**Defect-Free Doping on Graphene Using HorizontalInductively Coupled Plasma System**

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Graphene hasattracted enormous attention due to its remarkable physical properties which canrealize the potential for future applications in electronics, sensors, energystorage and etc. In special, the electronic properties of graphene areinfluenced by the number of layer, edge state, stacking sequence, and doping offoreign elements. Many studies have been reported on chemical doping by thermaland plasma processes with hydrogen, oxygen, or nitrogen. In spite of theadvantages of plasma process such as short treatment time and relatively easycontrol of doping level, it is still necessary to develop the method tosuppress plasma-induced defect formation.

Here, we demonstratethe defect free doping on graphene using a horizontal inductively coupled plasma(ICP) system. The grapheneis prepared by mechanical exfoliation and plasma-doped by the ICP systemconsisting of horizontal quartz tube. We installed an electrically floated gridbetween the plasma formation region and graphene to control the energy ofimpinging doping species. The plasma treatment was carried out using nitrogengas by adjusting the sample position from the ICP coil, grid position, plasmapower, pressure, and exposure time. The structural damage is quantitatively andextensively evaluated from the intensities of specific Raman peaks such as, D,G, D' and 2D band. Finally, we confirmed the defect-free doping on graphene andwill present the effect of grid insertion on the result.