Application of graphene quantum dots functionalized with thymine and thymine-appended zinc phthalocyanine as novel photoluminescent nanoprobes.

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Supporting Information

Additional experimental

Synthesis of pristine graphene quantum dots (GQDs): GQDs were synthesized by the top-down hydrothermal method [**1**]. Briefly: GO (0.5 g) was oxidized in conc. H_2SO_4 (10 mL) and HNO_3 (30 mL) for 4 h under ultrasonication. The mixture was then diluted with Millipore water (100 mL) and filtered through a 0.22 μm microporous membrane. The pH of the oxidized GO was turned to 8.0 using 10% NaOH. The obtained suspension was transferred to a 400 mL Teflon-lined autoclave and heated up to 200 ^{o}C for 12 h. The product was left to cool naturally to room temperature and filtered using a 0.22 μm membrane. The collected colloidal solution was further dialyzed for two days using a dialysis membrane (MW 1.5 kDa) to remove excess acids and salts, after which GQDs with strong fluorescence were thus obtained. Powdered GQDs were obtained by freeze drying the colloidal solution.

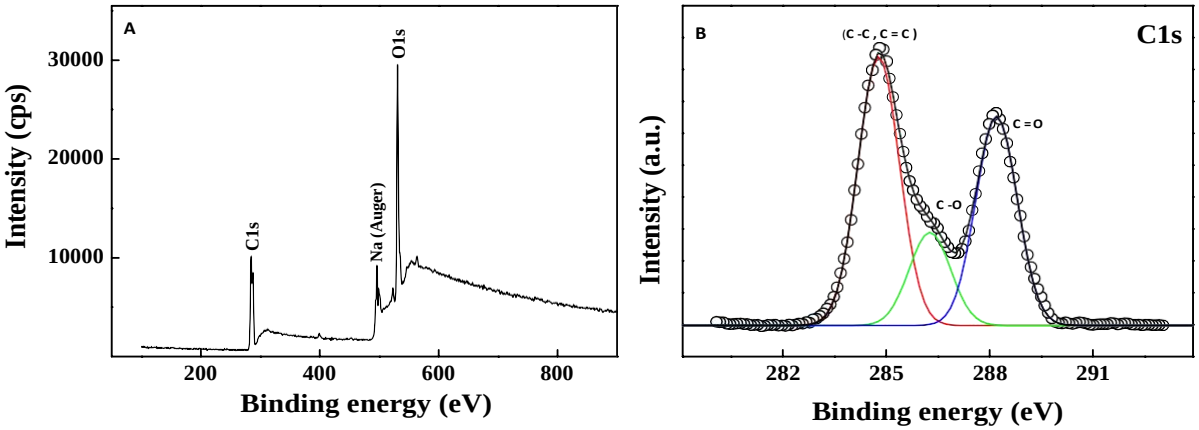

Fig. S1. XPS spectra of as-synthesized GQDs (A) Wide survey scan (B) High resolution spectrum of C1s.

