Photoluminescence effect of edge structure induced by defect engineering of graphene quantum defects

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Fluorescence property of graphene has been widely reported yet, which comes from the functional groups on graphene surface[1-3]. Nevertheless, with maintaining the overall honeycomb structure, graphene quantum dots become the only option to obtain the photoluminescence property[4-6]. Due to the 0 D structures for quantum confinement in all three spatial directions of graphene quantum dots, the frequency and intensity of light emission, as well as non-linear optical properties, become altered, with absorption and fluorescence blue-shift[7,8]. By imitating this unique quantum edge defect structure, here we report the photoluminescence property on large sheet graphene, through inducing quantum scale defects on graphene surface via defect engineering. Variety methods were adopted crossly to reduce the functional groups, which could be doped in the process. After eliminating the influence of functional groups, the relevancy between quantum defects, which is observed directly by HR-TEM, and fluorescence has been established. We hope that this research could be an opportunity to study the relationship between edge structure of quantum defects and the photoluminescence effect, so that it will become promising to induce photoluminescence on different nanomaterials.

References

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Figures

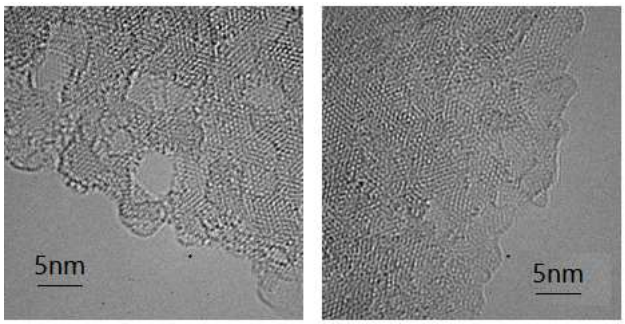

Figure 1: Quantum defects on graphene surface

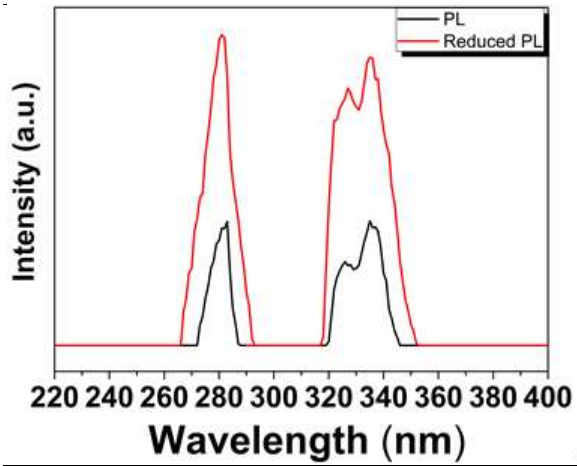

Figure 2: Fluorescence spectra of photoluminescence graphene samples (PL) and reduced photoluminescence graphene samples (Reduced PL)