Non-Condon and Double Resonance Raman Behaviors in Carbon Nanotubes Enriched in a Single Chirality

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Access to carbon nanotube samples enriched in single chiralities allows the observation of new photophysical behaviors obscured or difficult to demonstrate in mixed-chirality ensembles. Recent examples include the observation of strongly asymmetric G-band excitation profiles resulting from non-Condon effects[1] and the unambiguous demonstration of Raman interference effects.[2] We present here a study of the E_{ii} dependence in non-Condon behavior with excitations from E_{11} thru E_{44} for both RBM and G modes. Additionally, the complex response expected for the CNT 2-D mode has not yet been clearly defined because of similar limitations. We present results on the dispersive and resonance behaviors of the 2-D mode obtained from samples enriched in a single chirality. The response will be discussed in the context of the interplay of dispersive effects and resonance with the E_{11} and E_{22} transitions. The results will be compared to simulations that include all relevant electronic and phonon bands tied to the double-resonance process.

1. J.G. Duque, et. al., *ACS Nano*, **5**, 5233 (2011).
2. J. G. Duque, et. al., *Phys. Rev. Lett*., **108**, 117404 (2012).