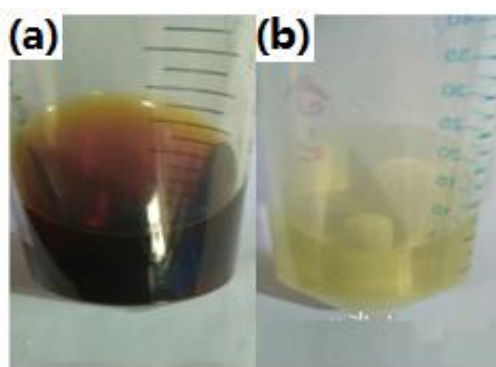


## Electronic Supplementary Information

### 1. Technical Details of GQDs

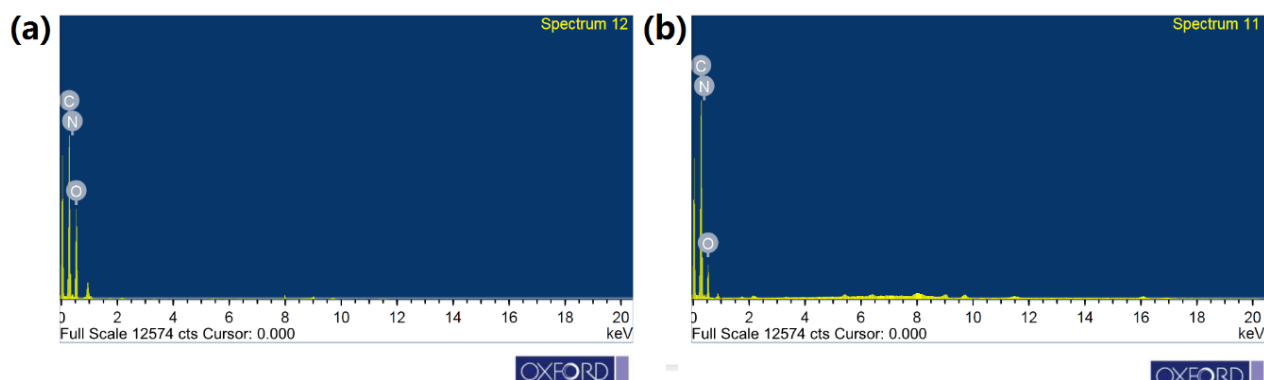
Graphene quantum dots, aqua green luminescent, 1 mg/mL in H<sub>2</sub>O,  $\lambda_{em}$  540 nm $\pm$ 10 nm, FWHM 80 nm, quantum yield  $\geq$ 17%, CAS Number 7440-44-0.

