

Electrical Properties of a-IGZO Thin Films for Transparent TFTs

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Recently, amorphous transparent oxide semiconductors (TOS) have been widely studied for many optoelectronic devices such as AM-OLED (active-matrix organic light emitting diodes). The TOS TFTs using a-IGZO channel layers exhibit a high electron mobility, a smooth surface, a uniform deposition at a large area, a high optical transparency, a low-temperature fabrication. In spite of many advantages of the sputtering process such as better step coverage, good uniformity over large area, small shadow effect and good adhesion, there are not enough researches about characteristics of a-IGZO thin films.

In this study, therefore, we focused on the electrical properties of a-IGZO thin films as a channel layer of TFTs. TFTs with the a-IGZO channel layers and Y₂O₃ gate insulators were fabricated. Source and drain layers were deposited using ITO target. TFTs were deposited on unheated non-alkali glass substrates (5cm×5cm) with a sintered ceramic IGZO disc (3 inch \varnothing , 5mm t), Y₂O₃ disc (3 inch \varnothing , 5mm t) and ITO disc (3 inch \varnothing , 5mm t) as a target by magnetron sputtering method. The O₂ gas was used as the reactive gas. Deposition was carried out under various sputtering conditions to investigate the effect of sputtering process on the characteristics of a-IGZO thin films. Correlation between sputtering factors and electronic properties of the film will be discussed in detail.