

## Electronic Supplementary Information

# Sulfur-doped graphene quantum dots based paper sensor for highly sensitive and selective detection of 4- nitrophenol in contaminated water and wastewater

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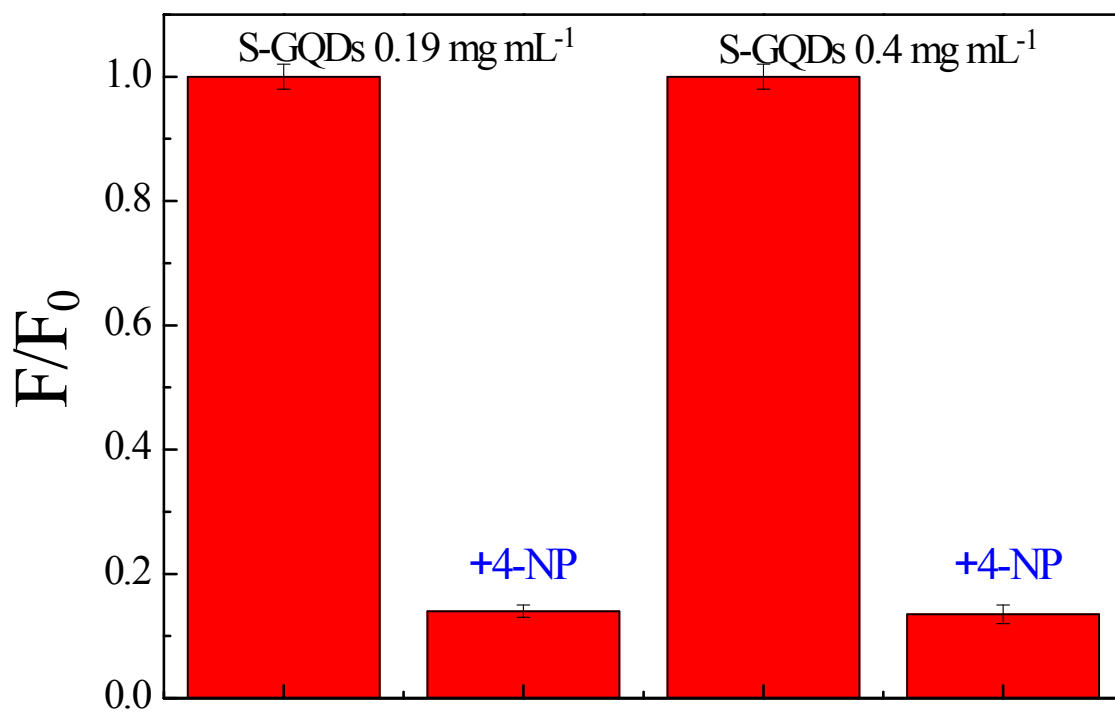
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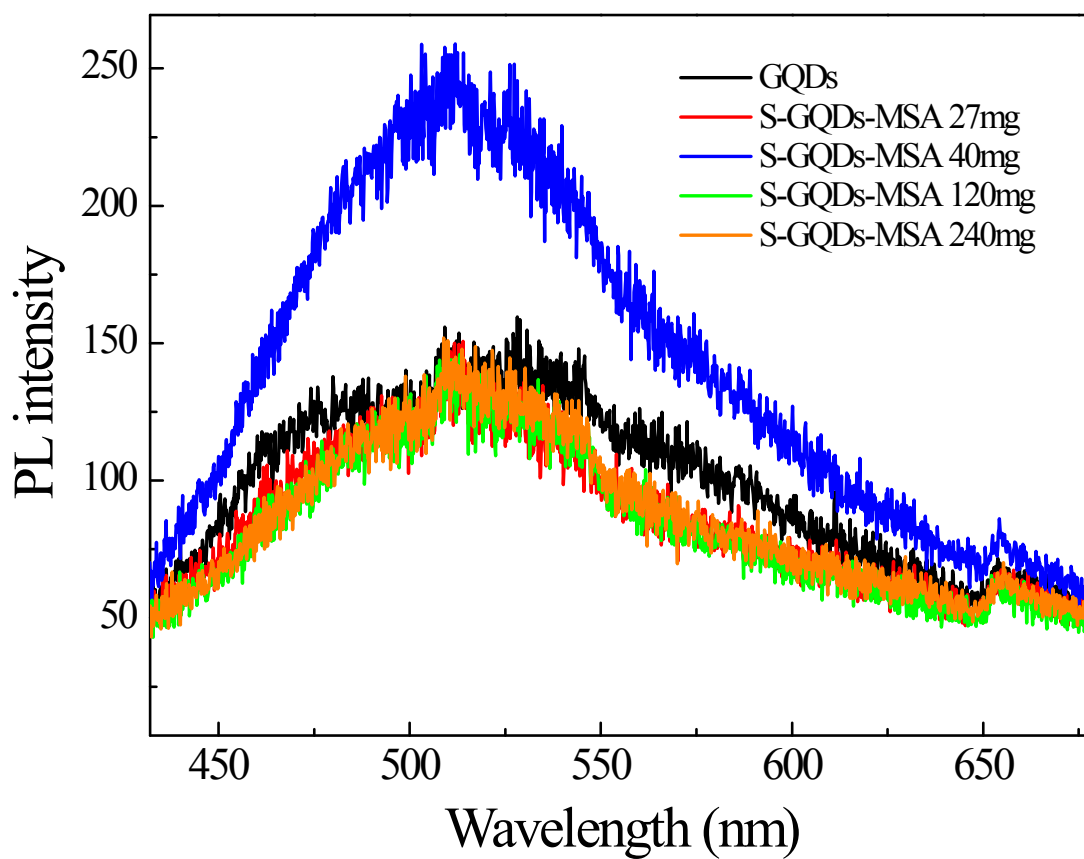
**Table S1.** The physicochemical property of different types of wastewater

