Investigation of graphene on SiC under neutron irradiation by Raman Spectroscopy

In this work, we report study on the impact of neutron radiation on quasi-free-standing (QFS) graphene [1]. For this purpose, we have fabricated hydrogen-intercalated QFS graphene on semi-insulating high-purity 4H-SiC (0001) [2], passivated with an Al₂O₃ layer [3], and exposed it to a fast-neutron fluence of ≈ 6.6 x 10^{17} cm⁻². The result have shown that the graphene sheet is only moderately affected by the neutron radiation with the estimated defect density of ≈ 4 x 10^{10} cm⁻². The effect was more pronounced within the SiC step edges than the terraces [4]. However, in both cases the defect density was seven orders of magnitude lower than the fluence, which indicates that graphene has a small cross-section for neutrons.

References


Figures

**Figure 1:** High-resolution post-neutron-irradiation Raman map (2D band width) of hydrogen-intercalated QFS epitaxial CVD graphene on semiinsulating high-purity on-axis 4H-SiC (0001), all passivated with a 100-nm-thick atomic-layer-deposited aluminum oxide layer. Spots numbered 1 and 2 have their individual Raman spectra.