Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Ar/N2 Magnetron Sputtering Discharges to Control Growth of Transparent Conducting Oxide Films KOICHIRO OSHIKAWA, IPING SUHARIADI, DAISUKE YAMASHITA, HYUNWOONG SEO, KUNIHIRO KAMATAKI, GIICHIRO UCHIDA, KAZUNORI KOGA, MASAHARU SHIRATANI, NAHO ITAGAKI, Kyushu University — Here we demonstrate advantageous application of Ar/N2 discharges to magnetron sputtering deposition of ZnO films for crystal growth control [1]. Optical emission spectroscopy reveals that atomic nitrogen in Ar/N2 discharges plays important roles in determining the crystal grain density as well as the surface morphology of ZnO films. By utilizing 10-nm-thick ZnO films fabricated in Ar/N2 discharges as buffer layers, we have succeeded in fabricating low-resistive ZnO:Al (2wt.%) films, the properties of which are superior to those of conventional ZnO:Al films fabricated without N2. The resistivity of ZnO:Al films with buffer layers is a constant low value of 2.6×10^{-4} Ω·cm in the thickness range 20-200 nm, whereas the resistivity of conventional ZnO:Al films increases from 6.3×10^{-4} to 1.5×10^{-3} Ω·cm with decreasing the thickness from 200 nm to 20 nm. Effects of Ar/N2 discharges on other transparent conductive oxides including In2O3:Sn will be discussed at the conference.

[1] N. Itagaki, et al., Appl. Phys. Express 4 (2011) 011101.

Kouichirou Oshikawa
Kyushu University

Date submitted: 14 Jun 2013 Electronic form version 1.4