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Strain induced phonon softening in graphene MINGYUAN HUANG, Columbia University, HUGEN YAN, DAHUA SONG, CHANGYAO CHEN, TONY HEINZ, JAMES HONE, Columbia University, COLUMBIA UNIVERSITY COLLABORATION — We have developed a process to transfer single layer graphene from silicon dioxide to polydimethylsiloxane (PDMS). This allows the straightforward application of uniaxial strain by bending of the PDMS. Using this technique, we examine the Raman scattering spectra of graphene sheets under uniaxial strain. The spectra display significant strain-induced downshifts, as predicted by theory. The frequency shows up to 14 and 30 cm^{-1} downshifts for the G mode and D^* mode, respectively; the softening rate ($\Delta\omega/\omega$) is about 1% for both. This behavior is explained by the weakening of carbon-carbon bonds due to elongation, and is consistent with previous studies on carbon nanotubes.

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