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High On-Currents in Doped Schottky-Barrier Nanotube Transistors YUNG-FU CHEN, MICHAEL FUHRER, Department of Physics and Center for Superconductivity Research, University of Maryland, College Park, MD 20742-4111, USA — For many contact metals, the short channel single-walled carbon nanotube field-effect transistor (SWNT-FET) has been understood as a ballistic Schottky barrier-FET (SB-FET), in which high on- currents may be realized with thin gate dielectrics through narrowing of the SB by the gate field [1]. Recently Ohmic contacts to nanotubes have been achieved through the use of high work function metals; such devices show high on-currents and near-ideal subthreshold swings [2]. Here we demonstrate that SWNTs in ambient on SiO_2 are p-doped. Doped SB-SWNT- FETs exhibit high on-currents due to thinning of the SB by doping, but retain the poor subthreshold behavior of SB-FETs. Dopants in SWNT-FETs can be removed by applying up to 50 V drain bias in vacuum, corresponding to dissipated power of > 1 mW. Undoped devices exhibit much lower on-currents, and intrinsic, ambipolar behavior with symmetric SB. This work is supported by National Science Foundation under Grant No. 0102950. [1] S. Heinze, et al., Phys. Rev. Lett. 89, 106801 (2002). [2] A. Javey, et al., Nature 424, 654 (2003).

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