Parameters	Metal industry	Sewage	Electroplating	Lake water (NTHU)
pH	7.3	6.7	7.8	8.5 ± 0.2
Suspendid solid (mg L <sup>-1</sup> )	8.6	5.3	2.3	ND <sup>a</sup>
TOC (mg L <sup>-1</sup> )	ND <sup>a</sup>	ND <sup>a</sup>	ND <sup>a</sup>	22.4 ± 1.8
COD (mg L <sup>-1</sup> )	44.5	53.1	21.3	ND <sup>a</sup>
Metal ions (mg L <sup>-1</sup> )				
Cu ions	0.009	0.017	0.024	ND <sup>a</sup>
Zn ions	0.041	0.039	0.009	ND <sup>a</sup>
Ni ions	0.013	0.004	0.003	ND <sup>a</sup>
Total alkalinity (mg-CaCO <sub>3</sub> L <sup>-1</sup> )	ND <sup>a</sup>	ND <sup>a</sup>	ND <sup>a</sup>	130 ± 14

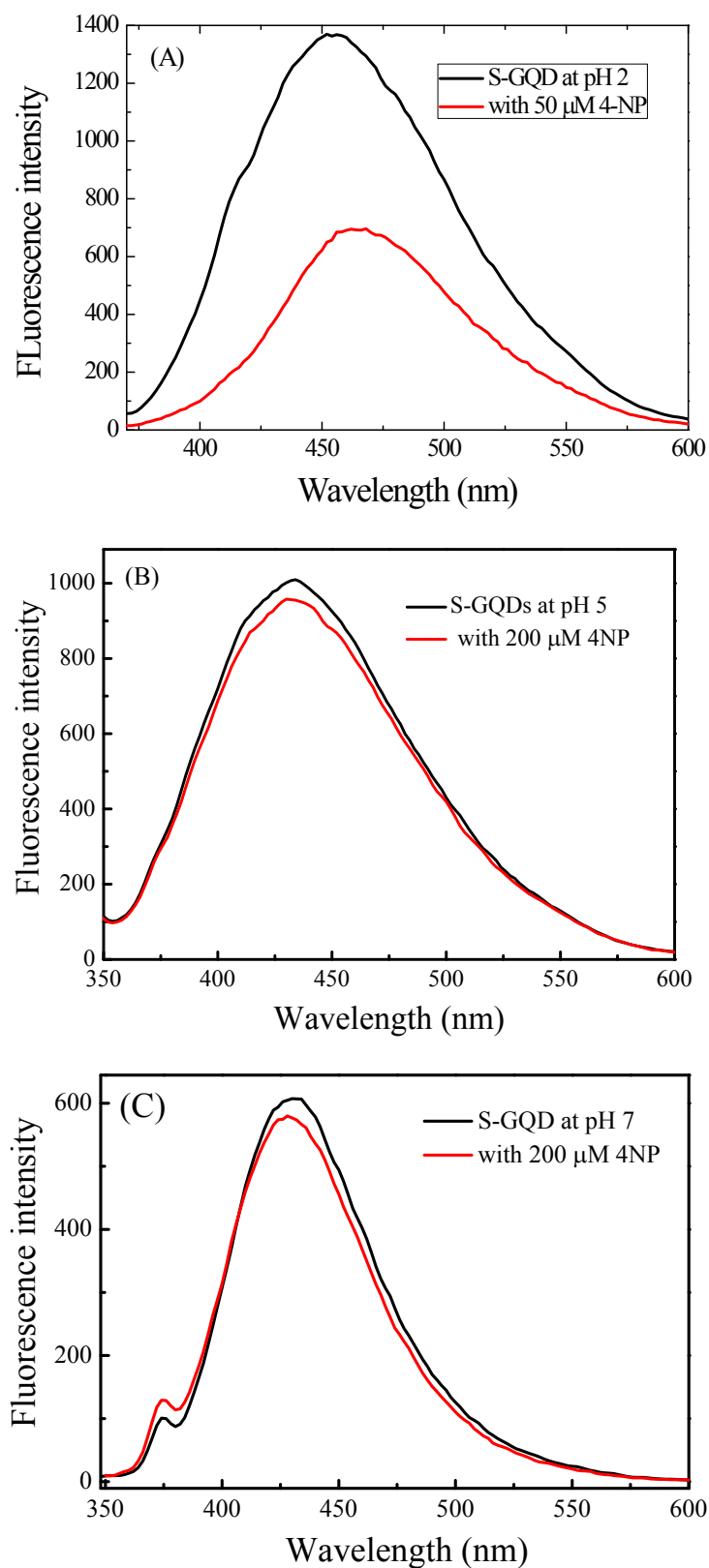
a ND: Not detected.



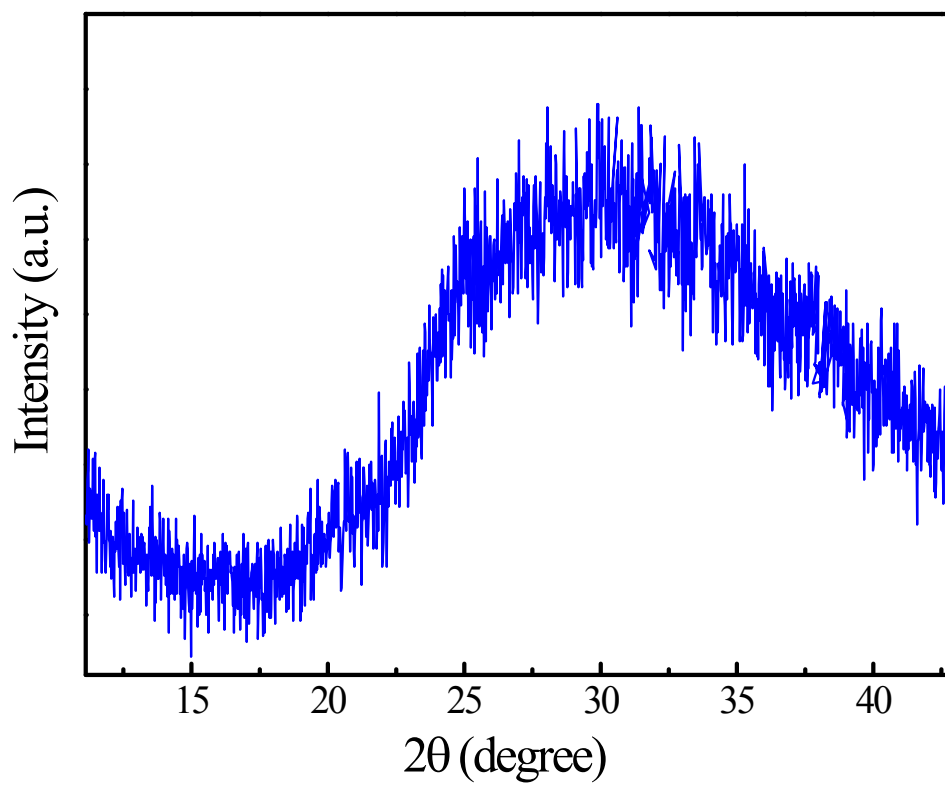
**Fig. S1.** The change in emission fluorescence of various concentrations of S-GQDs (0.19 and 0.4 mg mL<sup>-1</sup>) after addition of 200  $\mu$ M 4NP.



