

## Development of a turn-on graphene quantum dot-based fluorescence probe for sensing of pyrene in water

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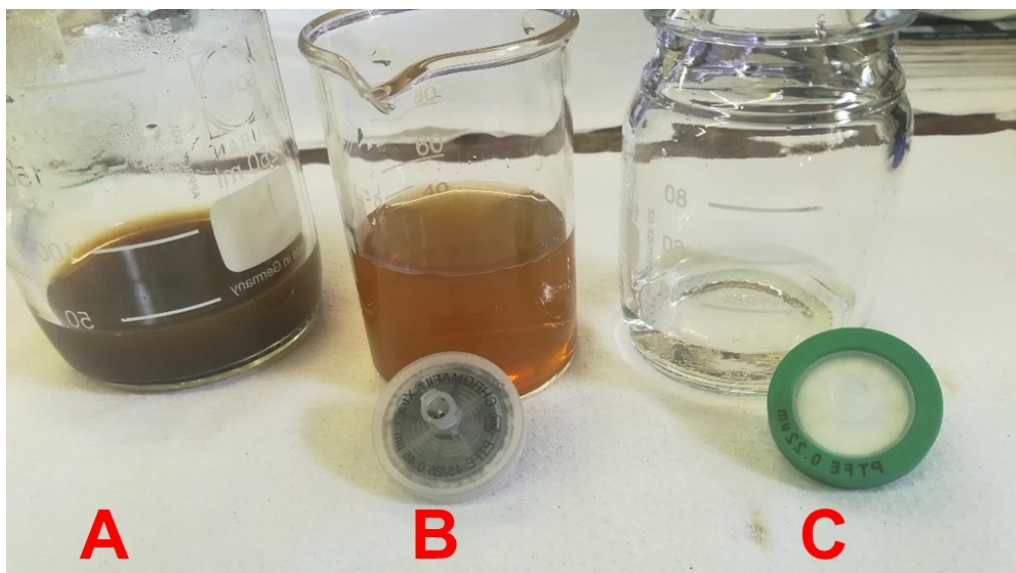
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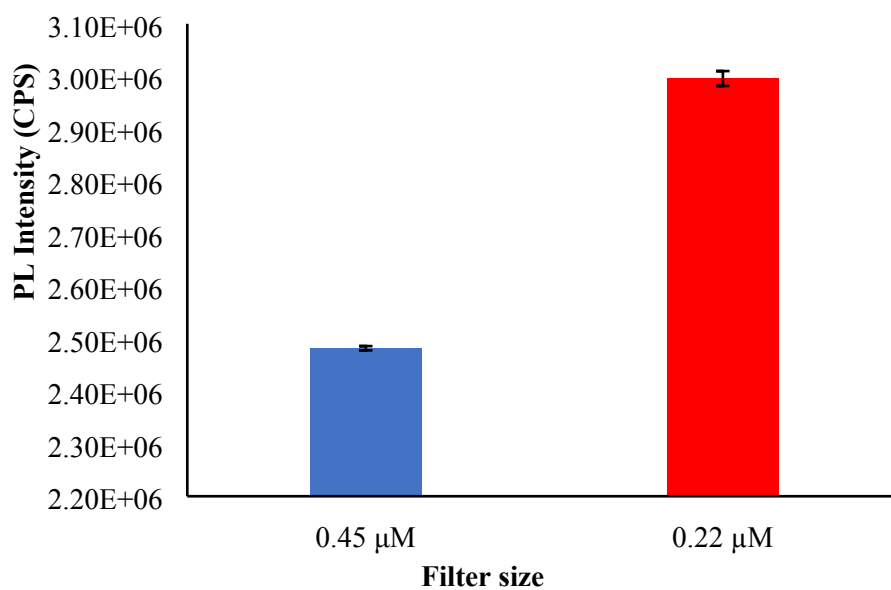
### Supplementary Information

#### Purification of GQDs

Following the oxidation of GO through ultra-sonication in with  $\text{MnO}_4$ , a brown mixture was obtained indicating complete oxidation (**Figure S1A**). This mixture was then filtered using a 0.45  $\mu\text{m}$  PTFE filter (**Figure S1B**) and the filtrate was further filtered using a 0.22  $\mu\text{m}$  PTFE filter to obtain a pale yellow GQDs solution (**Figure S1C**). Using the 0.22  $\mu\text{m}$  PTFE was shown to improve the PL by up to 20% as shown in **Figure S2**.



