

Development of Silver 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 embedded ZnO thin films were prepared by sandwiching a RF magnetron sputtering of silver between ZnO films grown by RF magnetron sputtering method at room temperature. Optimum thickness of silver and ZnO layer was determined for optical transmittance spectroscopy and electrical conductivity measurements. Optical absorption spectra (UV-VIS), X-ray diffraction, field emission scanning electron microscope, Sheet resistance meter 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 high transmittance of 95.4% and low sheet resistance $7\Omega/\text{sq}$. The optimum thickness of Ag thin films was determined to be 12~15 nm and with about 30 nm thickness ZnO thin films.