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Polarization and electric field dependent electron-phonon interaction in graphene and graphene oxide SATYAPRAKASH SAHOO, RAM S. KATIYAR, Department of Physics, University of Puerto Rico, San Juan, PR 00936-837 — Raman spectroscopy has been emerged as one of the important tool to understand various physical properties of graphene and graphene oxide. In this study, polarized Raman scattering has been performed to understand the electron-phonon interaction in connection with the second order Raman scattering process (2D band) in monolayer, bilayer and suspended bilayer graphene. The 2D Raman band shows strong polarization dependent irrespective of number of graphene layers. This effect has been explained on the basis of anisotropic photon scattering through the nodes at the K-point of the Brillouin zone in graphene during optical absorption. We also explored the electron-phonon interaction in graphene oxide in presence of electric field. The in-situ Raman studies show significant changes in the D and G Raman bands. In particular, the splitting of G band was observed with increase in voltage which indicates the electric field can alter the deformation-potential mediated electron-phonon interaction in graphene oxide. The electrical conductivity of graphene oxide was also found to increase dramatically with increase in voltage.

Ram S. Katiyar
Department of Physics, University of Puerto Rico, San Juan, PR 00936-8377

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