

## Supporting Information

### **Tuning the antioxidant activity of graphene quantum dots: protective nanomaterials against dye decoloration**

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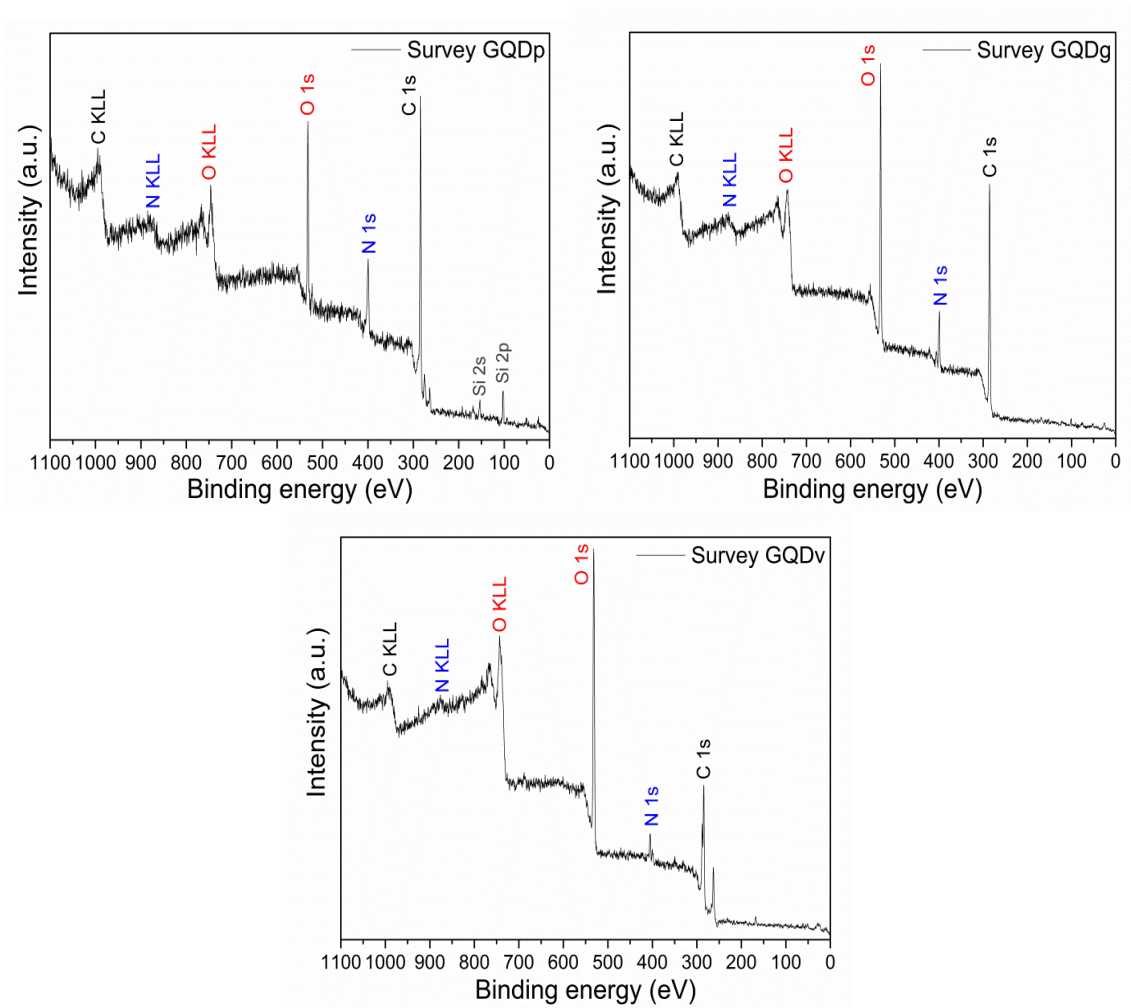
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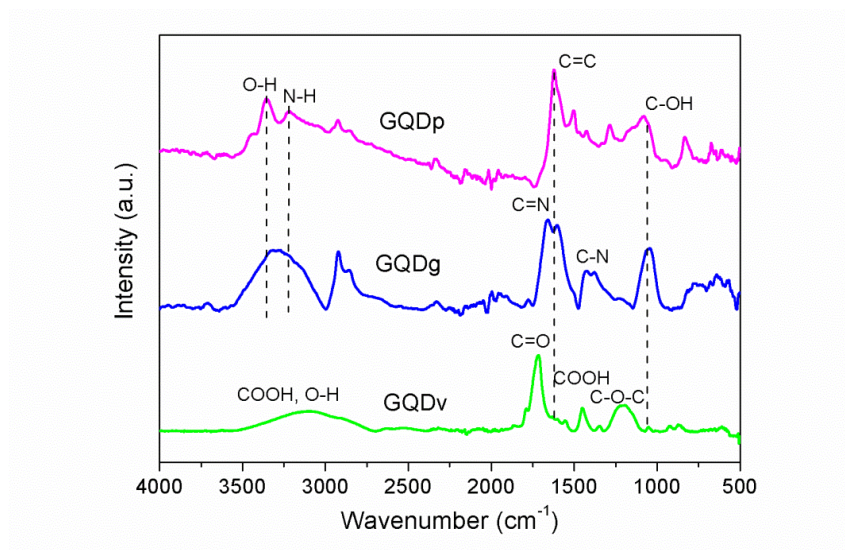
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#### **XPS experimental and fitting conditions**

