

Physical and Chemical Properties of Graphene Systems under Mechanical Perturbations

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In this talk, I will describe effects of various external mechanical perturbations on physical and chemical properties of graphene systems and their consequences in various spectroscopic signals. First, an ideal strength of single layer graphene will be re-examined by considering unique interplays between electrons and phonons in the system when equibiaxial strain is applied. Various channels to weaken the integrity of hexagonal network of carbon atoms will be introduced and the ideal strength of single layer graphene is determined [1,2]. Second, when inhomogeneous strains or shears are applied to bilayer graphene, a possible energy gap generation [3] is demonstrated and an occurrence of electronic topological transition [4] will be discussed. I will also discuss the several spectroscopic consequences of such external mechanical perturbations in graphene systems [5,6,7]. Finally, a couple of applications such as doped and corrugated graphene for oxygen reduction reaction will be discussed [8].

References

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