High Performance ZnO Thin-Film Transistors Using High-k TiHfO Gate Dielectrics

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Abstract

ZnO-based TFTs have attracted much attentions duing to their good device performance, low cost, and potential to realize transparent and flexible active circuits. However, most of ZnO TFTs suffered from high threshold voltage (VT), poor subshreshold swing (SS), and high operation voltage, setting a limit on their applications. These issues mainly result from the use of low dielectric materials (such as SiO2) which usually leads to poor gate control on the channel current. Recently a lot of efforts are made to find suitable material for gate dielectrics of ZnO TFTs [1]-[4]. In this study, firstly, we integrated high-κ TiHfO material into ZnO TFTs for its high dielectric constant [5][6] and a promising result of low VT of 0.34 V, small SS of 0.23 V/dec, good Ion/Ioff ratio of 105, and high mobility of 2.1 cm2/V-s. was attained.

Keyword：TFT ZnO