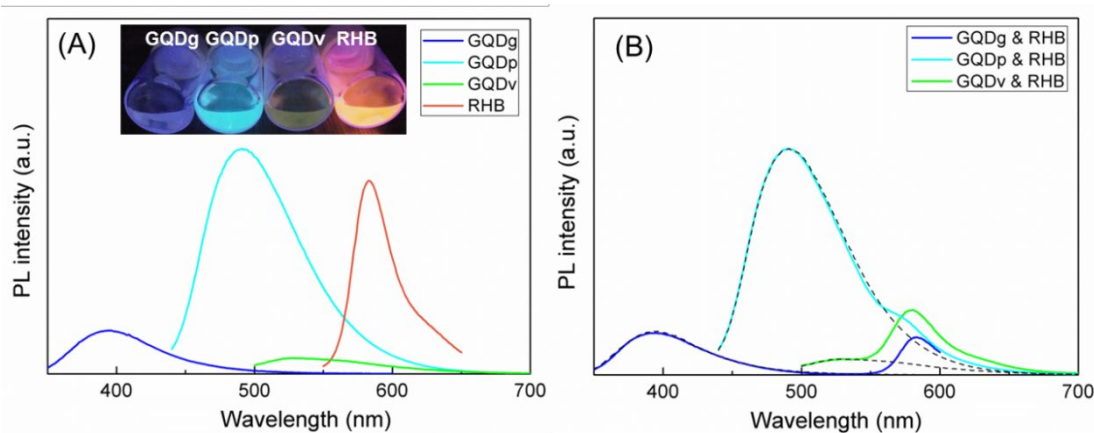
XPS experiments were performed in a SPECS Sage HR 100 spectrometer with a non-monochromatic X-ray source (Magnesium K $\alpha$  line of 1253.6 eV energy and a power applied of 250 W) and calibrated using the 3d<sub>5/2</sub> line of Ag with a full width at half maximum (FWHM) of 1.1 eV. The selected resolution for the spectra was 30 eV of pass energy and 0.5 eV/step for the general survey spectra and 15 eV of pass energy and 0.15 eV/step for the detailed spectra of the different elements. All measurements were made in an ultra-high vacuum chamber at a pressure around  $8 \cdot 10^{-8}$  mbar. In the fittings asymmetric and Gaussian-Lorentzian functions were used (after a Shirley background correction) where the FWHM of all the peaks were constrained while the peak positions and areas were set free.



