

# Electronic Supplementary Information for **Graphene Quantum Dot-based Theranostic Agents for Active Targeting of Breast Cancer**

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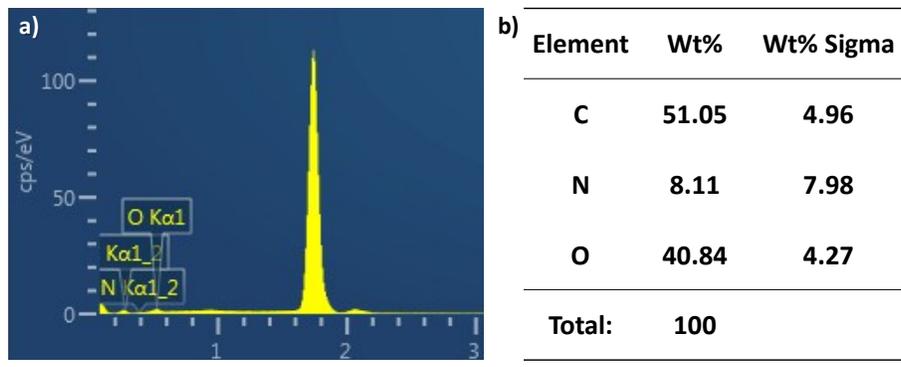
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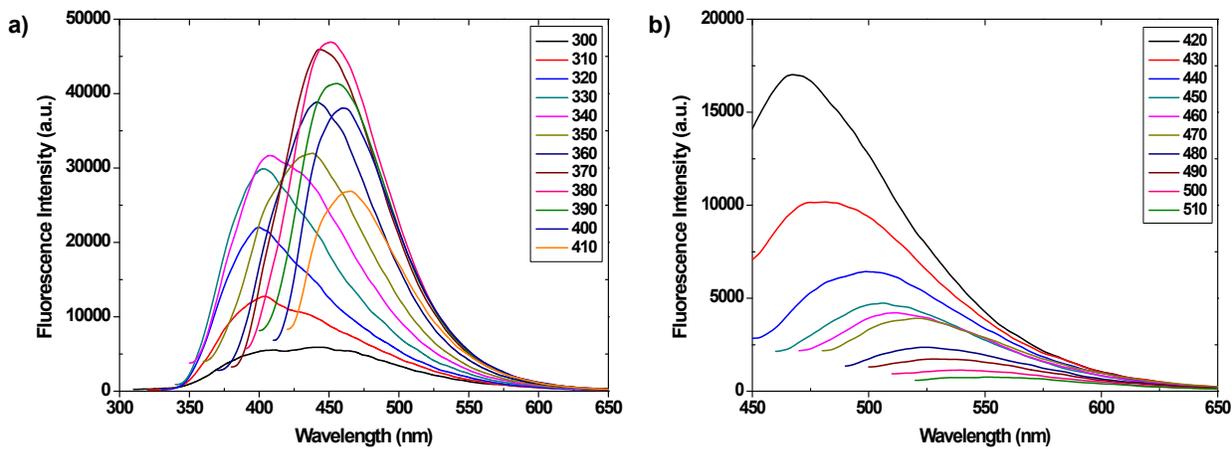
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## **1. EDX of GQD-NH<sub>2</sub>**

