

Effect of the oxygen flow ratio on the structural and electrical properties of indium zinc tin oxide (IZTO) films prepared by pulsed DC magnetron sputtering

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Transparent conduction oxides (TCOs) films is extensively reported for optoelectronic devices application such as touch panels, solar cells, liquid crystal displays (LCDs), and organic light emitting diodes(OLEDs). Among the many TCO film, indium tin oxide(ITO) is in great demand due to the growth of flat panel display industry. However, indium is not only high cost but also its deposits dwindling. Therefore, many studies are being done on the transparent conductive oxides(TCOs). We fabricated a target of IZTO(In₂O₃:ZnO:SnO₂=70:15:15 wt.%) reduced indium. Then, IZTO thin films were deposited on glass substrates by pulsed DC magnetron sputtering with various oxygen flow ratio. The substrate temperature was fixed at the room temperature. We investigated the electrical, optical, structural properties of IZTO thin films. The electrical properties of IZTO thin films were dependent on the oxygen partial pressure. As a result, the most excellent properties of IZTO thin films were obtained at the 3% of oxygen flow rate with the low resistivity of $7.236 \times 10^{-4} \Omega \text{cm}$. And also the optical properties of IZTO thin films were shown the good transmittance over 80%. These IZTO thin films were used to fabricated organic light emitting diodes(OLEDs) as anode and the device performances studied. The OLED with an IZTO anode deposited at optimized deposition condition showed good brightness properties. Therefore, 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.