Large-Scale Synthesis and Characterization of N Doped Few-Layered Graphene using PECVD

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Nitrogen doping on graphene can not only alter its electronic properties and but also it can create sites that are electrochemically active [1]. Different C-N bonding configurations in these structures as well as the distribution of nitrogen atoms in the structure of graphene are crucial factors in potential applications of chemically functionalized graphene as a fuel cell cathode for oxygen reduction reaction [2]. In this work we report synthesis of few-layered large area (~ 70 cm^2) nitrogen doped graphene on copper foil using Plasma Enhanced Chemical Vapor Deposition (PECVD) technique. Spectral fingerprints obtained by Raman and X-ray Photoelectron Spectroscopy topographic images obtained by Atomic Force and Raman Microscopy are used to interpret the nitrogen doping process on graphene both on copper and on arbitrary substrates. Plasma assisted nitrogen doping creates primarily graphitic, pyridinic and pyrrollic nitrogen in graphene network, and thermal treatments can dramatically enhance the number of pyridinic nitrogen, which is believed to play an important role in the generation of the active sites for oxygen reduction reaction.

References

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Figures

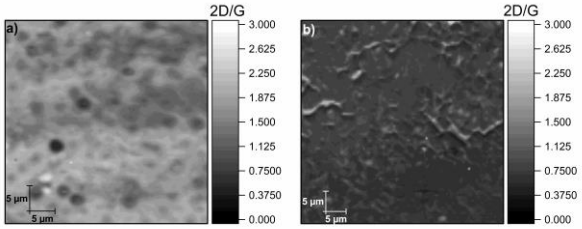

Figure 1: Raman map of 2D peak intensity over G peak intensity of a) pristine b) N-doped graphene