

# Fabrication of Orange Fluorescent Boron-Doped Graphene Quantum Dots for $\text{Al}^{3+}$ Ion Detection

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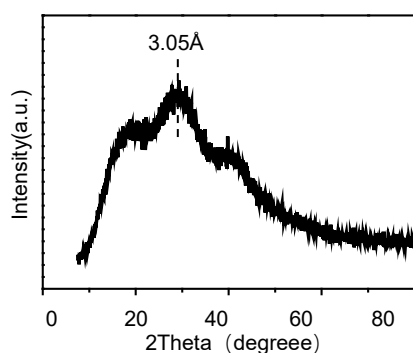


Figure S1. XRD patterns of c-GQDs.

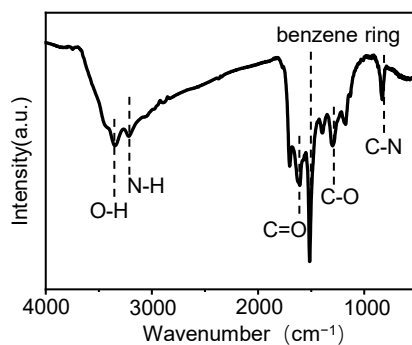
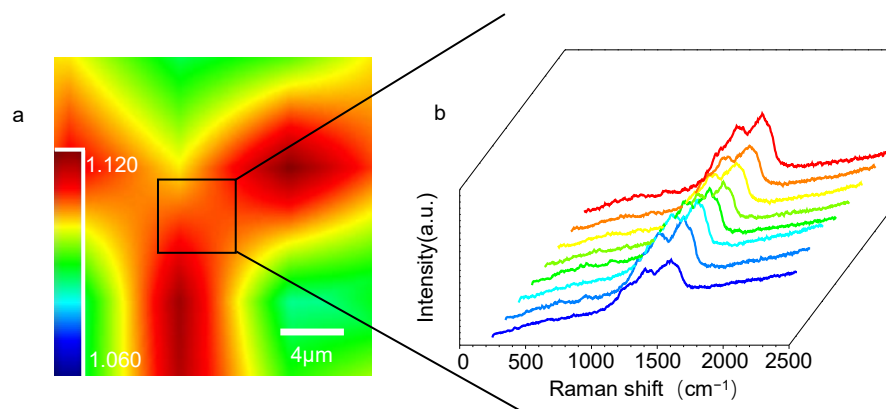
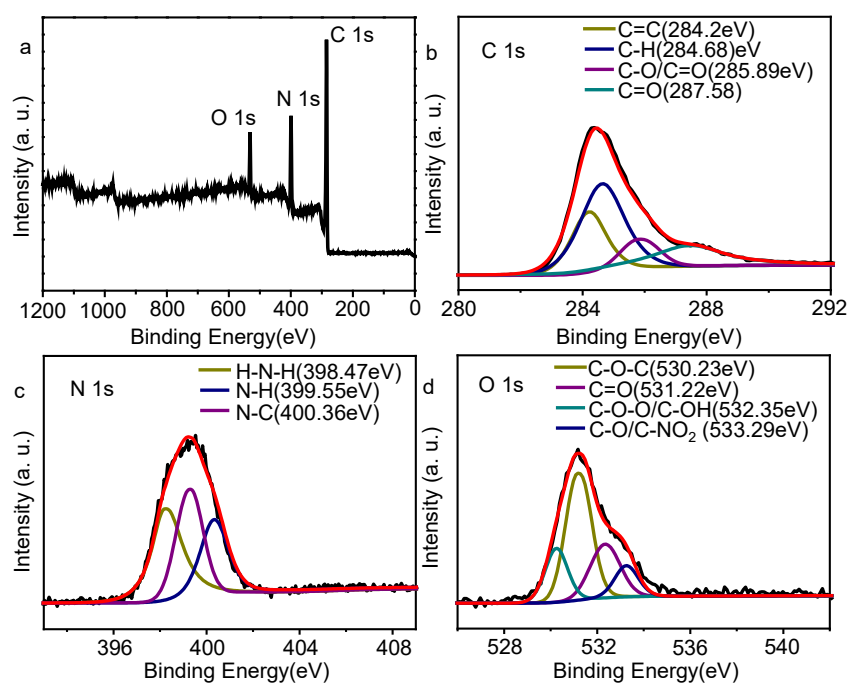


