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Optical study of electron-phonon coupling in multilayer graphene with different stacking order ZHIQIANG LI, CHUN-HUNG LUI, KIN-FAI MAK, Columbia University, LARRY CARR, Brookhaven National Laboratory, JIE SHAN, Case Western Reserve University, TONY HEINZ, Columbia University —
The optical conductivity spectra of mechanically exfoliated multi-layer graphene samples were explored in the infrared range. In samples from three to six layers in thickness, two distinct types of spectra were observed for different samples with precisely the same number of layers, which can be attributed to the optical absorption of multi-layer graphene samples with Bernal stacking (ABAB series) and rhombohedral stacking (ABC series). Furthermore, the G-mode phonon exhibits a lineshape characteristic of a Fano resonance due to strong electron-phonon coupling. The width and lineshape of the phonons are strongly modified by the interband electronic transition as the layer number increases. The intensity of the phonons in samples with rhombohedral stacking is much higher than those in samples with Bernal stacking. We will discuss the new aspects of electron-phonon coupling in multi-layer graphene revealed by this work.

Zhiqiang Li

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