

Fabrication of vertically-oriented graphene using helicon wave plasma chemical vapor deposition

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Properties of high density Ar/CH₄ plasmas with excitation of the m=+1 mode helicon wave has been studied for reactive plasma synthesis of Vertically-oriented graphene (VG) thin films. The experimental setup is shown in Figure 1. VG was deposited on Si substrates by helicon wave plasma reactor. The reactive species of the helicon plasma in the reaction chamber were measured by the optical emission spectra (OES). OES show that the line emissions of CH and C₂ were considerably enhanced in the helicon wave-excited high-density plasma. Plasma density and electron temperature was measured by Langmuir probe. The deposited VG thin films were characterized by scanning electron microscopy (SEM) and Raman spectroscopy. It is found that an increase of the growth rate with the deposition time increase (from 120s to 600s). The I(D)/I(G) ratio and the G peak position decreased as a function of magnetic field, where the full width at half maximum (FWHM) of G peak increased. This indicates that the sp³C content increase [1].

Key words : Helicon wave plasma; Vertically-oriented

graphene; Optical emission spectroscopy (OES)

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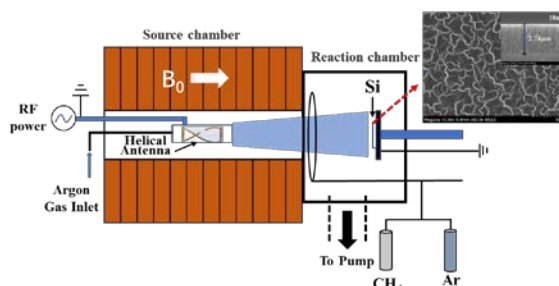


Fig.1 The schematic diagram of the HWP-CVD experimental setup

References

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