

The effect of oxygen species on the ZnO TFT prepared by atmosphere pressure
plasma jet

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Abstract

Bottom-gate thin-film transistors (TFTs) were fabricated with ZnO channel layer deposited by atmospheric pressure plasma jet (APPJ). The effect of oxygen partial pressure on the ZnO TFT was investigated. The ZnO thin films were deposited at 100°C, and oxygen gas was incorporated into plasma gas (N₂) in the percentage of 0%-1% (O₂/N₂+O₂). Reactive oxygen species could repair the oxygen vacancies during deposition, and the switching behavior was improved effectively. With increasing oxygen partial pressure, the ZnO thin films exhibited a more random orientation. By incorporating 0.69% O₂ into plasma gas, a threshold voltage of 26.7 V, a subthreshold swing of 3.89 V/decade, a field-effect mobility of 2.38 cm²/Vs and an I_{on}/I_{off} current ratio of 4.63x10⁹ were obtained.

Keyword : ZnO, atmosphere pressure plasma jet