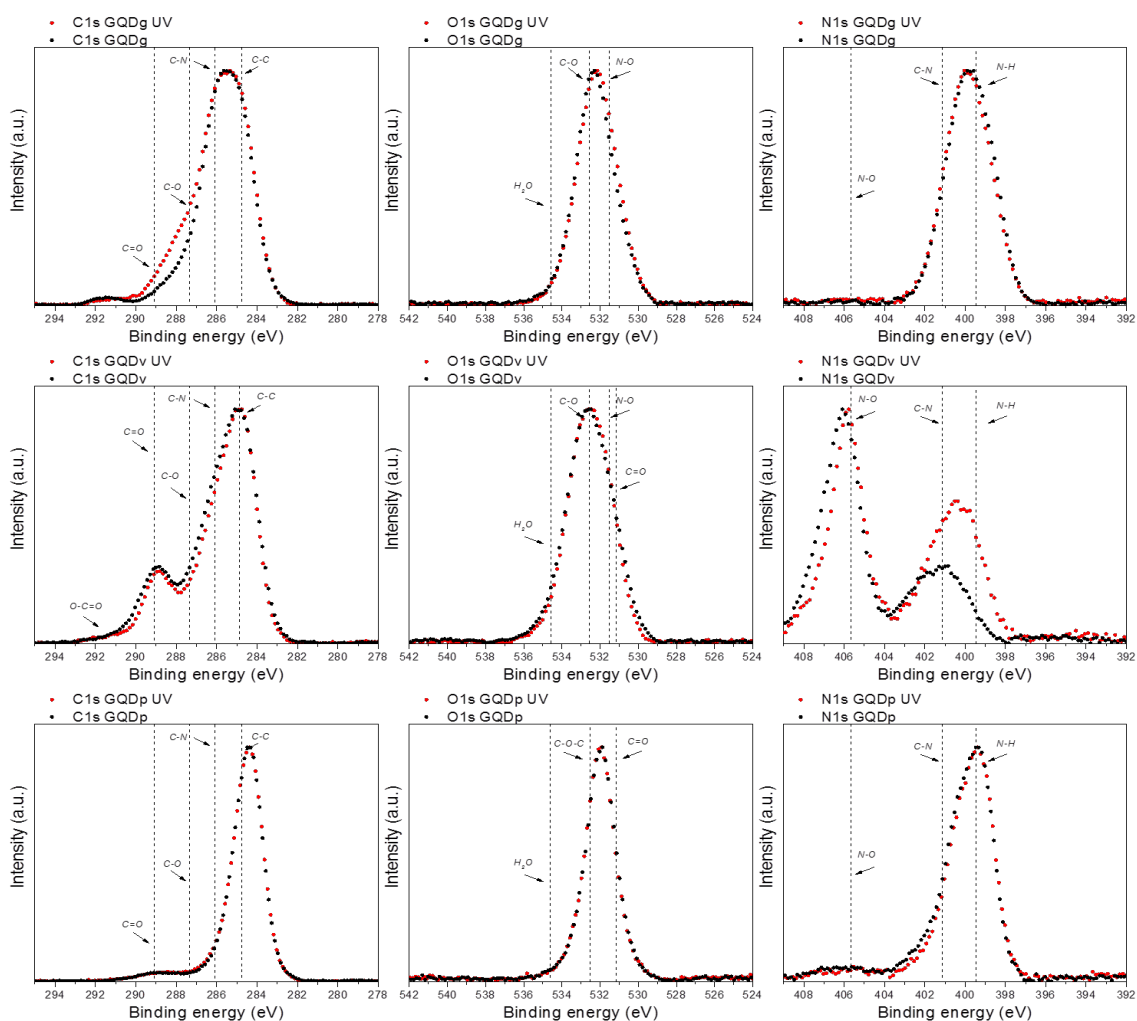
**Figure S1-** Survey XPS spectra of the different GQD



**Figure S2-** FTIR spectra of the different GQD



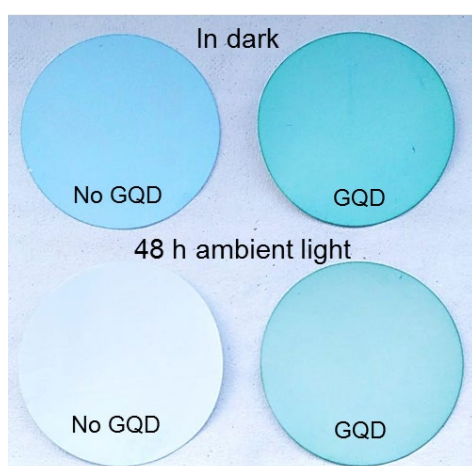
**Figure S3-** PL spectra and photographs under UV light of 0.1 mg/mL solutions of the different GQD in deionized water (A) and in presence of 0.02 mM RHB (B) at their respective maximum excitation wavelengths: 320 nm (GQDg), 420 nm (GQDp), 480 nm (GQDv) and 530 nm (RHB). For comparison, dotted spectra in Fig. S3B show the corresponding PL spectra of RHB-free GQD solutions.



**Figure S4-** Chemical composition of GQD before and after 1h of UV exposure determined by XPS.



**Figure S5-** Methylene blue-coated Nylon membranes without (left) and with (right) a GQDp pre-coating layer under UV illumination



**Figure S6-** Methylene blue-coated Nylon membranes without (left) and with (right) a protective GQDp antioxidant pre-coating layer stored in dark (top) and exposed to ambient light for 48h (down).