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Electrical Properties of Defects in Carbon Nanotubes BRETT GOLDSMITH, PHILIP G. COLLINS, Department of Physics and Astronomy, University of California Irvine, Irvine, CA 92697-4576 — Unmodified single-walled carbon nanotubes are generally considered to be defect free conductors, even though most synthesis and fabrication techniques introduce non-zero defect densities. Primarily using scanned probe microscopies, we have investigated a number of electronic devices in which defects play important, if not primary, roles. For example, defects in otherwise metallic nanotubes can lead to switching behaviors in a field-effect transistor geometry, leading to the misidentification of such tubes from transport measurements alone. Furthermore, defect sites also contribute disproportionally to the device resistance of a metallic nanotube. In semiconducting nanotubes, field-induced switching has different signatures depending on whether the contacts, the bulk nanotube, or a defect site dominates the behavior. We will present data and measurements from a variety of samples demonstrating the characteristics and frequency of such effects in typical nanotube devices. This work has been supported by NSF-DMR.

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