

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Temperature dependence of mean free length of electrons in single walled carbon nanotubes MENINDER PUREWAL, Columbia University, Department of Applied Physics and Applied Mathematics, ANIRUDDH RAVI, BYUNG HEE HONG, JOSHUA SMALL, Columbia University, Department of Physics, BHUPESH CHANDRA, JAMES HONE, Columbia University, Department of Mechanical Engineering, PHILIP KIM, Columbia University, Department of Physics — We have measured how single walled carbon nanotube resistance scales with channel length. Multiple two-terminal devices of varying source-drain separation are fabricated on isolated ultra-long (>1 mm) SWNTs grown by chemical vapor deposition. Pd electrodes provide low resistance contacts to the SWNTs. The resistance of SWNT devices are investigated in length scales ranging from 100 nm to 200 μm , from which the 1-dimensional resistivity is extracted. The temperature dependence of the electron mean free path obtained from the resistivity values indicate that in the majority of metallic SWNT devices the electron transport is ballistic up to ~ 500 nm at room temperature and ~ 10 μm at 1.6K.

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Date submitted: 02 Dec 2005

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