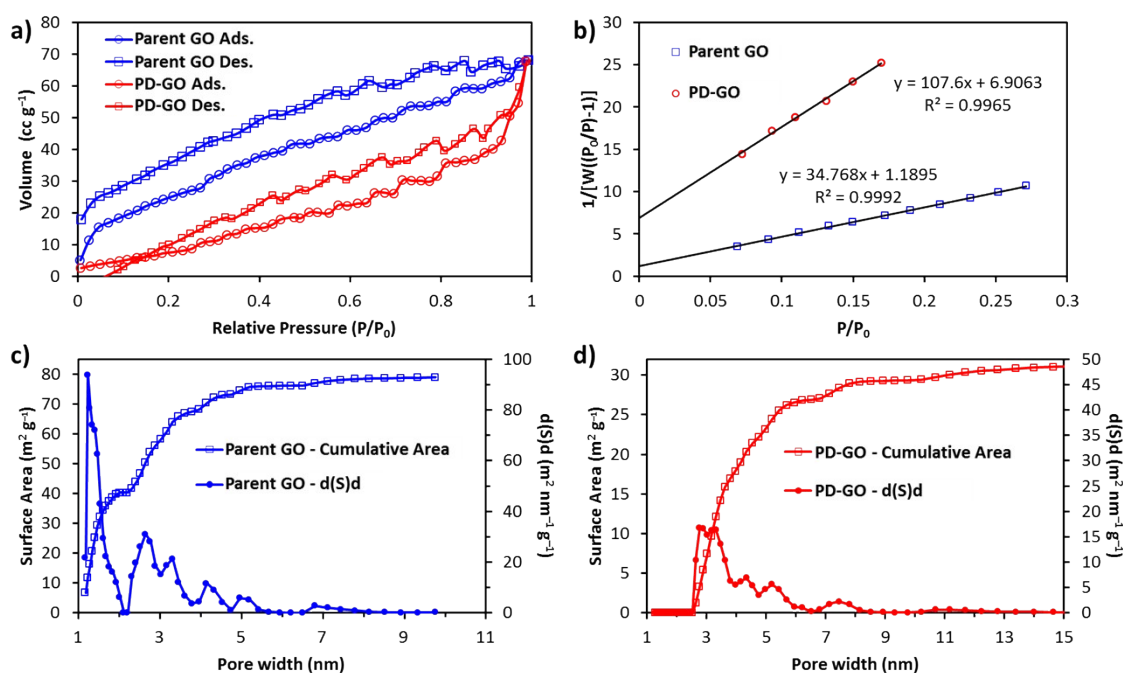


# Facile Labelling of Graphene Oxide for Superior Capacitive Energy Storage and Fluorescence Applications

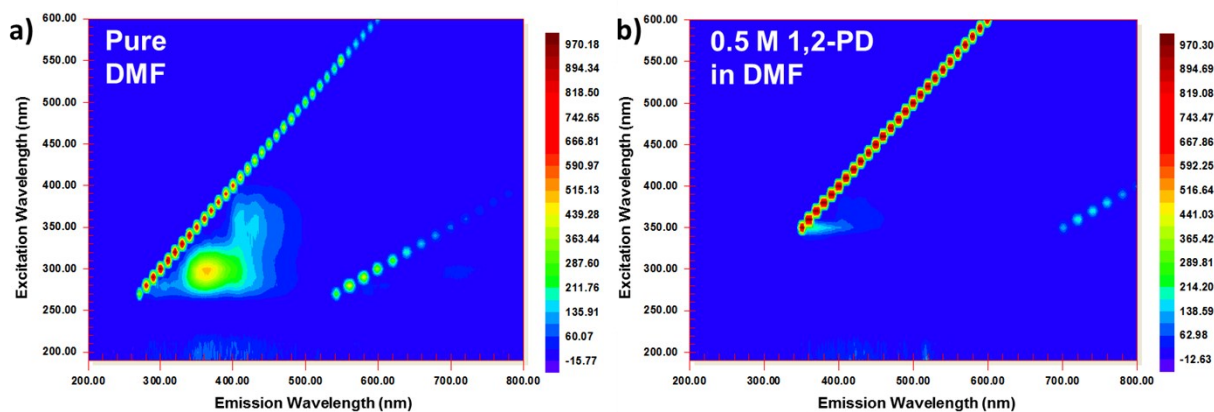
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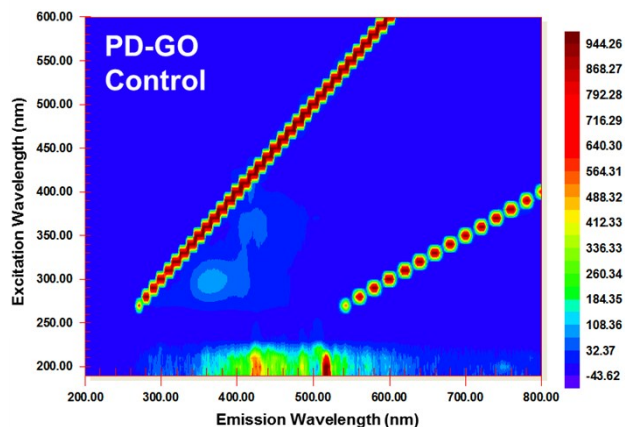
## Supporting Information



