

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Toward CN-VFET logic circuits**<sup>1</sup> STEPHEN GILBERT, BO LIU, MITCHELL MCCARTHY, EVAN DONOGHUE, ANDREW RINZLER, University of Florida, Department of Physics — Gate field modulation of the Fermi level in the low density of electronic states carbon nanotubes provides a new control mechanism for modulating the Schottky barrier between the nanotubes and a semiconductor to control charge injection across their interface. This has been exploited in the recently developed carbon nanotube-enabled vertical field effect transistor (CN-VFET) comprised of a bottom gate, dielectric layer, dilute nanotube source electrode, semiconducting channel layer, and drain electrode situated in a collinear, vertical stack. Since the channel length in this architecture is simply the thickness of a thin film, the naturally short channel lengths can overcome the relatively low mobility of organic semiconductors to source higher on-state currents or potentially improve operating speeds. Prototype logic gates using such organic transistors have yet to be demonstrated. As a step in this direction we have fabricated organic CMOS inverters utilizing a p-type and an n-type CN-VFET. The device fabrication, materials used, performance and progress toward a CN-VFET ring oscillator will be discussed.

<sup>1</sup>We acknowledge support from Nanoholdings LLC. S.G. acknowledges support from the NSF UF Materials Physics REU program.

Stephen Gilbert  
University of Florida, Department of Physics

Date submitted: 18 Nov 2012

Electronic form version 1.4