

Effect of the substrate temperature on the properties of transparent conductive IZTO films prepared by pulsed DC magnetron sputtering

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Indium tin oxide (ITO) has been widely used as transparent conductive oxides (TCOs) for transparent electrodes of various optoelectronic devices, such as liquid crystal displays (LCD) and organic light emitting diodes (OLED). However, indium has become increasingly expensive and rare because of its limited resources. In addition, ITO thin films have some problems for OLED and flexible displays, such as imperfect work function, chemical instability, and high deposition temperature. Therefore, multi-component TCO materials have been reported as anode materials. Among the various materials, IZTO thin films have been gained much attention as anode materials due to their high work function, good conductivity, high transparency and low deposition temperature.

IZTO thin films with a thickness of 200nm were deposited on Corning glass substrate at different substrate temperature by pulsed DC magnetron sputtering with a sintered ceramic target of IZTO (In₂O₃ 70 wt%, ZnO 15 wt%, SnO₂ 15 wt%). We investigated the electrical, optical, structural properties of IZTO thin films. As the substrate temperature is increased, the electrical properties of IZTO are improved. All IZTO thin films have good optical properties, which showed an average of transmittance over 80%. These IZTO thin films were used to fabricate organic light emitting diodes (OLEDs) as anode and the device performances studied. As a result, IZTO has utility value of TCO electrode although it reduced indium and we expect it is possible for the IZTO to apply to flexible display due to the low processing temperature.