

2005 OPT 2005 台灣光電科技研討會, 國立成功大學, 2005 年 12 月 9-10 日

Electrical and Optical Properties of ZnO:Al Film prepared on Polyethersulfone Substrate by RF Magnetron Sputtering

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Abstract

This study investigates the process parameter effects on the electrical and optical properties of AZO (ZnO:Al) thin film using radio frequency (RF) magnetron sputtering on flexible PES (polyethersulfone) substrates. The process parameters include RF power, working pressure and substrate bias. Results show that RF power was increased to promote the crystalline quality and decrease AZO thin film resistivity. However, when the RF power was increased to 200W the AZO thin film crystalline quality and conductivity became worse. Along with the working pressure increase, regarding the AZO thin film crystalline quality, conductivity and transmittance has the promotion. Substrate bias added has not help to increases crystalline quality, electrical and optical properties of film. At a 150WRF power, 670MPa working pressure and substrate bias 0V, the AZO thin film with a better electrical resistivity of 1.51×10^{-2} cm and an average optical transmittance of above 90% in the visible region is obtained.

Key words: RF magnetron sputtering; Transparent conducting film; AZO thin film; Polyethersulfone