

Supplementary Information:

Environmental Photochemistry of

Single Layered Graphene Oxide in Water

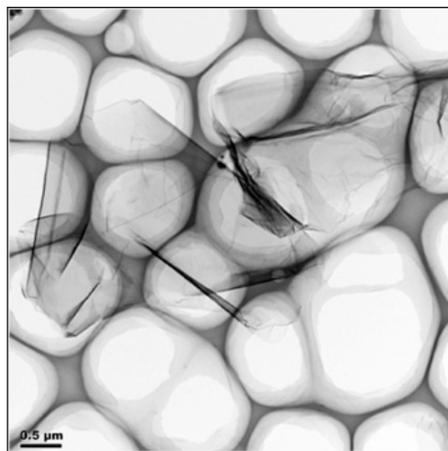
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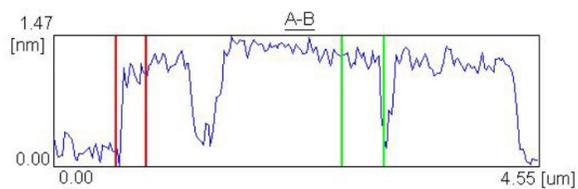
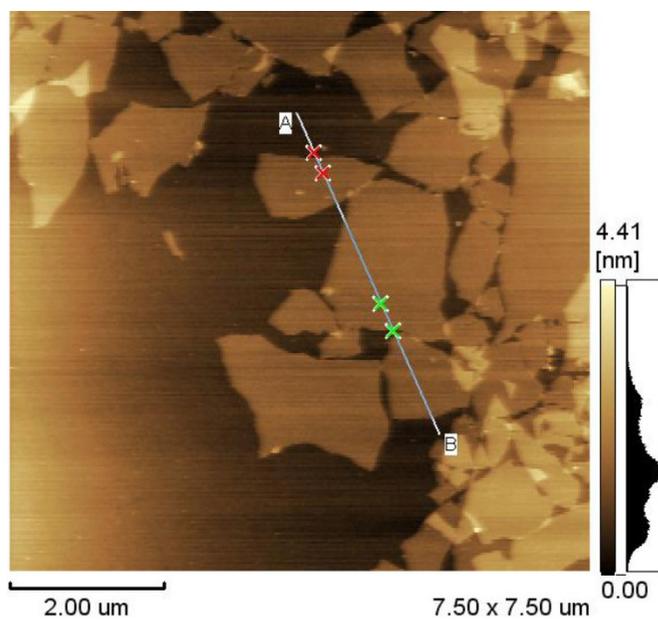
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Environmental Science: Nano

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TEM of Graphene Oxide Dispersion



	Width[μm]	Height[nm]	Angle[deg]
—	0.28	0.86	0.17
—	0.39	0.93	0.13

AFM Images of graphene oxide Dispersion

Figure SI-1. Images of GO (Provided by ACS Material LLC.).

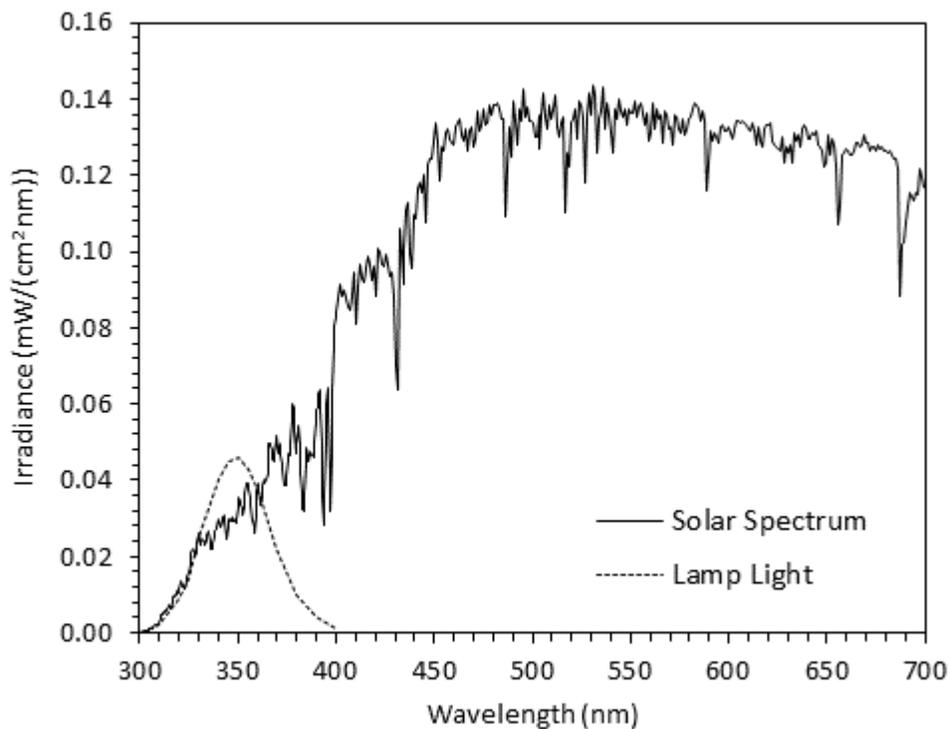


Figure SI-2. Irradiance spectra of solar light at earth’s surface and of the RPR-3500Å lamps. Note that the absolute intensity experienced by each GO sample is dependent on the distance of the sample from the lamps and the number of lamps employed. The solar irradiance data is the ASTM G173-03 Reference Spectra obtained from the SMARTS Version 2.9.2. (Simple Model of the Atmospheric Radiative Transfer of Sunshine) Model, hosted by NREL (National Renewable Energy Laboratory).