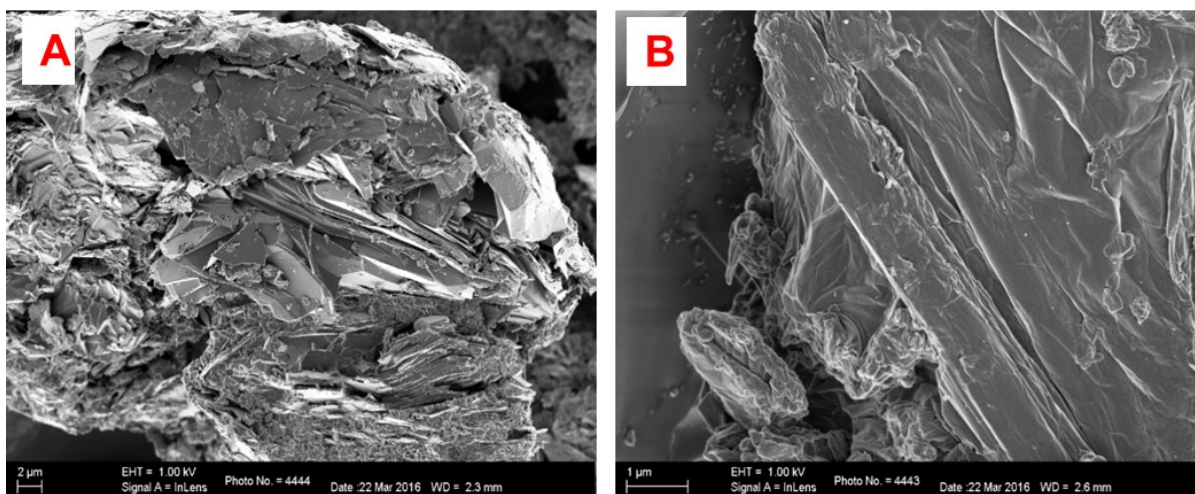
**Figure S1**(A) raw unfiltered GQDs after oxidation of GO. (B) Orange-yellowish GQDs solution after filtering through  $0.45\ \mu\text{m}$  PTFE filter, (C) pale yellow GQDs solution after filtering through a  $0.22\ \mu\text{m}$  PTFE filter.



**Figure S2** Effect of filtering on the PL intensity during the purification step.

## HRSEM of graphite and graphene oxide

High resolution scanning electron microscopy (HRSEM) was used to study the morphology of the graphene oxide from exfoliation of graphite precursors. The HRSEM images show that the graphite had characteristic flat carbon sheets stacked into layers (**Figure S3-A**) and after exfoliation to graphene oxide the sheets become folded into crumpled silk waves (**Figure S3-B**). This transformation is due to the harsh oxidation conditions which the graphite was subjected to in order to produce graphene oxide.



**Figure S3** (A) HRSEM image of graphite showing flat shiny carbon sheets staked in layers. (B) Graphene oxide sheets folded into crumpled silk waves following oxidation.

*Table S1 ICP scan results showing background elemental composition (mg/L) of the lake water sample.*

<b>Ag</b>	<b>Al</b>	<b>As</b>	<b>Au</b>	<b>B</b>	<b>Ba</b>	<b>Be</b>	<b>Bi</b>	<b>Ca</b>	<b>Cd</b>	<b>Ce</b>	<b>Co</b>
< 0.010	< 0.100	< 0.010	< 0.010	0,095	0,066	< 0.010	< 0.010	28	< 0.010	< 0.010	< 0.010

<b>Cr</b>	<b>Cs</b>	<b>Cu</b>	<b>Dy</b>	<b>Er</b>	<b>Eu</b>	<b>Fe</b>	<b>Ga</b>	<b>Gd</b>	<b>Ge</b>	<b>Hf</b>	<b>Hg</b>
< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0,070	0,010	< 0.010	< 0.010	< 0.010	< 0.010

<b>In</b>	<b>Ir</b>	<b>K</b>	<b>La</b>	<b>Li</b>	<b>Lu</b>	<b>Mg</b>	<b>Mn</b>	<b>Mo</b>	<b>Na</b>	<b>Nb</b>	<b>Nd</b>
< 0.010	< 0.010	6,1	< 0.010	< 0.010	< 0.010	10	< 0.025	< 0.010	13	< 0.010	< 0.010

<b>Ni</b>	<b>Os</b>	<b>P</b>	<b>Pb</b>	<b>Pd</b>	<b>Pr</b>	<b>Pt</b>	<b>Rb</b>	<b>Rh</b>	<b>Ru</b>	<b>Sb</b>	<b>Sc</b>
< 0.010	< 0.010	0,047	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Se</b>	<b>Si</b>	<b>Sm</b>	<b>Sn</b>	<b>Sr</b>	<b>Ta</b>	<b>Tb</b>	<b>Te</b>	<b>Th</b>	<b>Ti</b>	<b>Tl</b>	<b>Tm</b>
< 0.010	0,3	< 0.010	< 0.010	0,040	< 0.010	< 0.010	< 0.010	< 0.010	0,011	< 0.010	< 0.010

<b>U</b>	<b>V</b>	<b>W</b>	<b>Y</b>	<b>Yb</b>	<b>Zn</b>	<b>Zr</b>
< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0,030	< 0.010