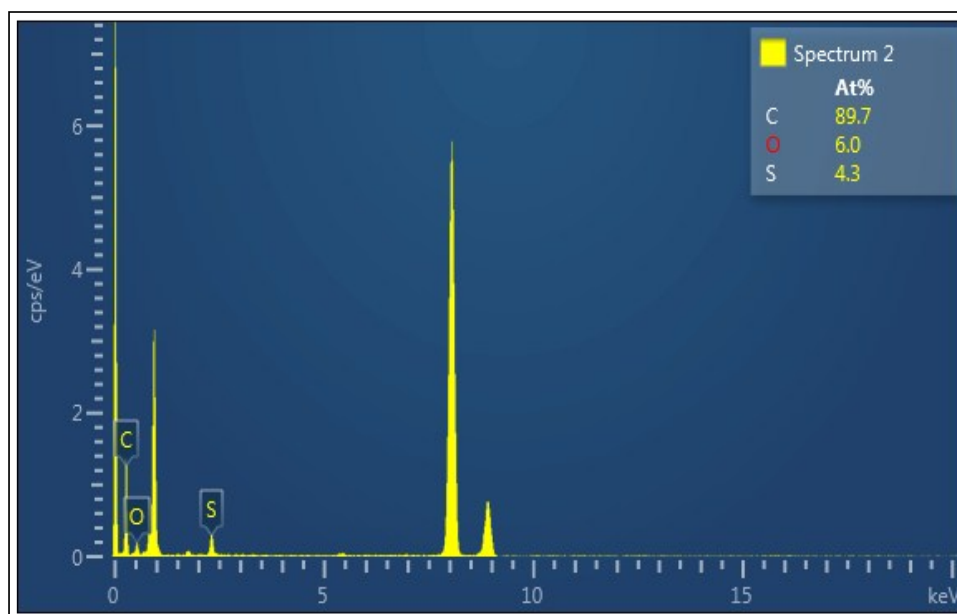
**Fig S2.** The photoluminescence intensity of as-prepared S-GQDs at various MSA/CA ratios ranging from 0.0135 to 0.12. The citric acid was fixed at 2 g, while the added amounts of MSA were in the range of 27 – 240 mg.



