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Mild plasma configuration yielding efficient doping on graphene surface

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In this talk, I will present the effectiveness of a mild plasma configuration in order to dope nitrogen on graphene without defect formation. The system is a vertical-type direct-current plasma with parallel electrodes. We change the electrode configuration and adjust the plasma input power and treatment time to utilize various ion-bombardment energies and plasma doses. The up-cathode system with a powered upper electrode and ground lower anode is more suitable than the traditional down-cathode system for efficient plasma doping. This configuration yields a low-energy ion process and thus suppresses high-energy ion-induced damages.
The graphene was prepared by mechanical exfoliation and the doping was performed using ammonia gas. The degree of a structural damage on graphene after the doping was mainly evaluated using Raman spectroscopy. Finally, the structural evolution of graphene and the doping components with respect to the plasma conditions are extensively characterized with Raman spectroscopy, atomic force microscopy, and X-ray photoelectron spectroscopy. The results provide an effective doping condition for doping nanomaterials without plasma-induced damage.

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