

Abstract Submitted
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Capacitance measurements of individual carbon nanotubes LUKE

A. K. DONEV, SHAHAL ILANI, PAUL L. MCEUEN, Laboratory of Atomic and Solid-State Physics, Cornell University — We present measurements of the capacitance of individual single walled carbon nanotubes. The nanotubes were grown from ethylene at 700°C using evaporated iron nanoclusters as the catalyst. Electrical contacts and local top gates were patterned using optical lithography and liftoff. The top gate consists of a thin oxide film (~ 15 nm, different oxides have been used) covering the nanotube with metal on top. The capacitance was measured between the nanotube and the top gate using a commercially available capacitance bridge. We also measure the transport through the tube and correlate the transport and capacitance measurements. For semiconducting tubes, we measure the difference in capacitance between the conducting state and the state where the charge carriers in the tube are depleted. The measured capacitance per unit length of the nanotube is in reasonable agreement with the geometric capacitance of a metal wire embedded in oxide near a conducting plane.

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