

Characterization of AZO thin films grown on various substrates by using facing target sputtering system

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Al doped ZnO(AZO) films as a transparent conductive oxide (TCO) electrode were deposited on glass, polyethylene naphthalate (PEN) and polyethylene terephthalate (PET) at room temperature by a conventional rf-magnetron sputtering (CMS) and a facing target sputtering (FTS) using Al₂O₃ and ZnO targets. In order to investigation of AZO properties, the structural, surface morphology, electrical, and optical characteristics of AZO films were respectively analyzed. The resistivities of AZO films using FTS system were $6.50 \times 10^{-4} \Omega\text{-cm}$ on glass, $7.0 \times 10^{-4} \Omega\text{-cm}$ on PEN, and $7.4 \times 10^{-4} \Omega\text{-cm}$ on PET substrates, while the values of AZO films using CMS system were $7.6 \times 10^{-4} \Omega\text{-cm}$ on glass, $1.20 \times 10^{-3} \Omega\text{-cm}$ on PEN, and $1.58 \times 10^{-3} \Omega\text{-cm}$ on PET substrates. The AZO-films deposited by FTS system showed uniform surface compared to those of the films by CMS system. We thought that the films deposited by FTS system had low stress due to bombardment of high energetic particles during CMS process, resulted in enhanced electrical conductivity and crystalline quality by highly c-axis preferred orientation and closely packed nano-crystalline of AZO films using FTS system.

This work (Grants No. C0217429) was supported by Business for Cooperative R&D between Industry, Academy, and Research Institute funded Korea Small and Medium Business Administration in 2015.

Keywords: AZO, FTS, TCO, Thin films, ZnO