

Development of metal embedded ZnO films for transparent conductive oxide

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Transparent conducting oxides (TCOs), have been widely used as devices. Depending on the conductivity and transmittance of TCOs are used in flat-panel displays, solar cells, LEDs, etc. Among various TCOs, ZnO is an attractive material for transparent electrode. In this study, silver or aluminum embedded ZnO thin films were prepared by sandwiching a sputtered silver or aluminum film between ZnO films grown by atomic layer deposition method . Optimum thickness of metal (Ag or Al) and ZnO layer was determined for optical transmittance spectroscopy and electrical conductivity measurements. Four-point probe, optical absorption spectra (UV-VIS), X-ray diffraction, field emission scanning electron microscope were used to explore the possible changes in electrical and optical properties of the TCO films. It was found that silver embedded ZnO films are more transparent than aluminum embedded ZnO films with high transmittance of 92%. More importantly, the electrical properties of silver embedded ZnO films showed were ten times better conductive properties than Al embedded ZnO films.