### 2. Physical appearance of CDs and rCDs



**Figure S1.** Photographic images of (a) CDs and (b) rCDs.

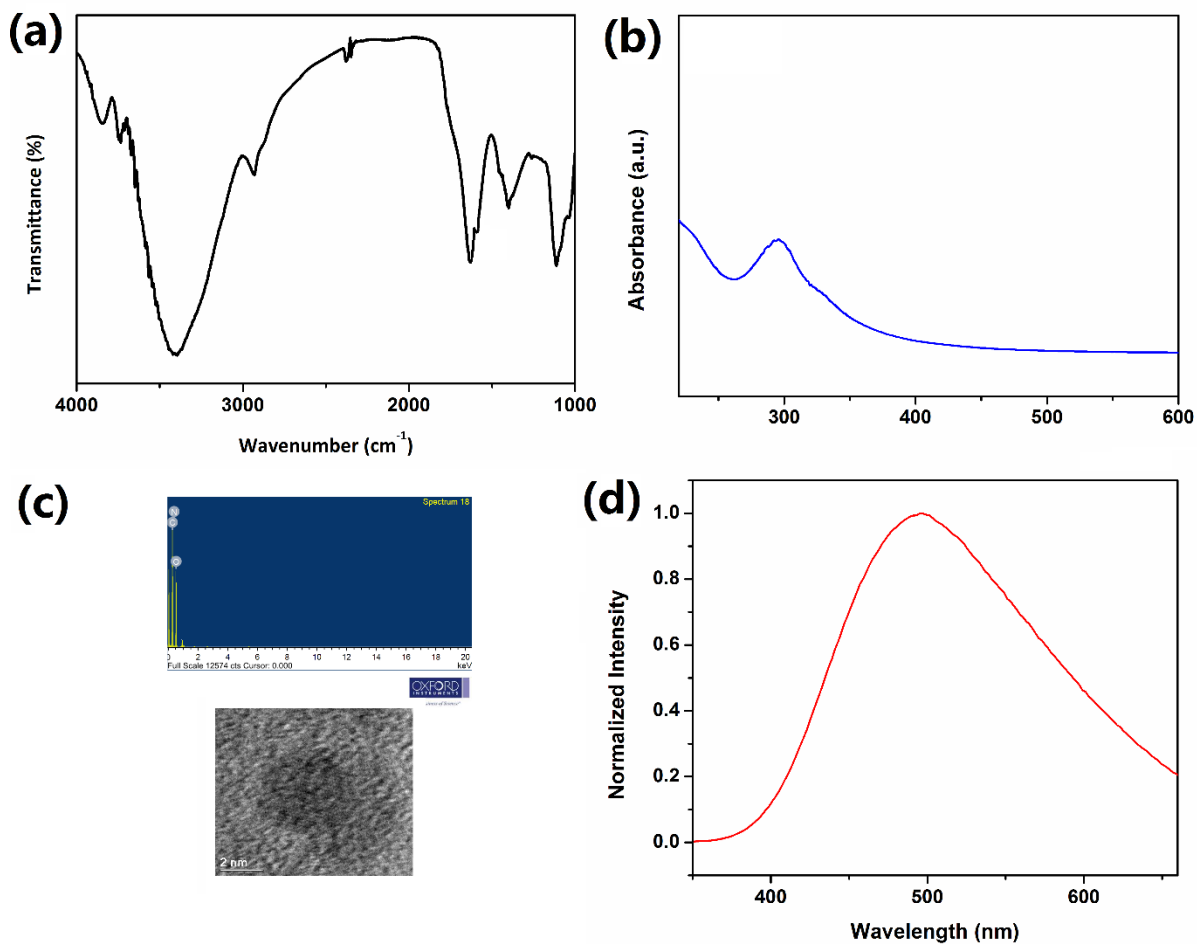
### 3. Elemental composition of CDs and rCDs



**Figure S2.** EDS spectra of (a) CDs and (b) rCDs.

#### 4. Preparation of oCDs

0.15 g of NaOH and 0.15 g of ClCH<sub>2</sub>COONa were taken in the 50 mL of carbon dot solution. Then it was sonicated for 6 h. After, the reaction period is over, the solution was subjected to membrane dialysis (cut off molecular weight 300 Da) for 48 h in aqueous solution. As prepared oCDs were characterized by FTIR, UV-vis, EDS and HRTEM analysis as shown in Figure S3 (a), (b) and (c), respectively. Figure S4 (d) shows the fluorescence spectrum of oCDs at the excitation wavelength of 340 nm.



