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Local-gated single-walled carbon nanotube field effect transistors assembled by AC dielectrophoresis PAUL STOKES, SAIFUL I. KHONDAKER, NANOSCIENCE TECHNOLOGY CENTER & DEPARTMENT OF PHYSICS, UNIVERSITY OF CENTRAL FLORIDA, ORLANDO, FL TEAM — Carbon nanotube field effect transistors (CNT-FETs) have displayed exceptional electrical properties that are superior to the traditional silicon MOSFET. Directed assembly of individually addressable CNT-FETs at selected positions of the circuit with high throughput needs to be demonstrated for future integrated circuits. Here, we present a simple and scalable technique for the fabrication of CMOS compatible & local gated CNT-FETs. The approach is based on directed assembly of individual single-walled carbon nanotube from dichloroethane via AC dielectrophoresis (DEP) onto pre-patterned source and drain electrodes with a local Al gate in the middle. We find that both metallic and semiconducting nanotubes can be assembled and the centered aluminum gate does not affect the DEP assembly. We also show that the measured device performance such as subthreshold swing of local-gated semiconducting nanotube FET is superior compared to the global back gated device possibly due to channel controlled operation. Directed assembly of local gated CNT-FETs at selected position of the circuit via DEP pave the way for large scale fabrication of CMOS compatible nanoelectronic devices.

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