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Raman Spectroscopy of Individual Suspended Carbon Nanotubes under Immense Strains CHIA-CHI CHANG, Department of Physics, University of Southern California, I-KAI HSU, MEHMET AKYOL, STEPHEN B. CRONIN — Suspended carbon nanotubes with long nanotube-substrate contacts grown by chemical vapor deposition enable us to explore carbon nanotubes up to strains of 13.6%. Here, Raman spectroscopy is utilized to observe strain-induced changes in the G band vibrational modes, which have a linear and pronounced response to the extension of the C-C bonds under various degrees of strain. The G band is found to downshift at rates ranging from -6.2 to -23.6cm^{-1}/% strain among the different nanotubes measured in this study. Despite this wide range of downshift coefficient, we observe broadening of the G band linewidth (FWHM) at a universal threshold downshift of $\Delta\omega_G > 75$cm^{-1}. The G band is observed to downshift by up to 157cm^{-1} (from 1592 to 1435cm^{-1}) under immense strains without any noticeable D band. Our measurements show that carbon nanotubes remain intact up to 13.6% strain with no slippage, breakage, or defect formation.

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