

Electronic Supplementary Information (ESI)

Benzoin Derived Reduced Graphene Oxide (rGO) and its Nanocomposite: Application in Dye Removal and Peroxidase-like Activity

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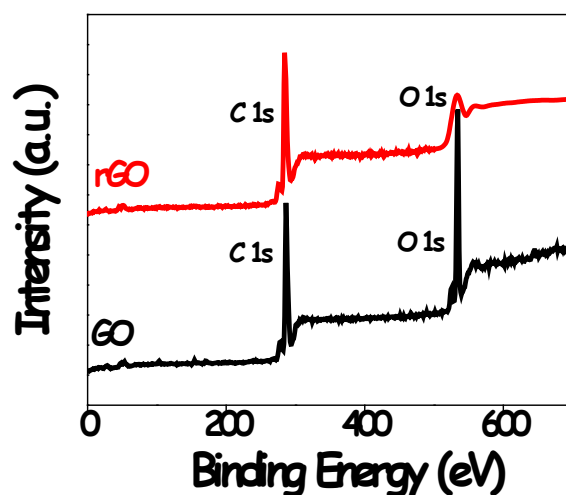


Fig. S1 Comparative wide scan XPS spectra of GO and rGO.

ESI 1: Experimental details for dye adsorption and desorption by rGO

To investigate the maximum dye adsorption capacity of rGO, 14 mg as-synthesized rGO was sonicated in 50 mL water for 20 minutes and then 50 mL of 10^{-4} M aqueous methylene blue (MB) solution as a representative dye was introduced into the aqueous suspension of rGO to make the final strength 5×10^{-5} M for MB. Within a few minutes of stirring, the solution turned colourless. Then we introduced fresh batches of MB solution having the same final concentration in successive steps under continuous stirring condition till the blue colour permanently persists in the solution. And in this manner 300 mL of 5×10^{-5} M aqueous MB solution could be decolorized with the introduced quantity of rGO. In a likewise fashion we studied the kinetics of adsorption process for all the dye molecules using 14 mg rGO and 300 mL of 5×10^{-5} M aqueous dye solutions. The dye-adsorbed rGO was thoroughly washed with water, dried in vacuum and again subjected to alcoholic (ethanol/methanol) treatment to initiate the desorption of the dye molecules from the solid matrix. Then the material was again exploited for the above adsorption-desorption study to check its recyclability. Here we have employed methylene blue (MB) and crystal violet (CV) as cationic dye; methyl orange (MO), congo red (CR) and eosin Y (EY) as anionic dye and neutral red (NR) as neutral dye for the adsorption study.

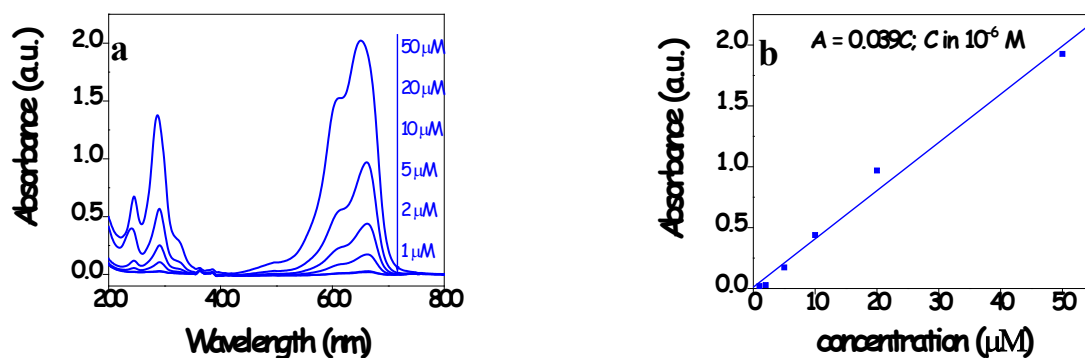


Fig. S2 (a) UV-visible spectra of MB solutions of different concentration. (b) plot of absorbance vs. concentration.

