

Improved Infrared Photodetection by Reduced Graphene Oxide

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Abstract Though graphene is a zero band gap material, low absorption ($\sim 2.3\%$ of sun light) [1] and fast carrier recombination limits its application as an effective photodetector [2]. The responsivity in most of the cases is few tens of mA.W^{-1} . On the other hand, reduced graphene oxide (RGO) with few layers of graphene with controlled defects can be better suited for photodetector. Few layer structure increases the absorption of radiation and defects in reduced graphene oxide limits the carrier recombination [3]. But presence of too much defects can lead to recombination of photoexcited carriers even before reaching the electrodes. Thus properly tuned defect can increase the responsivity of reduced graphene based photodetector. We have reduced graphene oxide by using EtOH and $\text{OH-CH}_2\text{-CH}_2\text{-OH}$. The reduction is without the use any extremely harmful reagent like hydrazine. Responsivity value of our prepared RGO based photodetectors can reach as high as $\sim 1 \text{ A.W}^{-1}$.

References

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[3] Zhang, Y., Liu, T., Meng, B., Li, X., Liang, G., Hu, X. and Wang, Q.J., *Nature communications*, **4** (2013), p.1811.

Figures

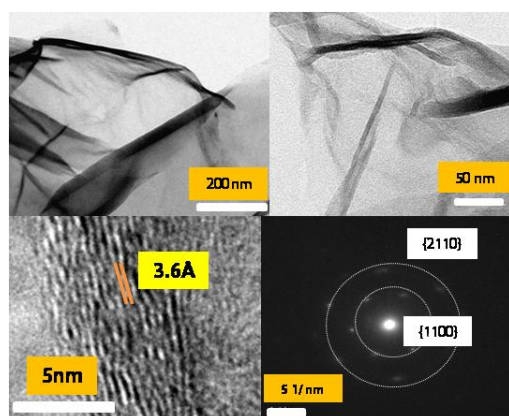


Fig. 1: TEM, HRTEM images and SAED pattern of RGO

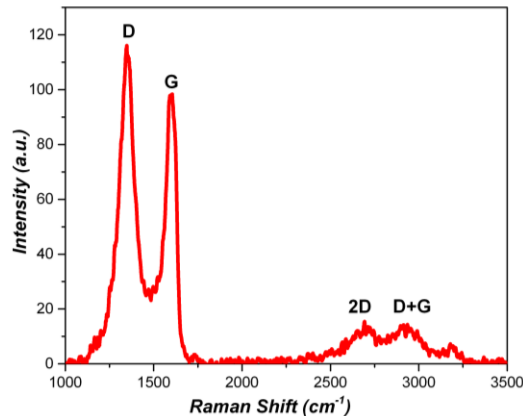


Fig. 2: Raman Spectra of RGO

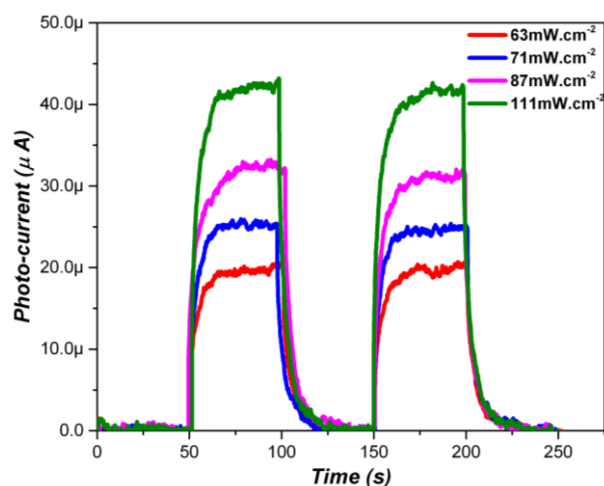


Fig. 3: Temporal photo-response with 1550 nm infrared laser.