

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Unusual conductance suppression in metallic carbon nanotubes¹

AMIN AHMADI, RYUICHI TSUCHIKAWA, DANIEL HELIGMAN, University of Central Florida, ZHENGYI ZHANG, Columbia University, EDUARDO MUCCIOLO, University of Central Florida, JAMES HONE, MASA ISHIGAMI, Columbia University — Clean metallic carbon nanotube usually show a finite “dip” in the conductance as a function of gate voltage. We have observed an extra conductance suppression as larger gate voltages are applied, forming a hump-like shape in the conductance versus gate voltage curve. We have performed numerical calculations using the recursive Green’s function technique on a tight-binding model to identify the origin of the hump. Our results show that the hump formation is associated with the unique combination of the linear dispersion of metallic carbon nanotubes and the presence of extrinsic impurities such as adsorbates. The width and position of the hump strongly depend on the densities of positive and negative impurities but show no dependence on the shape of the impurity potential, indicating why the hump is a rather ubiquitous phenomenon for metallic nanotubes.

¹This work is based upon research supported by the National Science Foundation under Grant No. 0955625 and 1006230

Amin Ahmadi
Univ of Central Florida

Date submitted: 14 Nov 2014

Electronic form version 1.4