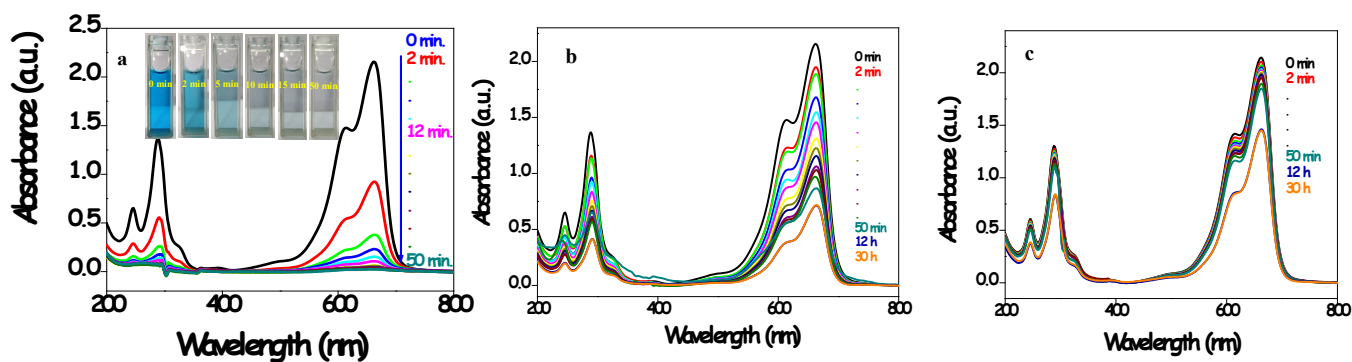


Fig. S3 UV-visible spectra of the adsorption kinetics of MB at (a) 1st cycle (Inset shows the color change at different time intervals), (b) 2nd cycle and (c) 3rd cycle.

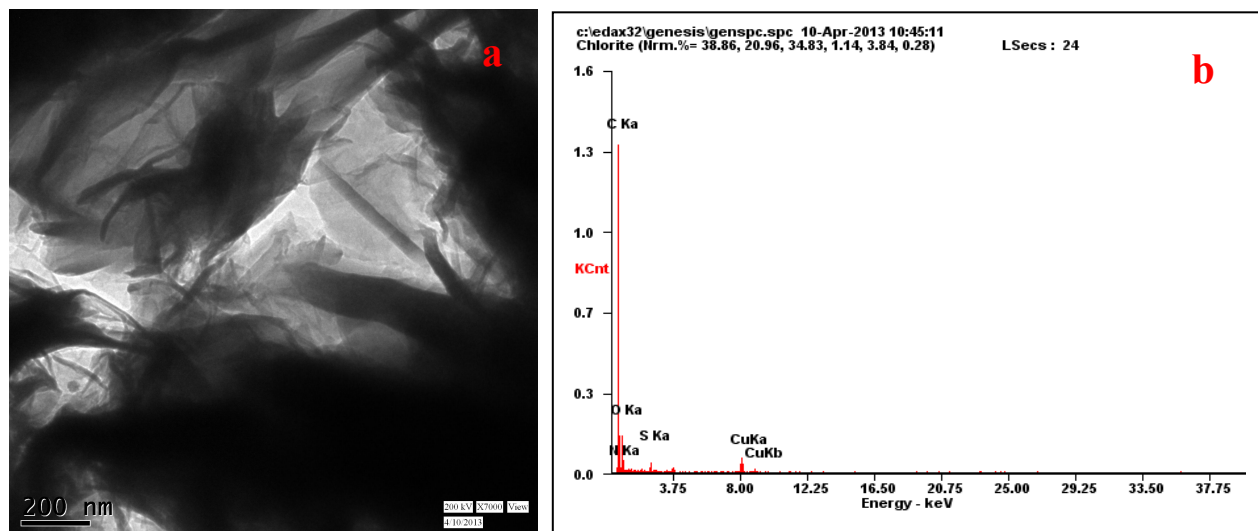
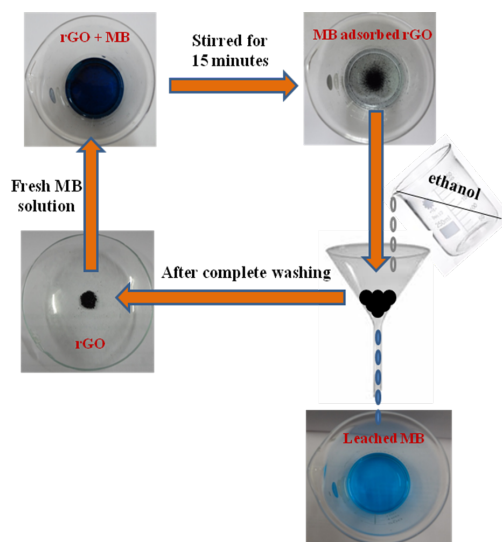


Fig. S4 (a) TEM image of aggregated rGO nanosheets (produced after MB desorption) and (b) EDX analysis of the corresponding rGO material.