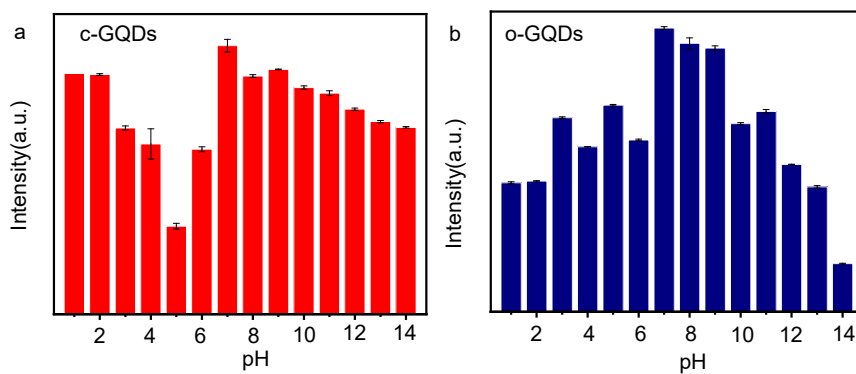
Figure S2. FT-IR spectra of c-GQDs.



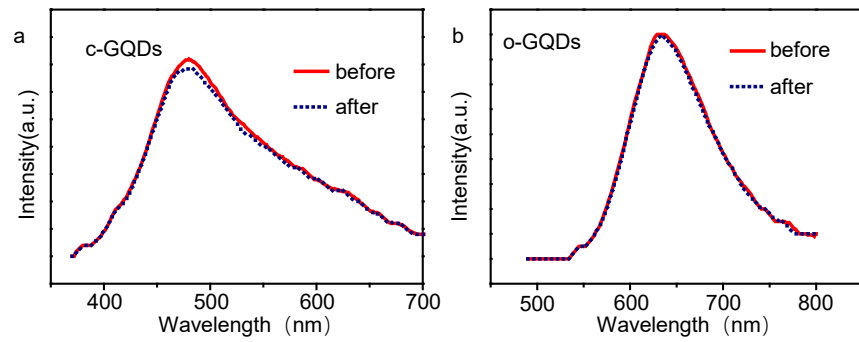
**Figure S3.** (a) High resolution microscope Raman image of c-GQDs (color indicates the ratio of peaks D to G). (b) Typical Raman spectra in the box region on the left.



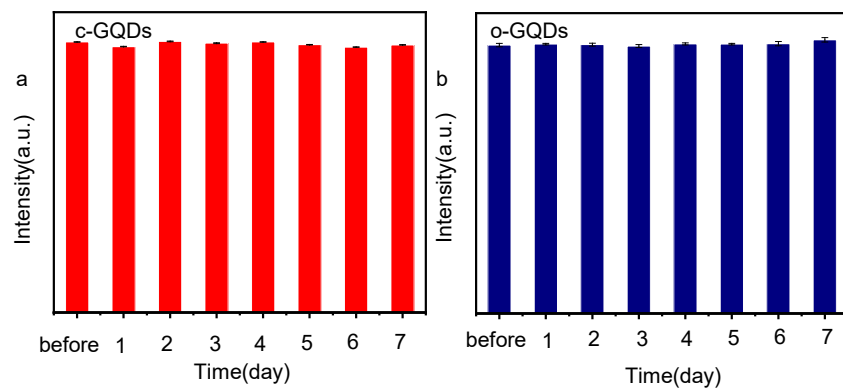
**Figure S4.** (a) Full X-ray photoelectron spectrum of c-GQDs, (b) C1s spectrum measured by X-ray photoelectron spectrum of c-GQDs, (c) N1s spectrum of c-GQDs, (d) O1s spectrum of c-GQDs.



