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Effect of resonant impurity scattering of carriers on Drude peak broadening in uniaxially strained graphene

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An explanation is proposed for the recently observed in optical spectra of monolayer graphene giant increase in the Drude-peak width under applied uniaxial strain. We argue that the underlying mechanism of this increase can be based on resonant scattering of carriers from inevitably present impurities such as adsorbed atoms that can be described by the Fano-Anderson model. We demonstrate that the often neglected scalar deformation potential plays the essential role in this process. The conditions necessary for the maximum effect of the giant Drude-peak broadening are determined. It is stressed that the effect is strongly enhanced when the Fermi level gets closer to the Dirac point. Our theoretical analysis provides guidelines for functionalizing graphene samples in a way that would allow to modulate efficiently the Drude-peak width by the applied strain.

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