Scheme S1 Schematic representation of MB adsorption-desorption by rGO and its recyclability.

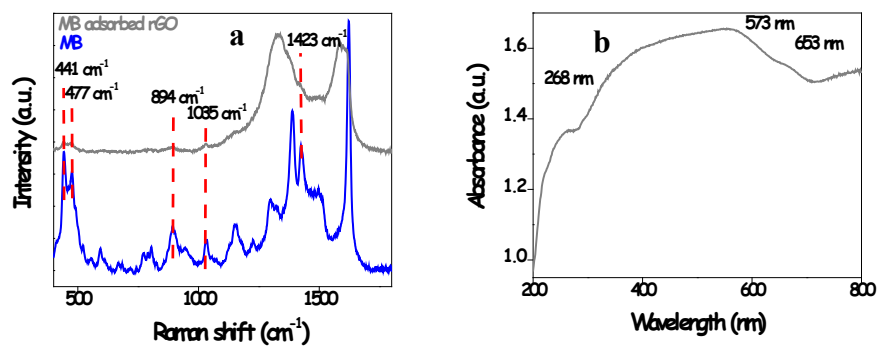


Fig. S5 (a) Comparative NRS spectra of MB and MB-adsorbed rGO with laser power = 5 and (b) DRS spectra of MB-adsorbed rGO.

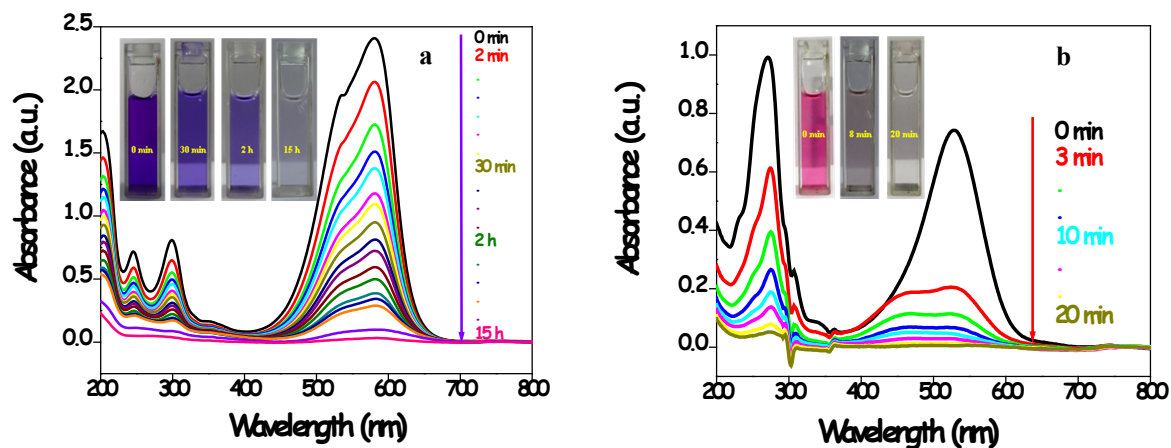


Fig. S6 UV-visible spectra for the kinetics of (a) CV and (b) NR adsorption by rGO. Inset showing the color of the CV and NR solutions at different time intervals.

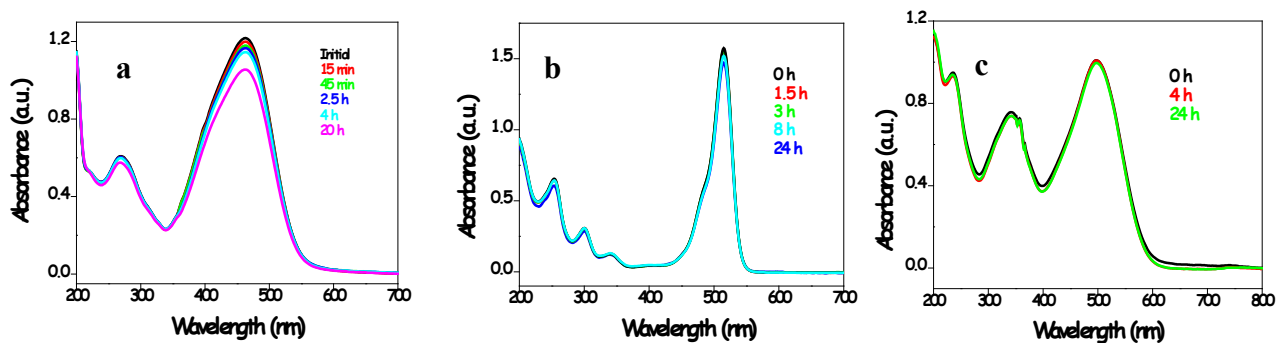


Fig. S7 UV-visible spectra for the adsorption kinetics of (a) MO (b) EY and (c) CR by rGO.

