

Nanooptics and photonics

Spectroscopic manifestation of intravalley double electron-phonon resonance processes in single- and bilayer graphene systems

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In recent years researches have devoted much attention to study of intervalley double electron-phonon processes in single- and bilayer graphenes, which determined main strips of Raman spectra.

We experimentally investigated dispersion (dependence phonon energy from quantum energies of exiting radiation) of 2D'-band in micro-Raman spectra of light scattering in single- and bilayer graphenes. D'-band, as a D-band are defect activated. Its frequencies depend on wavelenghtes of exiting radiation. But unlike the D-band, for which intervalley electron scattering mechanism is implemented, D'-band associated with intravalley electron scattering on defects. The 2D' strip is it's overtone.

Established non-monotonic, but the same for both structures dispersion nature of 2D'-bands, which allowed by selection rules, and defined their half-widthes are equal 10cm^{-1} .

It's shown that "sharpness" of the intravalley double electron-phonon resonance processes in graphenes can be used to experimental determination of localization of state density maxima (or phonon energy maxima) on i-LO phonon branches in single-and bilayer graphenes.