Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Photoluminescence microscopy of carbon nanotubes grown by chemical vapor deposition: influence of external dielectric screening on optical transition energies OLIVER KIOWSKI, Universität Karlsruhe, Institut für Physikalische Chemie, 76128 Karlsruhe, Germany, SERGEI LEBEDKIN, Forschungszentrum Karlsruhe, Institut für Nanotechnologie, 76021 Karlsruhe, Germany, MANFRED M. KAPPES, Universität Karlsruhe, Institut für Physikalische Chemie, 76128 Karlsruhe, Germany — Photoluminescence (PL) laser microscopy was applied to determine optical transition energies E_{11} and E_{22} of individual semiconducting single-walled carbon nanotubes (SWNTs) suspended on top of carbon nanotube 'forests', grown by chemical vapor deposition (CVD) on silicon substrates. A uniform increase of E_{11} and E_{22} energies by 40–55 and 24–48 meV, respectively, was found for 19 different (n,m) nanotube species suspended in air/vacuum – relative to SWNTs in a reference water-surfactant dispersion. We did not find any systematic correlation between nanotube (n,m) structure and energy shifts. CVD-grown SWNTs embedded in paraffin oil and 1-methylnaphthalene show nearly the same PL peak positions as SWNTs in aqueous dispersion, indicating similar dielectric screening of excitons in SWNTs in these media.

Oliver Kiowski
Universität Karlsruhe, Institut für Physikalische Chemie,
76128 Karlsruhe, Germany

Date submitted: 28 Nov 2006 Electronic form version 1.4