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Electron-Phonon Interactions in Graphene and Graphene Layers JIA-AN YAN, W.Y. RUAN, M.Y. CHOU, Georgia Institute of Technology — We have performed first-principles calculations of the phonon linewidth due to the electron-phonon coupling in one and two layers of graphene using the density-functional perturbation theory. For single-layer graphene, we find that the calculated linewidth is dominated by electron interaction with the two highest optical phonon modes near the Γ point and by the highest optical phonon mode near the Brillouin zone boundary corners K and K$'$. A value of the mass enhancement parameter, λ= 0.3, is obtained for the one layer when we extrapolate the smearing temperature to zero. As for the case of bilayer graphene, although the phonon dispersion relations are almost identical to those of single layer, significant enhancement of electron interaction with some phonon modes is observed due to interlayer coupling, leading to distinct phonon linewidths.

Jia-An Yan
Georgia Institute of Technology

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