Plenária PL2

2D materials studied by resonance and polarized Raman spectroscopy

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Abstract:

Raman spectroscopy is a very useful experimental tool to study phonons and electron-phonon interactions in 2D materials. I will start reviewing the resonance Raman spectra of 2D materials, showing that measurements performed by changing the energy of the incident photon provide information about the electronic structure of the material. I will focus on the resonance Raman effect in twisted bilayer graphene (TBG), presenting experimental results performed in TBG samples with different twisting angles that allow the distinction of intralayer and interlayer electron-phonon (el-ph). I will then present angle-resolved polarized Raman measurements in triclinic $ReSe_2$ and show that the Raman tensor elements for the different phonons are given by complex numbers due to the resonance effect. I will show that the wave vector dependence of the electron–phonon interaction is essential for explaining the distinct results observed for each phonon mode. Finally, we will present a resonance and polarized Raman study of the compound 1T-TaS_2, which exhibits charge density wave (CDW) and a commensurate phase at low temperature. Our results allowed us to resolve the behavior of phonons and electron-phonon interactions in the commensurate CDW lattice phase of 1T-TaS_2. We observe a distinct behavior from what is predicted for a single layer and probe a richer number of phonon modes that are compatible with the formation of double layer units (layer dimerization) of 1T-TaS_2.

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