Measurement of $^1\text{O}_2$

FFA was used to detect if $^1\text{O}_2$ was produced upon irradiation of GO. The FFA concentration at each specific irradiation time was determined by HPLC analysis (Varian 9012 gradient pump, 9050 UV/Vis detector and Prostar autosampler) using a C18 column, and by detecting and quantifying FFA with the UV/Vis detector at a wavelength of 219 nm. The mobile phase was 50% methanol and 50% water at a flow rate of 1 mL/min. The run time was 6 min and the injection volume was 100 μL .

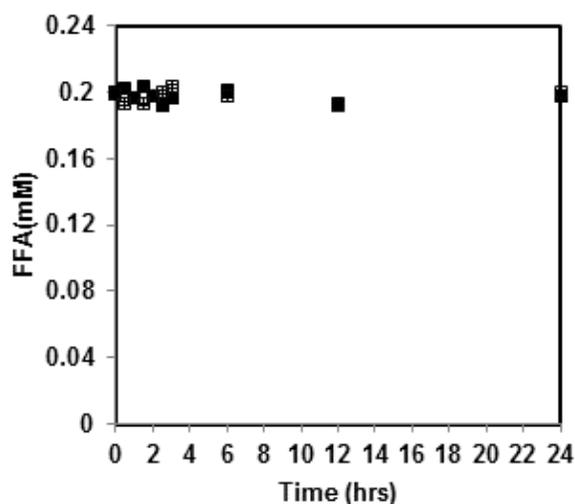


Figure SI-3. Data points are the concentrations of FFA (initially at 0.2 mM) detected in suspensions of 5 mg/L GO at pH 7 after irradiation (☉) or incubation in the dark (☒). All samples were analyzed by HPLC after removing the GO with a 0.2- μm membrane filter.

No FFA loss was observed as irradiation time increased, indicating negligible production of singlet oxygen. There are two possible reasons for this observation: Either little $^1\text{O}_2$ was generated, or after production it may have been rapidly quenched by the GO. Both explanations lead to no net production of $^1\text{O}_2$.

Detection of $O_2^{\cdot -}$ by reduction of XTT

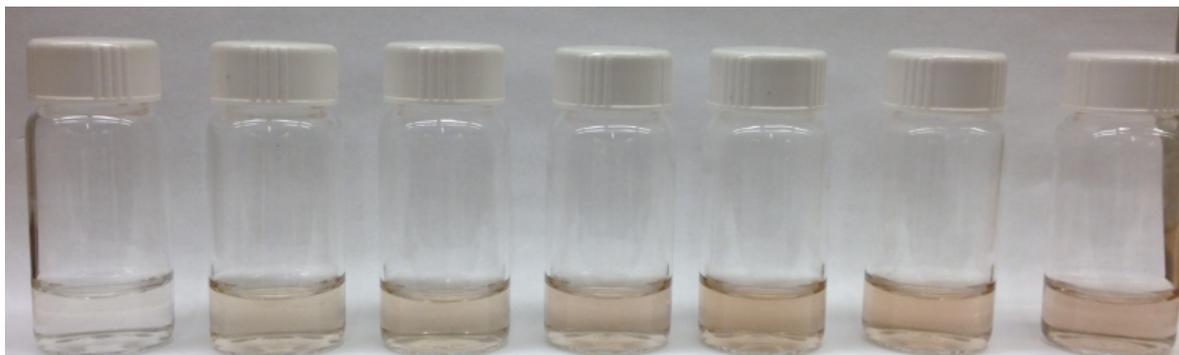


Figure SI-4. Photograph of 5 mg/L GO in water with XTT (0.1 mM) at pH=7 at irradiation times of 0, 0.5, 1, 1.5, 2, 2.5, and 3 hr (left to right), before filtering out the GO particles. Hence, the increase in color is due both to the increase in light absorbance of the GO and of the XTT product.

Measurement of $\cdot OH$

To detect the highly reactive hydroxyl radical, *p*CBA was used as a scavenger. The concentration of *p*CBA was determined by HPLC analysis using a C18 column and a UV detector set at 234 nm. The mobile phase was 70% methanol and 30% water, with the water containing 20 mM H_3PO_4 , at a flow rate of 0.8 mL/min. The run time was 10 min and the injection volume was 100 μ L. All samples were filtered through 0.2- μ m filter membranes before HPLC analysis.

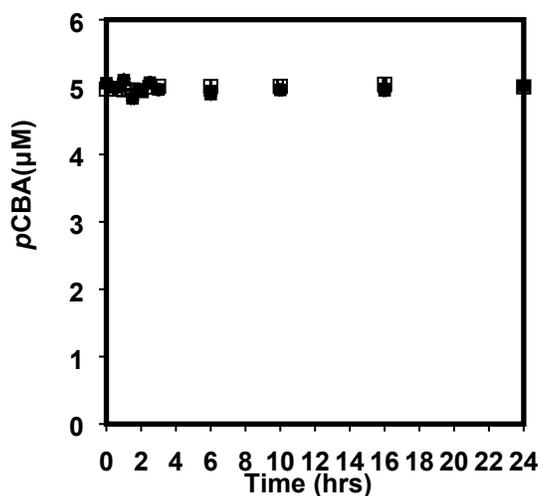


Figure SI-5. Data points are the concentrations of *p*CBA (initially at 5 μ M) detected in suspensions of 5 mg/L GO at pH 7 after irradiation (\odot), or incubation in the dark (\boxtimes). All samples were analyzed by HPLC after removing the GO with a 0.2- μ m membrane filter.