Abstract Submitted
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Effects of commensurate phase with kekule symmetry on the conductance of suspended graphene BORIS DZYUBENKO, JOSHUA KAHN, RYAN FOSTER, REECE HENRY, OSCAR VILCHES, DAVID COBDEN, Department of Physics, University of Washington — I will present measurements of the effects of the adsorption of monatomic and diatomic gases on the conductance of suspended graphene devices. The devices support adsorbed monolayers with two-dimensional phases like those known to form on bulk graphite, although the phase transitions occur at slightly higher pressures due to the reduced binding energy. We find that the formation of the $\sqrt{3} \times \sqrt{3}$ commensurate solid phases in the adsorbed monolayers greatly modifies the conductance of graphene, reducing it by as much as a factor of two. This is in sharp contrast with the much smaller effects of other adsorbed two-dimensional phases which are not in registry with the graphene lattice (e.g. 2D fluid, incommensurate solid). Further, we observe hysteretic behavior near the phase transition between the incommensurate solid and the commensurate solid phase which is absent when adsorption is restricted to one side of the graphene sheet, as when the graphene is supported on hexagonal boron nitride. We infer that the hysteresis results from interactions between the adsorbed monolayers on either side of the graphene sheet.

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