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Transparent indium zinc oxide transistor using pre-annealed sol-gel semiconducting layer

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Low-temperature, high-performance solution-processed metal oxide thin-film transistors such as zinc oxide, zinc tin oxide, amorphous indium gallium zinc oxide and indium zinc oxide (IZO) have been studied extensively to develop active-matrix devices by using TFTs liquid crystal displays, organic light emitting diodes and electrophoretic paper display. In this study, we report on thin-film transistors with indium zinc oxide (IZO) channel layers were fabricated via a pre-annealing process at various temperatures. The research is based on a thermal-annealing process in order to ensure achieve high performance of the transparetn IZO thin-film, meanwhile, devote to the fabrication of low-cost and large size electrical devices. The solution-processed IZO semiconductor matched well with the pre-annealing at the low temperature as low as 120°C, and it showed good performance: a field-effect mobility of 7.9 cm2/Vs, a threshold voltage of 1.4 V, a subthreshold slope of 0.48 V/dec., and a current on-to-off ratio of 2.9 X 107.

Biography

Sung-Jin Kim received the Ph.D. degree in the School of Electrical and Computer Engineering from Seoul National University, Seoul, Korea, in 2006. In, 2007, he was a Postdoctoral Research Scientist with the Department of Electrical Engineering, Columbia University, New York, NY, where he was initially engaged in research on the application of nano technology and new processing strategies for highly integrated systems. In 2008, he joined the School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, as a Postdoctoral Fellow working on solution-processable nano structured devices. His current research interests include the nano devices, flexible nano printing electronics, and energy harvesting nano applications.

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