Ar^+ bombardment as a tool for controllable defect creation on large scale CVD Single Layer Graphene

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Ion beam (Ar^+) bombardment with various energies was used to controllable induce defects into individual graphene specimens. The samples were $1cm^2$ copper chips with single layer graphene ontop, produced with the CVD method. Ar^+ ion irradiation (P_{Ar} = 3×10^{-6} mbar) performed for 12 s in a preparation chamber with ion energies ranging from 36 up to 200eV at an incidence angle of 0° with respect to the normal direction of the sample's surface. After ion bombardment the samples were exposed to H_2 atmosphere. X-ray photoelectron spectroscopy (XPS), ultraviolet photoelectron spectroscopy (UPS) and Raman Spectroscopy (RS) were used to characterize the samples [1-3] before and after the irradiation / H_2 exposure process. Our analysis revealed that the density of defects increases as the irradiation dose increases with the exception of the 36eV ion energy, which stands below the threshold for stable defect creation.

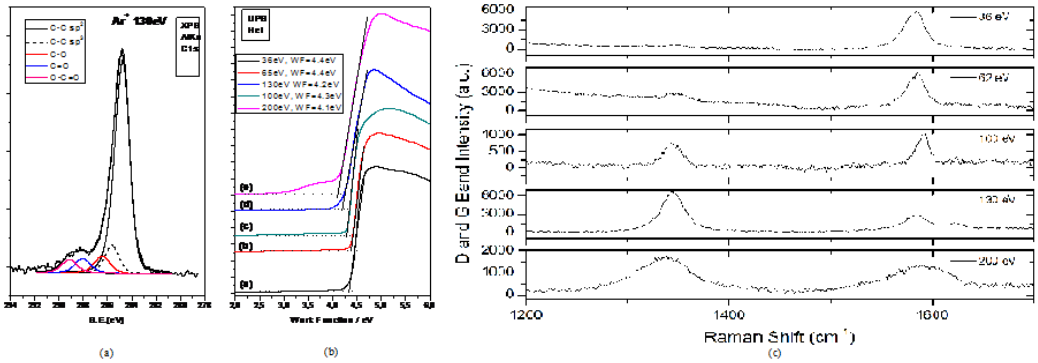

Figure 1 (a)Deconvoluted C1s XP peak for graphene/Cu after 130eV Ar^+ bombardment, (b), (c) HeI UPS and RS (λ_{exc}=514.5 nm) for graphene/Cu after 36eV, 65eV, 100eV, 130eV and 200eV Ar^+ bombardment.

References

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