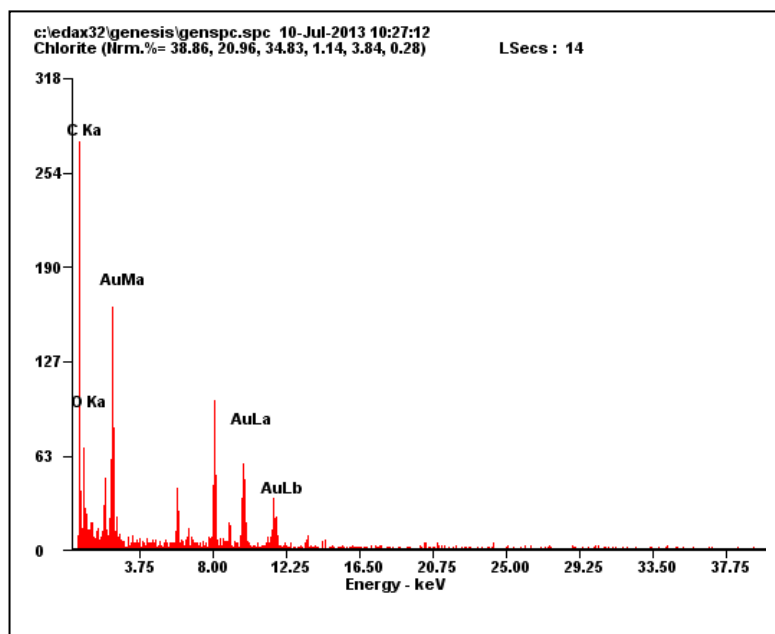


Fig. S8 EDX spectra of Au-rGO.

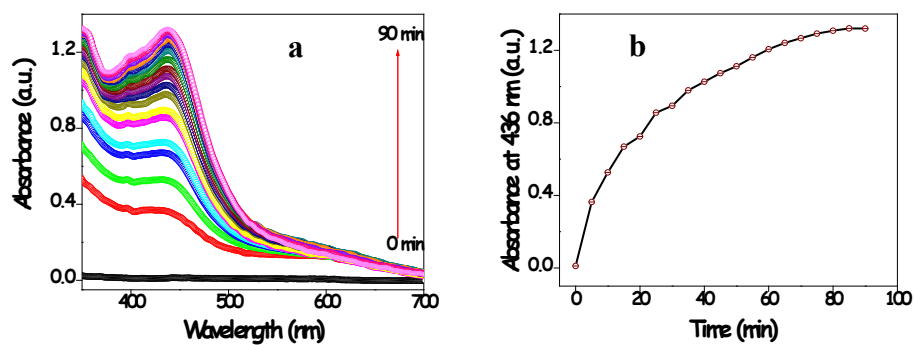


Fig. S9 (a) Time dependent UV-visible spectra of pyrogallol (PG) oxidation by *t*-BuOOH with Au-rGO as catalyst. (b) Absorption ($\lambda_{\text{max}} = 436 \text{ nm}$) vs. time plot for PG oxidation.

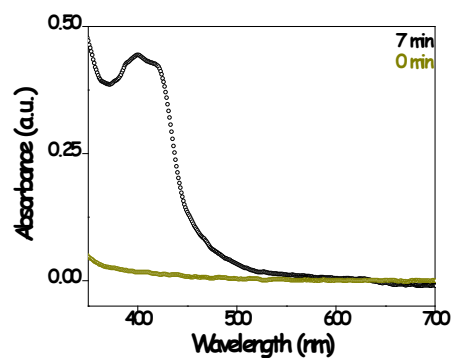


Fig. S10 Time dependent UV-visible spectra of pyrogallol (PG) oxidation by H_2O_2 with Au-rGO as catalyst.