Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

The effect of purification on electron transport properties of single-wall carbon nanotubes HISASHI KAJIURA, MASASHI SHIRAISHI, MASAFUMI ATA, Sony, ANIL NANDYALA, ULAS COSKUN, ALEXEY BEZRYADIN, University of Illinois — The effect of purification on room temperature electronic transport properties of laser-produced single-wall carbon nanotubes (SWNTs) was studied by submerging the nanotubes into liquid mercury. As-produced SWNTs were purified using H2O2, HCl, and NaOH solutions and heated at 923K at 0.01Pa for 1 h. Purified SWNTs having clean surface wall showed weak dependence of the electrical resistance on the length of the nanotube segment connecting electrodes. This provides evidence of quasi-ballistic electron transport in SWNTs. The estimated electronic mean free path of the purified SWNTs reached a few microns, which is longer than that of as-produced tubes. The electronic mean free path in purified SWNTs is consistent with the calculation based on the electron scattering by acoustic phonons. [H. Kajiura et al. Appl Phys Lett 86, 2005, 122106.]

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Date submitted: 02 Nov 2005 Electronic form version 1.4