

고유전 $\text{MgO}_{0.3}\text{BST}_{0.7}$ 게이트 절연막을 이용한 InGaZnO_4 기반의 박막 트랜지스터의 저전압 구동 특성 연구

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Low voltage operating InGaZnO_4 thin film transistors using high-k $\text{MgO}_{0.3}\text{BST}_{0.7}$ gate dielectric

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Abstract : InGaZnO_4 based thin film transistors (TFTs) are of interest for large area and low cost electronics. The TFTs have strong potential for application in flat panel displays and portable electronics due to their high field effect mobility, high on/off current ratios, and high optical transparency. The application of such room temperature processed transistors, however, is often limited by the operation voltage and long-term stability. Therefore, attaining an optimum thickness is necessary.

We investigated the thickness dependence of a room temperature grown $\text{MgO}_{0.3}\text{BST}_{0.7}$ composite gate dielectric and an InGaZnO_4 (IGZO) active semiconductor on the electrical characteristics of thin film transistors fabricated on a polyethylene terephthalate (PET) substrate. The TFT characteristics were changed markedly with variation of the gate dielectric and semiconductor thickness. The optimum gate dielectric and active semiconductor thickness were 300 nm and 30 nm, respectively. The TFT showed low operating voltage of less than 4 V, field effect mobility of $21.34 \text{ cm}^2/\text{V}\cdot\text{s}$, an on/off ratio of 8.27×10^6 , threshold voltage of 2.2 V, and a subthreshold swing of 0.42 V/dec.

Key Words : Transistor, Low voltage operation, High-k, IGZO, Flexible TFTs