25) epi-films have been successfully grown on m-plane and r-plane sapphire by using RF magnetron sputtering. The structural properties, including crystalline quality, strain state, and defect structures, of the ZnO and ZnO/Mg_xZn_{1-x}O layers are thoroughly examined by synchrotron x-ray scattering, transmission electron microscopy and atomic force microscopy. We found the surface morphology of the a-plane oriented ZnO epi-films is smoother than that of m-plane oriented one. Moreover, the surface of Mg_{0.25}Zn_{0.75}O epi-layer is significantly better than the ZnO epi-film and exhibits the same orientation dependence. The optical properties of these samples are also investigated by temperature, polarization and power dependent photoluminescence, and polarization dependent Raman spectroscopy. The results reveal the a-plane ZnO epi-film grown on r-sapphire with a Mg_{0.25}Zn_{0.75}O buffer layer is promising for bright UV emission application.

Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan, Bi-Hsuan

Date submitted: 17 Oct 2011

Electronic form version 1.4