

Abstract Submitted
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Influence of Strain on Quantum Transport in Graphene MD HOS-SAIN, UIUC — Strain is unavoidable in graphene, either suspended or supported on a dielectric substrate such as SiO₂. It is therefore crucial to identify the role of strain on transport properties in graphene. Experimentally, it is shown that local strain in graphene on a SiO₂ substrate can modify graphene's conductance near the Fermi energy. The modification is attributed to the coupling of strain and phonon-mediated inelastic tunneling effects. However, conductance on the dielectric substrate is not ballistic and isolating the influence of strain is a difficult task. In this study, strain effects on ballistic conductance, an experimentally attainable transport property for suspended graphene, is studied using a combination of density functional theory and the Landauer-Buttiker formalism. It is found that, unlike in a CNT, regardless of the applied strain graphene's conductance at the Fermi energy is $0.21G_0$. Furthermore, for conducting electrons with energies higher or lower than the Fermi energy of the system, tensile hydrostatic strain is found to increase conductance but compressive hydrostatic strain decreases conductance. For an 8% compressive hydrostatic strain, conductance increases by as large as 30%. Surprisingly, for uni-axial strain, if the energy of the conducting electrons is higher than the Fermi energy, conductance remains approximately unchanged, whereas conductance by electrons less than the Fermi energy decreases (increases) with compressive (tensile) strain along the transport direction.

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