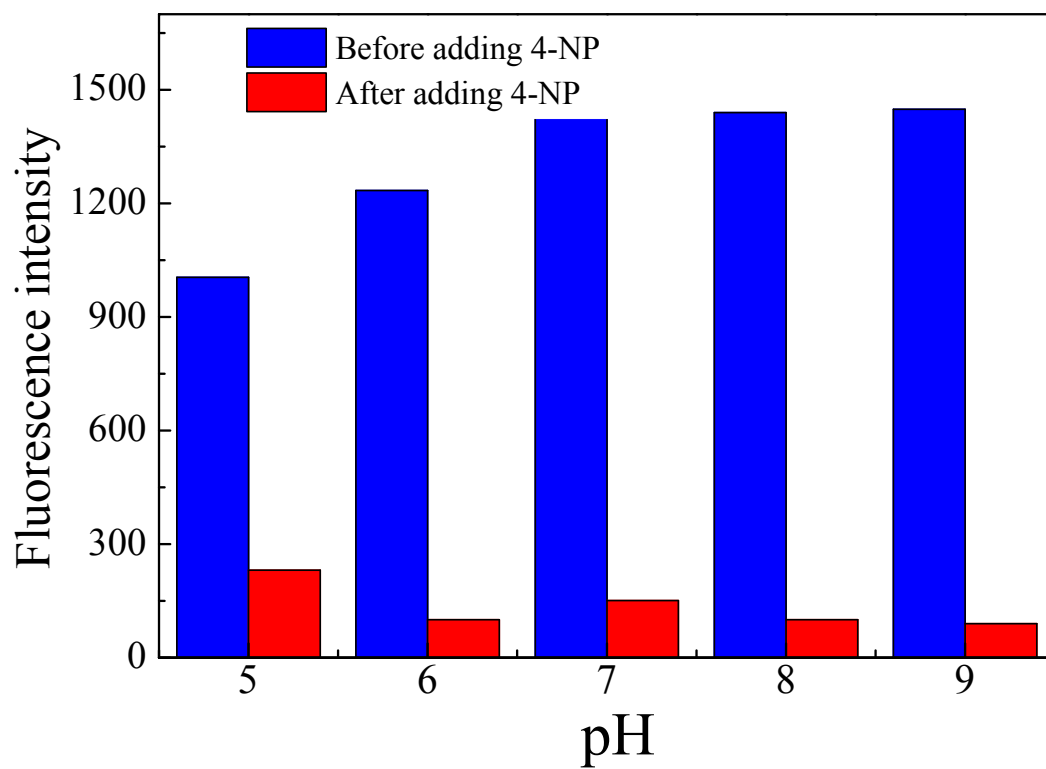
**Fig. S3.** The change in fluorescence intensity of S-GQDs before and after the addition of 4-nitrophenol at various pHs of 2 – 7 during fabrication procedure.



