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A comparison of measured electron-phonon and electron-photon coupling strengths in isolated and small ropes of single wall carbon nanotubes B.B. GOLDBERG, Y. YIN, A. WALSH, Physics Department, Boston University, S.B. CRONIN, Electrical Engineering Department, University of Southern California, M. TINKHAM, Department of Physics, Harvard University, A.N. VAMIVAKAS, M.S. ÜNLÜ, A.K. SWAN, Electrical and Computer Engineering, Boston University — Resonant Raman scattering excitation profiles and photoluminescence (PL) are measured for isolated carbon nanotubes (CNT) and small ropes suspended in air. Most of the measured CNTs do not exhibit PL and are believed to be in small ropes. The radial breathing mode electron-phonon coupling, M_{e-ph}, are measured, and values for the isolated CNT are in good quantitative agreement with ab initio calculations. The matrix elements M_{e-ph} and electron-photon coupling, M_{e-op}, for a CNT in a small rope are 1.7 times and 1.4-2.7 times weaker than in an isolated CNT. The reduced e-phonon coupling in small ropes is correlated with a smaller RRSE broadening η, compared to the value (45meV) obtained from an isolated CNT. Despite the reduced values of M_{e-ph} and η, M_{e-ph} in small ropes still display the same chiral dependence predicted for isolated CNTs.

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