

## **Carbon Nanotube Electronics - The Inside Story**

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We have used combinations of transport measurements and advanced microscopies to probe local properties of active single-wall nanotube devices with nanoscale resolution. We measure the Fermi energy at individual defects along carbon nanotube field effect transistors (CNFETs) by combining transport with simultaneous scanning-probe based imaging (Scanning Gate Microscopy and Scanning Impedance Microscopy). The same techniques are used to how transport in the CNFET evolves from defect-limited to diffusive to quasi-ballistic as the carrier density is increased by electrostatic doping. As a second example of the power of combined transport and nanoscale microscopy, we have developed a technique for measuring electronic transport and performing Transmission Electron Microscopy (TEM) on chemical vapor deposition (CVD) grown single-wall carbon nanotube (SWNTs) structures. TEM shows that we successfully created  $C_{60}$  filled "peapods" from CVD SWNTs. I will discuss synthesis techniques and transport data from these devices. Preliminary data on transport through electron-beam modified SWNTs will be discussed.