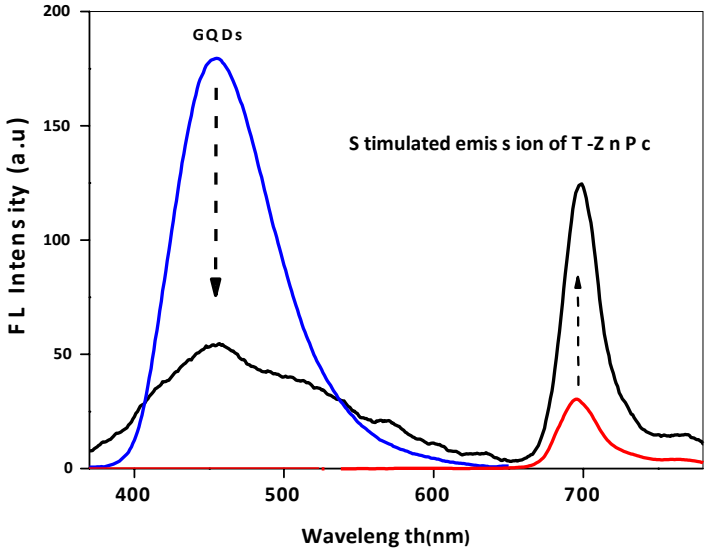

Fig. S2. Fluorescence emission of pristine GQDs-T-ZnPc conjugate showing stimulated emission in T-ZnPc: Solvent: Solvent: DMF/10 mM PBS, pH 7.0 (1:4).

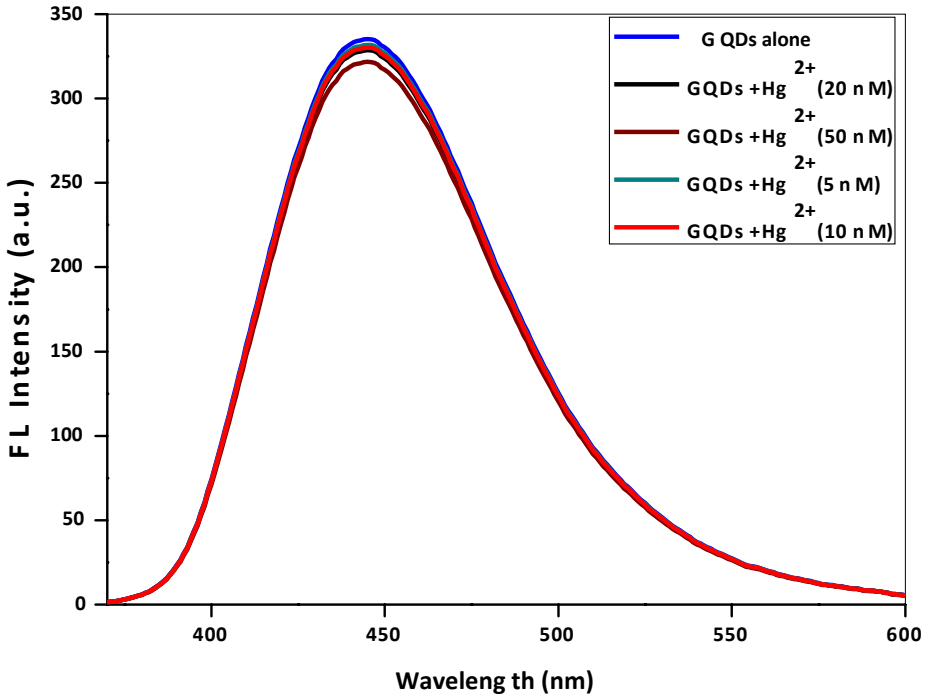

Fig. S3. FL intensity of pristine GQDs in the presence of various concentrations of Hg^{2+} (5-50 nM): Solvent: PBS (10 mM, pH 7.0).

Table S1. Comparison of the best fit fluorescence lifetime values of T-GQDs in the absence and presence of an equivalent of [Hg^{2+}] in 10 mM PBS, pH 7.0.

Sample	[Hg^{2+}](nM)	τ_F(ns)±0.10, n=3
T-GQDs	0	6.50
	0.1	6.52
	10	6.55
	20	6.45
	50	6.48

Table S2. Comparison of the fluorescence lifetime values of GQDs-T-ZnPc probe upon titration of different concentrations of Hg^{2+}. Solvent: DMF/10 mM PBS, pH 7.0 (1:4).

Sample	$[Hg^{2+}]$(nM)	τ_F(ns)
GQDs-T-ZnPc	0	1.95
	5	2.52
	10	2.98
	20	3.45
	50	4.02

Reference

1. O.J. Achadu, I. Uddin, T. Nyokong, *J. Photochem Photobiol A: Chemistry*, 2016, 317, 12-25.