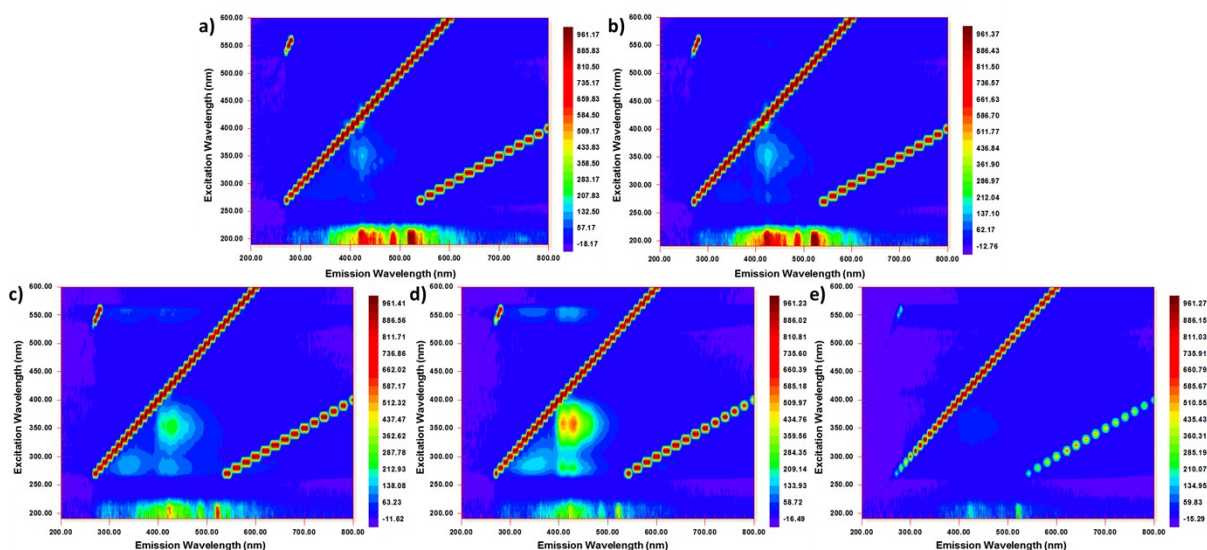
**Figure S1.** (a)  $N_2$  adsorption/desorption isotherms of parent GO and PD-GO, (b) Brunauer-Emmett-Teller (BET) plots of parent GO and PD-GO; (c-d) cumulative surface area and differential pore areas of parent GO and PD-GO respectively, calculated using a slit pore NLDFT model on carbon ( $N_2$  at 77 K).



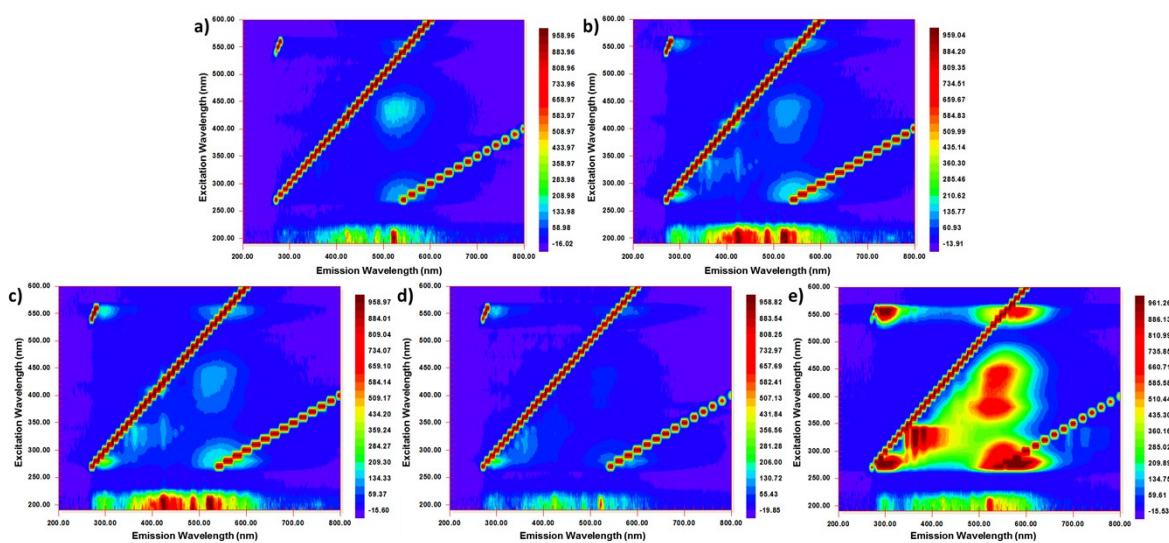
**Figure S2.** Excitation-emission maps of (a) pure DMF solvent and (b) 0.5 M 1,2-phenylenediamine in DMF. Faint fluorescence was observed for DMF with excitation light at approximately 300 nm and emission centered close to 370 nm.



