Electrochemical doping of CVD Graphene

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Recent advances in chemical vapor deposition (CVD) synthesis have now allowed the preparation of large and uniform monolayer graphene flakes. The CVD prepared graphene thus significantly simplifies the materials processing and more detailed studies with such samples can be readily performed. The successful application of graphene requires a detailed understanding of its electronic properties, including both its neutral and doped states. The doping of graphene leads to a shift of the Fermi level and for this reason doping provides a simple way to control the transport and optical properties. In our study the electrochemical charging has been applied to study the influence of doping on the intensity of the various Raman features of chemical vapor deposition –grown graphene. Three different laser excitation energies have been used to probe the influence of the excitation energy on the behavior of both the G and G' modes regarding their dependence on doping. The intensities of both the G and G' modes exhibit a significant but different dependence on doping. While the intensity of the G' band monotonically decreases with increasing magnitude of the electrode potential (positive or negative), for the G band a more complex behavior has been found. The striking feature is an increase of the Raman intensity of the G mode at a high value of the positive electrode potential. Furthermore, the observed increase of the Raman intensity of the G mode is found to be a function of laser excitation energy.

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