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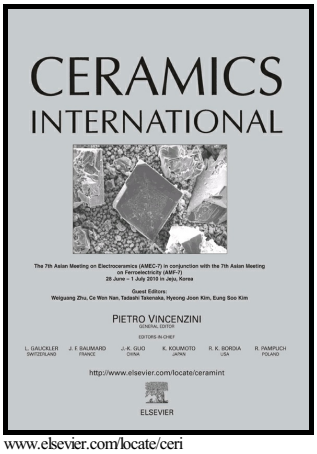


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# Solution-processed ytterbium oxide dielectrics for low-voltage thin-film transistors and inverters

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## Abstract

High permittivity (high k) metal-oxide thin films fabricated via solution processes have recently received much attention for the construction of low-operating voltage and high-performance thin-film transistors (TFTs). In this report, amorphous ytterbium oxide ($Yb_2O_3$) thin films were fabricated by spin coating and their applications in TFTs were explored. The physical properties of the solution-processed $Yb_2O_3$ thin films processed at different annealing temperatures were systematically investigated using various characterization techniques. To explore the feasibility of the $Yb_2O_3$ thin films as gate dielectrics for oxide TFTs, $In_2O_3$ TFTs based on $Yb_2O_3$ dielectrics were integrated. All the devices could be operated at 3 V, which is critical for the applications in portable, battery-driven, and low-power electronic devices. The optimized $In_2O_3/Yb_2O_3$ TFT exhibits high electrical performances, including field-effect mobility of 4.98 $cm^2/Vs$, on/off current ratio of ~$10^6$, turn-on voltage around 0 V, and subthreshold swing of 70 mV/decade, respectively. To demonstrate the potential of $In_2O_3/Yb_2O_3$ TFT toward more complex logic application, the unipolar inverter was further constructed.

Keywords: solution process; high-k dielectric; low-voltage operation; thin-film transistor; inverter