

Abstract Submitted  
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**Variable Range Hopping Conductivity in Carbon Nanotube Threads.** CHAMINDA JAYASHINGHE, DAVID MAST, MARK SCHULZ, VESSELIN SHANOV, University of Cincinnati — We have measured the low temperature, dc electrical transport in threads spun from long multi-wall carbon nanotubes (MWCNT). The electrical transport in these threads shows variable range hopping (VRH) behavior at low temperatures, as well as non-linear IV characteristics at high applied electric fields. The MWCNT used to make the threads have an outer diameter from about 6 nm to 30 nm; these MWCNT's have been grown in lengths up to 18mm. The diameter of the CNT threads in this study have diameters of 15 and 25 microns; the threads were spun using 2mm long MWCNT's. The room temperature (RT) resistivity of the threads is on the order of 5 mOhm cm and can be changed by post-spinning treatment strategies such as high temperature annealing. From 300K down to 4.2K, the resistivities show an exponential dependence with temperature consistent with VRH conduction. As the RT resistivity decreases, the low temperature transport shifts from being dominated, at low temperatures, by Coulomb-Gap VRH described by Efros and Shklovskii [1] to 3D-VRH as first formulated by Mott [2]. Analysis will be given of how the VRH behavior changes with intrinsic and post-treatment thread resistivity. [1] A.L. Efros and B.I. Shklovskii, J. Phys. C: Solid State Physics. **8**, L49 (1975). [2] N.F. Mott, J. Non-Cryst. Solids **1**, 1 (1968).

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