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Exciton environment effect and exciton-phonon interaction of single wall carbon nanotubes[1] RIICHIRO SAITO, AHAMAD R.T. NUGRAHA, JIN SUNG PARK, Tohoku Univ., PAULO T. ARAUJO, ADO JORIO, Univ. Fed. of Minas Gerais, MILDRED S. DRESSELHAUS, MIT — Optical transition energies of carbon nanotubes depend on metalicity and surrounding materials, which we call environmental effect. Using the extended tight binding exciton energy calculation combined with the screening effect of an exciton by surrounding materials, the transition energies are calculated as a function of diameter and dielectric constants and compared with the experimental results (P. T. Aroujo et al, PRL 103, 146802, (2009)). Now the all experimental data for a wide range of energy up to 3eV and for a wide range diameter up to 2nm can be fitted to the theoretical values in a high numerical accuracy within 60meV which is sufficient for assigning (n,m) values for many type of surfactant materials. We also report resonance Raman window values by a new, ETB exciton-phonon interaction, which will be compared with recent experimental measurement of radial breathing phonon Raman spectroscopy and excitation profile.

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