Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Floating Electrode Transistor based on Single-walled Carbon Nanotube Networks for High Source–drain Voltage Operation JEONGSU KIM, JUHYUNG LEE, HYUNGWOO LEE, TAEKYEONG KIM, HYE JUN JIN, JUYEON SHIN, Department of Physics and Astronomy, Seoul National University, YOUNGKI SHIN, SANGHO PARK, YOONHO KHANG, Process Development Group, Samsung Electronics Co, SEUNGHUN HONG, Department of Physics and Astronomy, Seoul National University — Thin film transistors (TFTs) based on single-walled carbon nanotubes (swCNTs) were reported to exhibit extraordinary characteristics in terms of their conductivity, transparency and flexibility. However, until now, most studies have focused on CNT-TFTs for an operation at a relatively low source–drain voltage below $\sim$ 10 V, while, for some applications such as LCD displays, one needs a rather high source–drain bias voltage. However, such a high voltage bias on source and drain electrodes may reduce the gating effect of conventional CNT-TFT devices by lowering the Schottky barrier and degrade its overall device performance. Herein, we developed floating electrode thin-film transistors (F-TFTs) based on semiconducting swCNT networks for a high source-drain voltage operation. In this device structure, the swCNT network channel was divided into a number of channels connected by floating metallic electrodes. At a high source-drain voltage, the F-TFTs showed a much higher on–off ratio than conventional swCNT-TFTs. This work should provide an important guideline in designing CNT-TFTs for high voltage applications.

Jeongsu Kim
Department of Physics and Astronomy, Seoul National University

Date submitted: 03 Dec 2012 Electronic form version 1.4