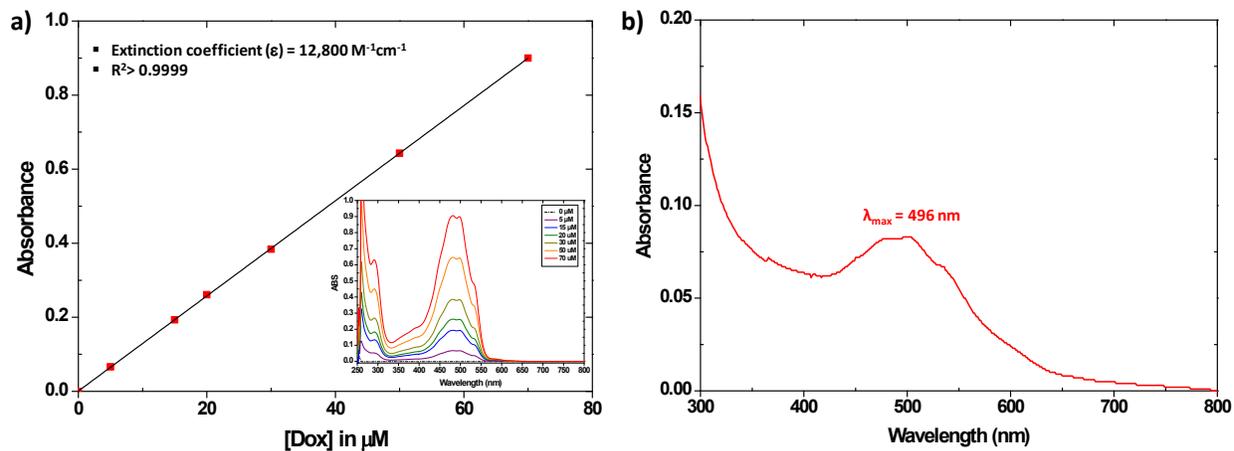
Chemical analysis to determine the content of carbon, nitrogen, and oxygen in GQD-NH<sub>2</sub> was conducted using energy dispersive X-ray spectroscopy (EDX) (Oxford, 51-XXM1034, UK), which was attached to a Field emission scanning electron microscope (FE-SEM) with an operating voltage of 5KV. The quantitative analysis of GQDs-NH<sub>2</sub> on the silicon wafer confirmed that 8.1% N was present. This indicated that amine groups were successfully functionalized onto the surface of GQDs-NH<sub>2</sub>. Furthermore, 40.84% oxygen and 51.05% carbon measurements suggest that oxidation and hydrolysis occurred during the synthesis of GQDs-NH<sub>2</sub> in the presence of L-glutamic acid.



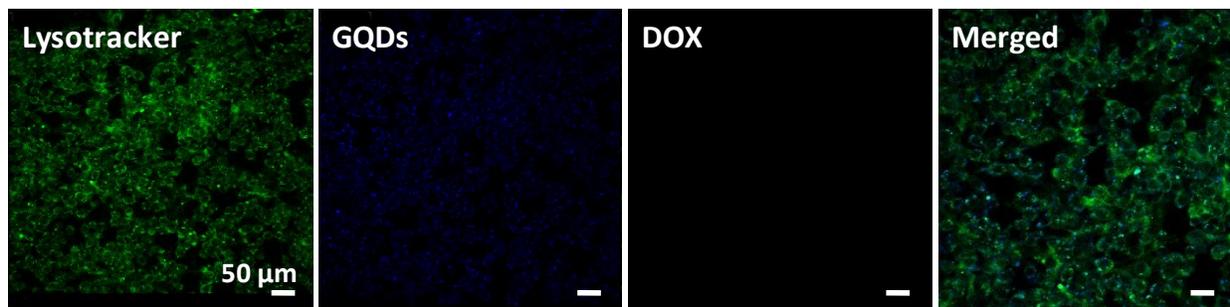
**Fig. S1** EDX spectrum of GQDs-NH<sub>2</sub> (a) and elemental content (b).



**Fig. S2** Excitation-dependent emission of GQDs-NH<sub>2</sub> (a) excitation at (300 nm to 410 nm) (b) excitation at (420 nm to 510 nm).



**Fig. S3** (a) The UV/Vis absorbance at  $\lambda_{\text{max}} = 496 \text{ nm}$  of DOX at various concentrations ( $\mu\text{M}$ ) in the mixture of DW/DMF = 1/3 (v/v) and the overlaid UV spectra (inset). (b) The UV/Vis absorbance of DL-GQD solution (1 mg/mL) in DW/DMF = 1/3 (v/v) at  $\lambda_{\text{ex}} = 496 \text{ nm}$ .



**Fig. S4** CLSM images (scale bar = 50  $\mu\text{m}$ ) of MCF-7 cells incubated with empty GQD-comp for 14 hrs.