Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Simple, Rapid Chirality Characterization of Single Walled Carbon Nanotubes PHILLIP WILLIAMS, National Institute of Aerospace, MIN NAMKUNG, NASA Goddard Space Flight Center, CANDIS MAYWEATHER, JOSLYN PERKINS, Spelman College, BUZZ WINCHESKI, NASA Langley Research Center, CHEOL PARK, National Institute of Aerospace, JUOCK NAMKUNG, Naval Air Warfare Center — Raman scattering and optical absorption spectroscopy are used for the chirality characterization of single wall carbon nanotubes (SWNTs) dispersed in various solvent systems. Radial breathing mode (RBM) Raman peaks for semiconducting and metallic SWNTs are identified by directly comparing the Raman spectra with the Kataura plot. The SWNT diameters are then calculated from these resonant peak positions. Next, a list of (n, m) pairs, yielding the SWNT diameters within a few percent of that obtained from each resonant peak position, is established. The interband transition energies for the list of SWNT (n, m) pairs are calculated based on the tight binding energy expression for each list of the (n, m) pairs, and the pairs yielding the closest values to the corresponding experimental optical absorption peaks are selected. The results reveal the most probable chiralities for the semiconducting nanotubes and for the metallic nanotubes present in a batch of SWNTs. Directly incorporating the Raman scattering data into the optical absorption spectra, the present method is considered the simplest practical technique currently available.

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Date submitted: 13 Dec 2005 Electronic form version 1.4