Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Stability of carbon nanotubes to laser irradiation probed by Raman spectroscopy. ALEXANDER SOLDATOV, DAVID OLEVIK, Dept. of Physics, Lulea University of Technology, MANUEL DOSSOT, Dept. of Chemical Physics, Nancy University, EDWARD MCRAE, Lab. of Solid State Chemistry, Nancy University — CNTs in a bundled state suffer from overheating effects - exposure to laser irradiation leads to a reversible shift of the RBM resonance window at a moderate laser fluence [1] or even to damaging of certain nanotube types at higher fluencies. Here we report on our systematic study of the influence of laser irradiation on the Raman spectra of HiPCO-produced single wall CNTs. Specifically, we have examined Raman response of bundled CNTs to: i) laser power density; ii) exposure time and iii) photon energy (1.96 and 2.33 eV). Our results show that irreversible destruction of CNTs in the bundles takes place at even a moderate laser power density ($\sim$500 W/cm^2). Notably, the tubes with smaller diameters are influenced first and the rate of CNT damage increases with photon energy. Finally, we determined that the threshold for the RBM spectrum profile to change at $\sim$200 W/cm^2, which is apparently below the laser fluencies used typically in Raman experiments on CNT bundles. Based on these results we developed a regime of Raman data collection which was recently used to identify functionalization of different types of CNTs [2] from their RBM Raman spectra. [1] C. Fantini, et al. Phys. Rev. Lett., **93**, 147406 (2004). [2] J. Liu, et al. Carbon, **45**, 885, (2007).

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Date submitted: 27 Nov 2007 Electronic form version 1.4