

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Low-temperature electronic transport in Pt-nanocluster decorated alumina template grown carbon nanotubes SWASTIK KAR, CATERINA SOLDANO, LI CHEN, Rensselaer Polytechnic Institute, SAIKAT TALAPATRA, University of Southern Illinois at Carbondale, ROBERT VAJTAI, SAROJ NAYAK, PULICKEL AJAYAN, Rensselaer Polytechnic Institute — Alumina template grown nanotubes are known to be highly disordered tube when compared to arc-discharge grown tubes. This is due to the particular type of growth process involved. Temperature dependence study reveals a slow power law dependence of the conductance as a function of the temperature. Large value of power law exponents found in pristine tubes, suggest that the transport mechanism takes place through tunneling between adjacent graphene flakes. When platinum-decorated, those devices show a Luttinger liquid behavior in the high-T regime and a large suppression of the conductance at low-T due to the interplay of disorder and $e - e$ interactions. Transport properties are studied in light of a recently proposed model for disordered multi-channel quantum wires. Magneto-transport measurements ($|B| < 5T$) show the presence of weak localization and a small but distinct Rashba spin-orbit scattering effect in the low-field regime ($|B| < .5T$), the latter attributed to the surface decoration. Coherent transport is found to be recovered with increasing applied electric field.

Caterina Soldano
Department of Physics, Applied Physics and Astronomy,
Rensselaer Polytechnic Institute

Date submitted: 28 Dec 2007

Electronic form version 1.4