Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Template-directed Self-assembly of Carbon Nanotube Field-Effect Transistors STEPHEN MCGILL, SALEEM RAO, PRADEEP MANANDHAR, Physics & MARTECH, Florida State University, Tallahassee, FL, SEUNGHUN HONG, Physics & Nano-Systems Institute, Seoul National University, Seoul, South Korea, PENG XIONG, Physics & MARTECH, Florida State University, Tallahassee, FL — We pattern self-assembled monolayers (SAMs) of organic molecules to control the interactions between carbon nanotubes and inorganic surfaces. Deposition of the SAMs forms a template that directs the placement and alignment of nanotubes on lithographically defined electrodes to create field-effect transistors (FETs). Our assembly process is highly scalable and we demonstrate parallel fabrication of five FETs on a single substrate. These FETs exhibit large "on" currents of $\sim 1\mu$A with "on/off" ratios as high as 10^6. Furthermore, our devices exhibit novel functionality by operating hysteresis-free without passivation of the nanotube or electrode surfaces. These features may lead to enhanced performance for delicate sensing applications utilizing these devices. We discuss the electrical characteristics of these FETs and contrast them with other state-of-the-art devices and assembly strategies. This work has been supported by NSF NIRT grant ECS-0210332.

Stephen McGill
Physics & MARTECH, Florida State University, Tallahassee, FL

Date submitted: 11 Jan 2006 Electronic form version 1.4