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Contact Resistance, Electrical Breakdown and Temperature-Dependent Conductance of Multi-Walled Carbon Nanotubes XIANGYU CHEN, Department of Physics, Stanford University, DEJI AKINWANDE, H.-S. PHILIP WONG, Department of Electrical Engineering, Stanford University — Contact resistance has always been one of the major issues for applications of carbon nanotubes such as interconnects for VLSI chips, etc. In order to study the physics of contact between carbon nanotubes and metal, the temperature dependence of contact resistance between carbon nanotube and different metals (Cr/Au, Pd, Ti/Au, etc.) in an extended temperature range (4K to 400K) are explored. These data provide insight into the carrier transport between metal and carbon nanotubes. In addition, the temperature coefficient of the resistivity of multi-walled carbon nanotubes (MWCNT) of different lengths in the temperature range from 4K to 400K are measured and compared with theoretical calculations. By studying the temperature-dependent conductance, we are able to understand carrier transport in MWCNTs at low temperatures. The electrical breakdown behavior of MWCNT is also studied. Information from shell-by-shell breakdown provides insight about the critical current density and inter-shell conductance at different temperatures.

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