

Transparent Oxide Thin Film Transistors with Transparent ZTO Channel and ZTO/Ag/ZTO Source/Drain Electrodes

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We investigate the transparent TFTs using a transparent ZnSnO₃ (ZTO)/Ag/ZTO multilayer electrode as S/D electrodes with low resistivity of 3.24×10^{-5} ohm-cm, and high transparency of 86.29% in ZTO based TFTs. The Transparent TFTs (TTFTs) are prepared on glass substrate coated 100 nm of ITO thin film. On atomic layer deposited Al₂O₃, 50 nm ZTO layer is deposited by RF magnetron sputtering through a shadow mask for channel layer using ZTO target with 1 : 1 molar ratio of ZnO : SnO₂. The power of 100W, the working pressure of 2mTorr, and the gas flow of Ar 20 sccm during the ZTO deposition. After channel layer deposition, a ZTO (35 nm)/Ag (12 nm)/ZTO(35 nm) multilayer is deposited by DC/RF magnetron sputtering to form transparent S/D electrodes which are patterned through the shadow mask. Devices are annealed in air at 300°C for 30 min following ZTO deposition. Using UV/Visible spectrometer, the optical transmittances of the TTFT using ZTO/Ag/ ZTO multilayer electrodes are compared with TFT using Mo electrode. The structural properties of ZTO based TTFT with ZTO/Ag/ZTO multilayer electrodes are analyzed by high resolution transmission electron microscopy (HREM) and X-ray photoelectron spectroscopy (XPS). The transfer and output characterization of ZTO TTFTs are examined by a customized probe station with HP4145B system in are.

Keywords: Transparent TFT, ZTO/Ag/ZTO, Amorphous ZTO, Transparent Electrode