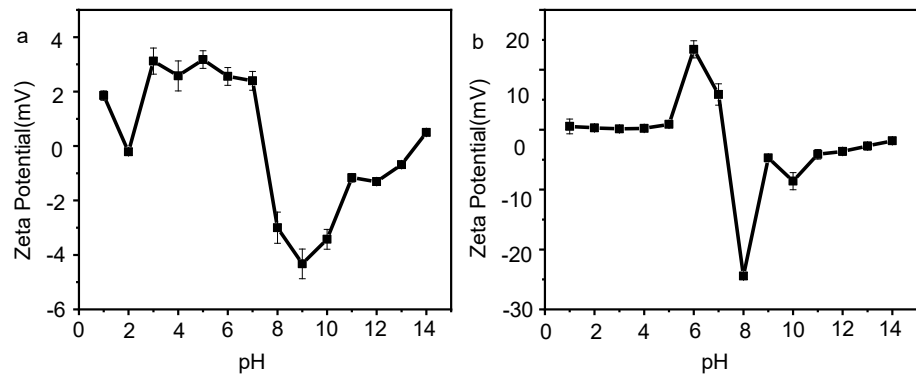
**Figure S5.** PH stability test of (a)c-GQDs, (b)o-GQDs.



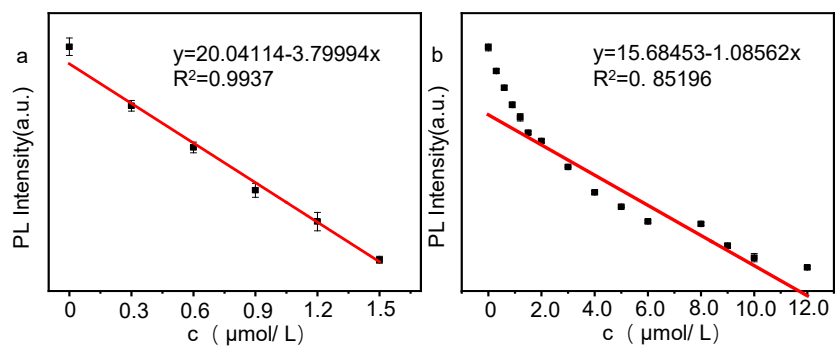
**Figure S6.** Dispersion stability of (a)c-GQDs, (b)o-GQDs.



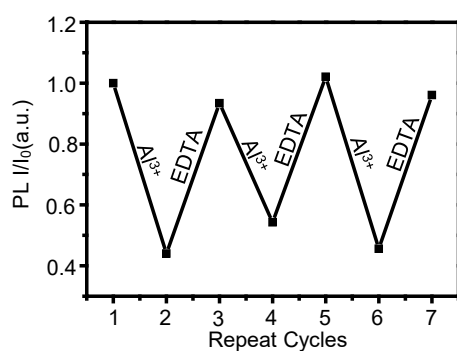
**Figure S7.** Temporal stability of (a)c-GQDs, (b)o-GQDs.



**Figure S8.** Zeta potential test of (a)c-GQDs, (b)o-GQDs at pH 1-14.



**Figure S9.** Linear plot between o-GQDs PL intensity and different concentrations of Al<sup>3+</sup>. (a) Al<sup>3+</sup> concentration was 0–1.5 μM; (b) Al<sup>3+</sup> concentration was 0–12 μM.



**Figure S10.** The reversible cycles of o-GQDs with Al<sup>3+</sup> and EDTA were studied by PL intensity variation.

**Table S1.** XPS measures the element ratios of c-GQDs and o-GQDs in the spectrum.

Element	C 1s	N 1s	O 1s	B 1s	C 1s/O 1s	N 1s/O 1s
c-GQDs	3.5	3.58	3.63		0.96	0.98
o-GQDs	3.3	3.17	4.24	3.63	0.77	0.74