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A comparative study of transport properties between low- and high-resistance nanotube field-effect transistors SWASTIK KAR, ARAVIND VIJAYARAGHAVAN, CATERINA SOLDANO, PULICKEL AJAYAN, Rensselaer Polytechnic Institute — A large amount of fundamental work has been done in demonstrating the possibilities of using carbon nanotubes in future nanoscale devices. A primary concern in these devices has been the nature of transport mechanism in carbon nanotubes, especially semiconducting nanotubes where the conductance can be modulated significantly using a gate voltage, giving rise to a nanotube field-effect transistor. The quality of the metal-nanotube interface plays a significant role in determining the characteristics of field-effect transistors fabricated using single-wall carbon nanotubes. When contact-resistance is high due to a large Schottky barrier, the transistor characteristics are dominated by this barrier. When the barrier height is low, the intrinsic nanotube electronic properties determine the transistor characteristics. In this work, we compare and contrast the significant features of the transistor characteristics for the two types of devices.

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