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Carbon nanotube Y-junctions for Nanoscale Electronics PRABHAKAR BANDARU, CHIARA DARAIO, SUNGHO JIN, Univ. of California San Diego, APPARAO RAO, Clemson University — Carbon Nanotube (CNT) based electronics offer significant potential, as a nanoscale alternative to silicon based devices, for novel molecular electronics technologies. To realize truly nanoelectronic architecture, it is desirable to have a fully integrated nanotube based technology, where both devices and interconnects are based on CNTs. With this aim in mind, we report on the electrical properties of CNT based Y-junctions. The carrier delocalization and the inevitable presence of catalyst particles, introduced during growth, at the junction region induce a net charge and scattering which can be exploited in constructing electronic devices. We have assembled and electrically characterized the DC resistance and the AC impedance of several Y-junction devices[2] with possibilities for switching and transistor related applications. These experiments alert us to the vast potentialities of Y-junction devices in the development of nanoelectronic components including inverters, logic gates, and frequency mixers. An electrical impedance model of a MWNT Y-junction will be presented which will help gain an understanding of the current transport mechanisms in these nanostructures. 1. P. Bandaru et al, "Novel electrical switching behavior and logic in carbon nanotube Y-junctions", Nature Materials, vol. 4(9), 663-666, (2005) 2. N. Gothard, et al. "Controlled growth of Y-junction nanotubes using Ti-doped vapor catalyst", Nanoletters **4**, 213-217 (2004).

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