**Fig. S4.** XRD patterns of as-prepared S-GQDs.

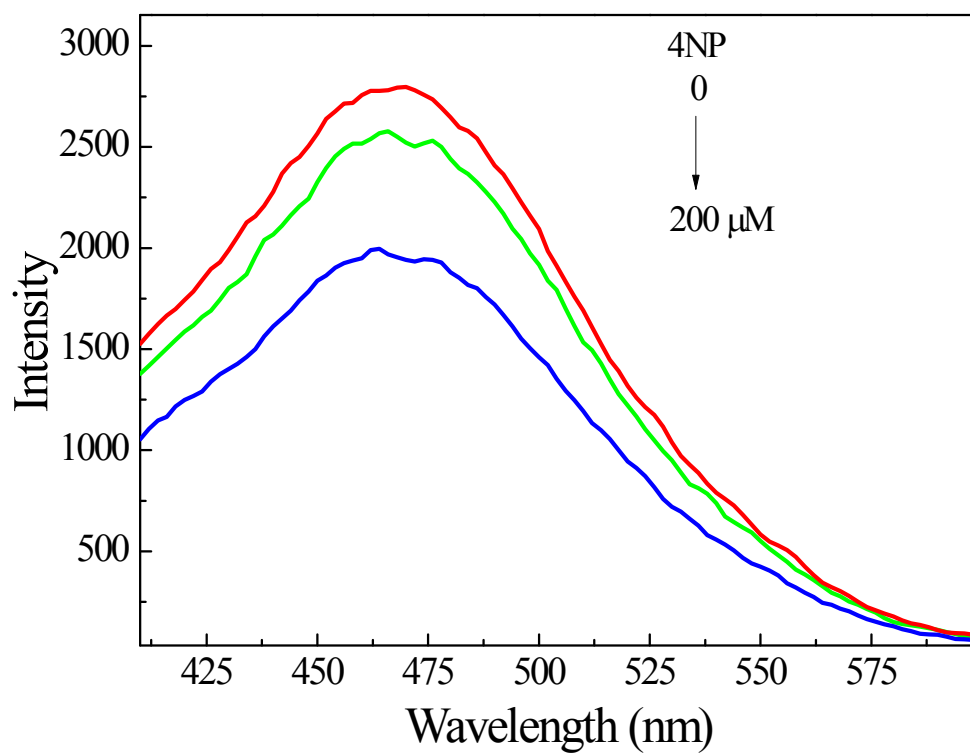


**Fig. S5.** The EDS spectrum of as-prepared S-GQDs.

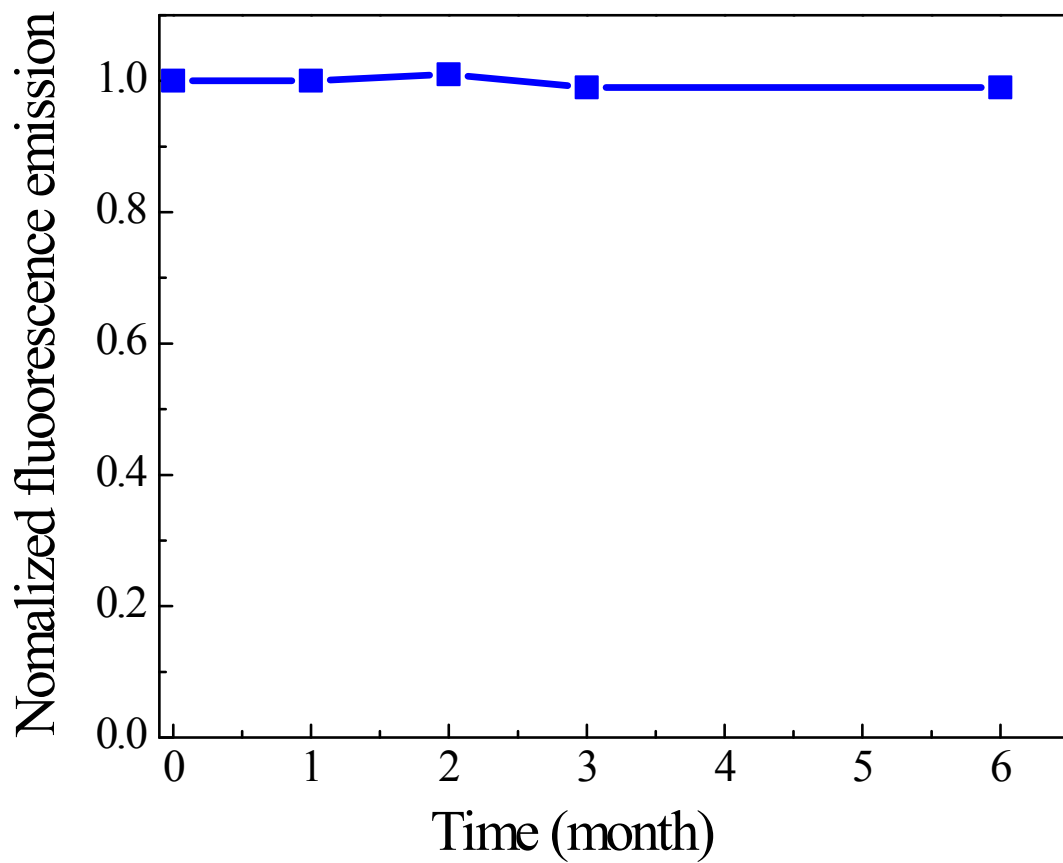


**Fig. S6.** The fluorescence intensity of S-GQDs at different pHs before and after the addition of 200  $\mu$ M 4-NP.





**Fig. S7.** The fluorescence emission intensity of as-prepared GQDs after the addition of various concentrations of 4-NP.



**Fig. S8.** The change in fluorescence intensity of S-GQDs after long term storage in air.