

Abstract Submitted
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Raman Studies of Exciton-Phonon Coupling in Carbon Nanotubes: Quantitation of Bundled vs. Isolated Behavior STEPHEN DOORN, ANDREW SHREVE, SERGEI TRETIAK, Los Alamos National Laboratory, ZHENG TANG LUO, FOTIOS PAPADIMITRAKOPOULOS, University of Connecticut — Exciton-phonon and electron-phonon coupling are important for a number of carbon nanotube optical and transport behaviors and have recently drawn attention for their role in chirality- dependent intensities observed in radial breathing mode (RBM) Raman spectra. Given the importance of these effects, there is a need to quantitate the magnitude of the exciton-phonon coupling. We present a Raman transform analysis of RBM fundamental and overtone intensities that yield the magnitude of coupling for five specific nanotube chiralities. These results agree with values predicted through quantum chemical calculations and indicate that non-Condon effects may be important in describing nanotube transitions. We extend the analysis of the coupling to bundled nanotube samples and find it decreases significantly in these sample types. We also discuss the coupling behavior of a new class of intermediate frequency modes (IFMs) that display step-wise dispersive behavior. These IFMs are associated with coupling between the E11 and E22 transitions. Bundling is found to increase the coupling observed for these modes.

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