

Simple Patterning of Thin ZnO Semiconductor film Using Soft Lithography

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Patterning is essential process to avoid crosstalk and leakage current for thin film transistors (TFTs). For conventional lithography, ZnO-based materials are soluble in a wet developing process using strong acid or base solution as well as vulnerable to plasma treatment during dry etching process. To overcome these problems, we developed new patterning method using soft lithography which is conducted by Poly (dimethyl siloxane) mold. ZnO can be formed aqueous salt by NH_4OH as form of $\text{Zn}(\text{OH})_x(\text{NH}_3)_y^{(2-x)+}$. Using this property, direct contact region between PDMS mold and spin-coated ZnO films dissolved in water because of the formation of ZnO based aqueous salt induced by NH_4OH solvent in PDMS mold. We fabricated TFT devices based on our method and confirmed that there was no degradation to deteriorate performance of device. We developed new patterning method using soft lithography which is simple, cost-effective, residual layer free and can be ambient condition. This method fabricated not only a reliable electronic devices but also device with high field effect mobility due to applicable for ZnO TFTs.