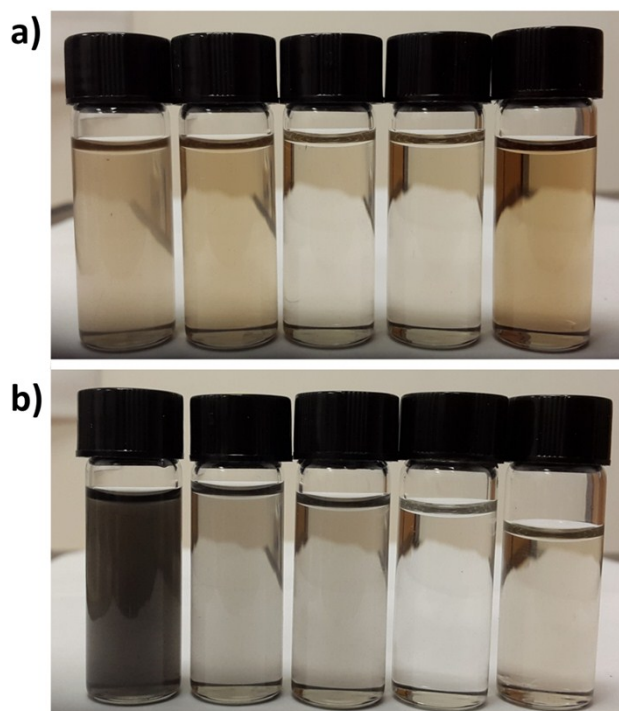
**Figure S3.** Excitation-emission map of the control GO material at  $0.1 \text{ mg mL}^{-1}$  concentration in DMF. Broad emission band from 360 nm to 600 nm was observed consistent with the parent and labelled GOs.



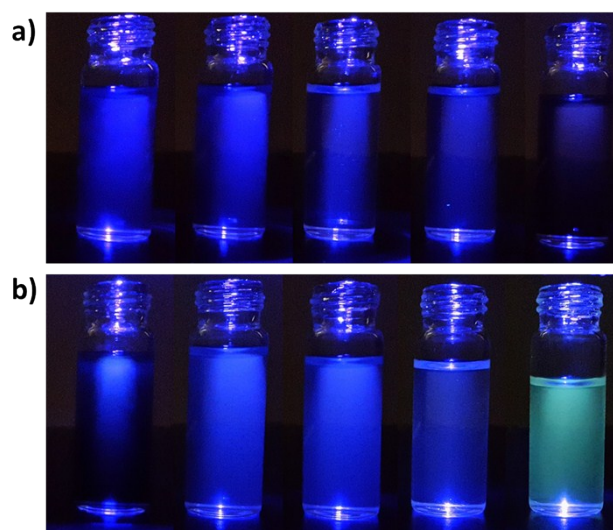
**Figure S4.** Excitation-emission maps of the parent GO in DMF after gradient centrifugation. Precipitates collected and re-dispersed in DMF after consecutive 20 min centrifugation steps at (a) 1000 rpm, (b) 3000 rpm, (c) 6000 rpm, and (d) 9000 rpm. (e) Supernatant obtained after final centrifugation step at 9000 rpm for 20 mins. Weak emission close to 340-440 nm is similar to that observed for DMF in Figure S2.



