PT-P009

산소분압에 따른 IGZO 박막트랜지스터의 특성변화 연구

한동석[1], 강유진[1], 박재형[1], 윤돈규[2], 박종완[2]

[1]한양대학교 나노반도체공학과, [2]한양대학교 신소재공학과

Semiconducting amorphous InGaZnO (a-IGZO) has attracted significant research attention as improved deposition techniques have made it possible to make high-quality a-IGZO thin films. IGZO thin films have several advantages over thin film transistors (TFTs) based on other semiconducting channel layers.The electron mobility in IGZO devices is relatively high, exceeding amorphous Si (a-Si) by a factor of 10 and most organic devices by a factor of 10^2. Moreover, in contrast to other amorphous semiconductors, highly conducting degenerate states can be obtained with IGZO through doping, yet such a state cannot be produced with a-Si. IGZO thin films are capable of mobilities greaterthan 10 cm^2/Vs (higher than a-Si:H), and are transparent at visible wavelengths. For oxide semiconductors, carrier concentrations can be controlled through oxygen vacancy concentration. Hence, adjusting the oxygen partial pressure during deposition and post-deposition processing provides an effective method of controlling oxygen concentration. In this study, we deposited IGZO thinfilms at optimized conditions and then analyzed the film's electrical properties, surface morphology, and crystal structure. Then, we explored how to generate IGZO thin films using DC magnetron sputtering. We also describe the construction and characteristics of a bottom-gate-type TFT, including the output and transfer curves and bias stress instability mechanism.

Keywords: IGZO (InGaZnO), TFTs (Thin film transistors), Oxygen partial pressure, Bias stress instability