

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Negative differential conductance in suspended semiconducting carbon nanotubes** HAIBING PENG, ALEX ZETTL, Center of Integrated Nanomechanical Systems and Department of Physics, University of California at Berkeley, Berkeley, CA 94720 — Suspended single-wall carbon nanotubes (SWCNTs) have been grown directly on metal electrodes with electrical contact by chemical vapor deposition. Extraordinary negative differential conductance was observed for the first time in suspended semiconducting SWCNTs. The current-voltage characteristics show an abrupt drop of conductance as the source-drain voltage is increased, followed by a constant differential conductance at higher voltage. The effect is qualitatively different from the recently reported negative differential conductance in metallic SWCNTs (*Phys. Rev. Lett.* **95** 155505, 2005). We suggest that the observed negative differential conductance in semiconducting SWCNTs may be attributable to Schottky barriers between the as-grown suspended SWCNTs and the electrodes, instead of optical phonon scattering invoked in explaining the negative differential conductance in metallic SWCNTs. Our observations not only have potential applications for novel electronic devices, but also shed light on better understanding and manipulating SWCNTs transistors.

Haibing Peng  
Center of Integrated Nanomechanical Systems and Dept. of Physics  
University of California at Berkeley, Berkeley, CA 94720

Date submitted: 02 Dec 2005

Electronic form version 1.4