Abstract Submitted
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Estimating Schottky barrier heights using the current characteristics of sparse CNT networks[1] ALEJANDRO JIMENEZ, California Polytechnic State University, HONG PHAN NGUYEN , NATALIE PLANK, Victoria University of Wellington, COLLEEN A. MARLOW, California Polytechnic State University — Carbon nanotube (CNT) thin film networks are a promising platform used for field effect transistor devices with bio-sensitivity. There is compelling evidence that this sensitivity occurs due to changes in the transport across metallic (m) and semiconducting (s) tube junctions in the network due to electrostatic gating. Transport across individual m-s junctions is asymmetric and nonlinear due to the Schottky barriers formed at the m-s CNT junctions. In large dense CNT network devices the nonlinear signature of individual m-s junctions is washed out in the overall current characteristics. However, we have observed the nonlinear signature of the m-s junctions in the current characteristics of sparse CNT network devices. To understand the interaction between the individual junctions and the overall network morphology we studied the current characteristics of sparse CNT network devices from room temperature down to 20 K. By varying the temperature of these devices we were able to probe the energetic dependence of the CNT Schottky barriers. We used two distinct models to extract the height of the Schottky barriers from the set of temperature data. While the models differ significantly, both models suggest a transition in the dominant transport mechanism at low temperatures.

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