

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**M-plane ZnO grown on m-plane sapphire by radio-frequency magnetron sputtering** BI-HSUAN LIN, WEI-REIN LIU, SHAO-TING HSU, CHIN-CHIA KUO, SONG YANG, CHIA-HUNG HSU, WEN-FENG HSIEH, DEPARTMENT OF PHOTONICS AND INSTITUTE OF ELECTRO-OPTICAL ENGINEERING, NATIONAL CHIAO TUNG UNIVERSITY TEAM, DIVISION OF SCIENTIFIC RESEARCH, NATIONAL SYNCHROTRON RADIATION RESEARCH CENTER TEAM, DEPT OF PHOTONICS & INST. OF ELECTRO-OPTICAL SCIENCE AND ENGINEERING, NATL. CHENG KUNG UNIVERSITY TEAM — High quality m-plane orientated ZnO films with in-plane epitaxial relationship of  $(0002)_{ZnO} || (11-20)_{sapphire}$  and  $(11-20)_{ZnO} || (0006)_{sapphire}$  have been successfully grown on m-plane sapphire by using radio-frequency magnetron sputtering. The introduction of a nanometer thick low temperature grown ZnO buffer layer effectively eliminated other undesirable orientations. The significant anisotropy of the strain field breaks the hexagonal symmetry and leads to the different physical properties from that of c-plane oriented ZnO films. The structural properties, including crystalline quality, strain state, and defect structures, of the m-plane ZnO layers are thoroughly examined by synchrotron x-ray scattering, transmission electron microscopy and atomic force microscopy. The optical properties are investigated by temperature, polarization as well as power dependent photoluminescence, and polarization dependent Raman spectroscopy. The correlation between the structural and optical properties will be discussed.

Bi-Hsuan Lin

Date submitted: 09 Nov 2010

Electronic form version 1.4