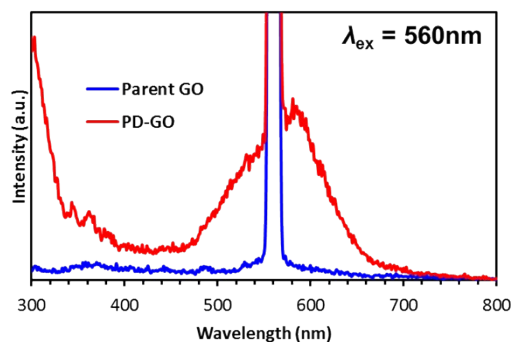
**Figure S5.** Excitation-emission maps of PD-GO in DMF after gradient centrifugation. Precipitates collected and re-dispersed in DMF after consecutive 20 min centrifugation steps at (a) 1000 rpm, (b) 3000 rpm, (c) 6000 rpm, and (d) 9000 rpm. (e) Supernatant obtained after final centrifugation step at 9000 rpm for 20 mins. Strongest fluorescence from 460 nm to 640 nm was only observed in the supernatant from centrifugation at 9000 rpm.



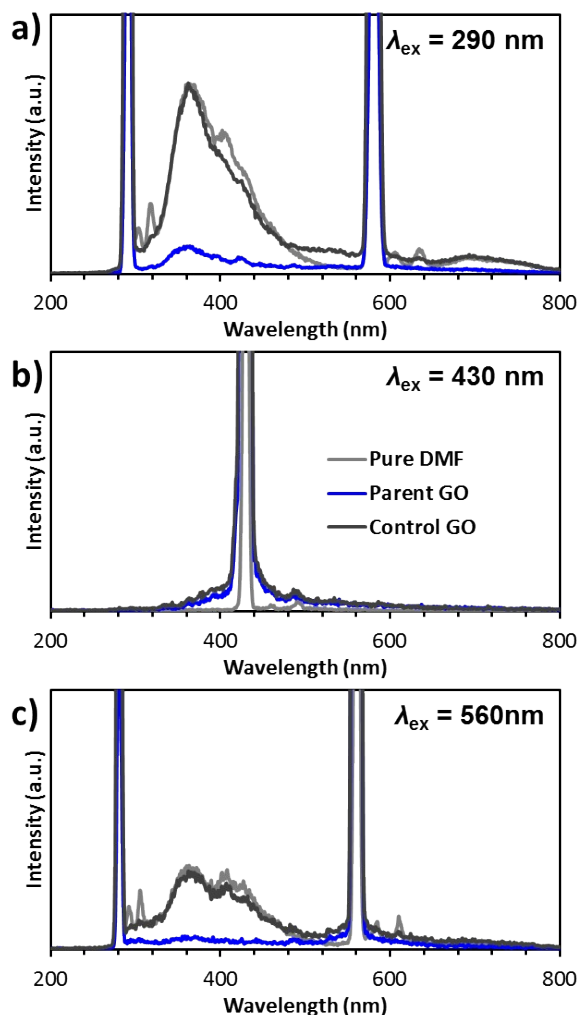
**Figure S6.** Images of (a) parent GO and (b) PD-GO dispersions in DMF after gradient centrifugation. Precipitates were collected and re-dispersed in DMF after consecutive 20 min centrifugation steps at increasing speeds of 1000 rpm, 3000 rpm, 6000 rpm, and 9000 rpm (at increasing speeds from left to right). Rightmost: supernatant obtained after final centrifugation step at 9000 rpm for 20 mins.



**Figure S7.** Images of (a) parent GO and (b) PD-GO dispersions in DMF after gradient centrifugation and irradiated under UV light (365 nm). Precipitates were collected and re-dispersed in DMF after consecutive 20 min centrifugation steps at increasing speeds of 1000 rpm, 3000 rpm, 6000 rpm, and 9000 rpm (at increasing speeds from left to right). Rightmost: supernatant obtained after final centrifugation step at 9000 rpm for 20 mins.



**Figure S8.** Emission spectra of parent GO and PD-GO at 560 nm excitation wavelength. The weak observed fluorescence may be expected of a “leaking component” from the excitation monochromator of the spectrofluorometer, with the result that at the applied 560 nm excitation, a lower intensity  $\sim 280$  nm beam passes through concurrently.<sup>1</sup>



**Figure S9.** Comparison of emission spectra for pure DMF, parent GO and the control GO material at varying excitation wavelengths. High intensity lines are due to scattering of the excitation light and its second order. Fluorescence at 360-370 nm is seen to arise from the DMF solvent.

## References

1. X. Wen, P. Yu, Y.-R. Toh, X. Ma, J. Tang, On the Upconversion Fluorescence in Carbon Nanodots and Graphene Quantum Dots. *Chem. Commun.*, 2014, **50**, 4703-4706.