**Figure S3.** (a) FTIR spectrum, (b) UV-vis spectrum, (c) EDS and HRTEM, (d) fluorescence spectrum (@340 nm) of oCDs.

## 5. Normalized PL spectra of CDs, rCDs and oCDs

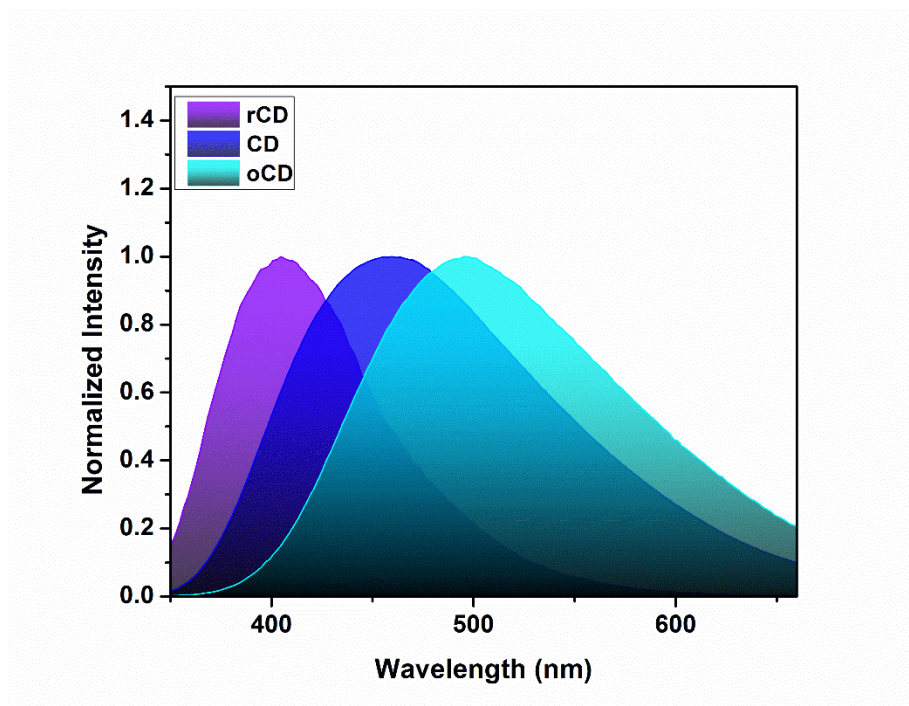


Figure S4. Normalized PL spectra of CDs, rCDs, and oCDs.

## 6. Chromaticity diagram

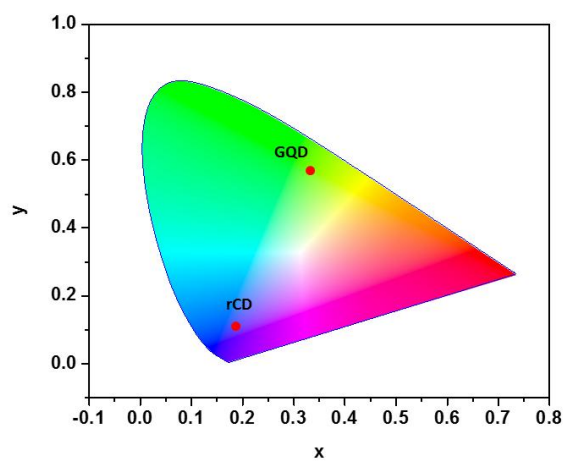


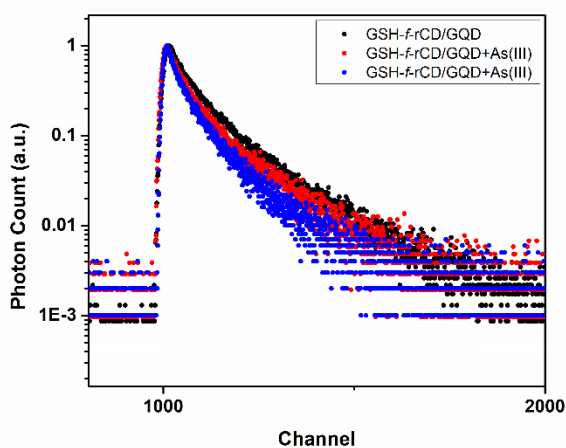
Figure S5. CIE colour-coordinates of rCDs and GQDs.

## 7. Various optical properties

**Table S1.** Various optical properties of CDs, rCDs, oCDs and GQDs.

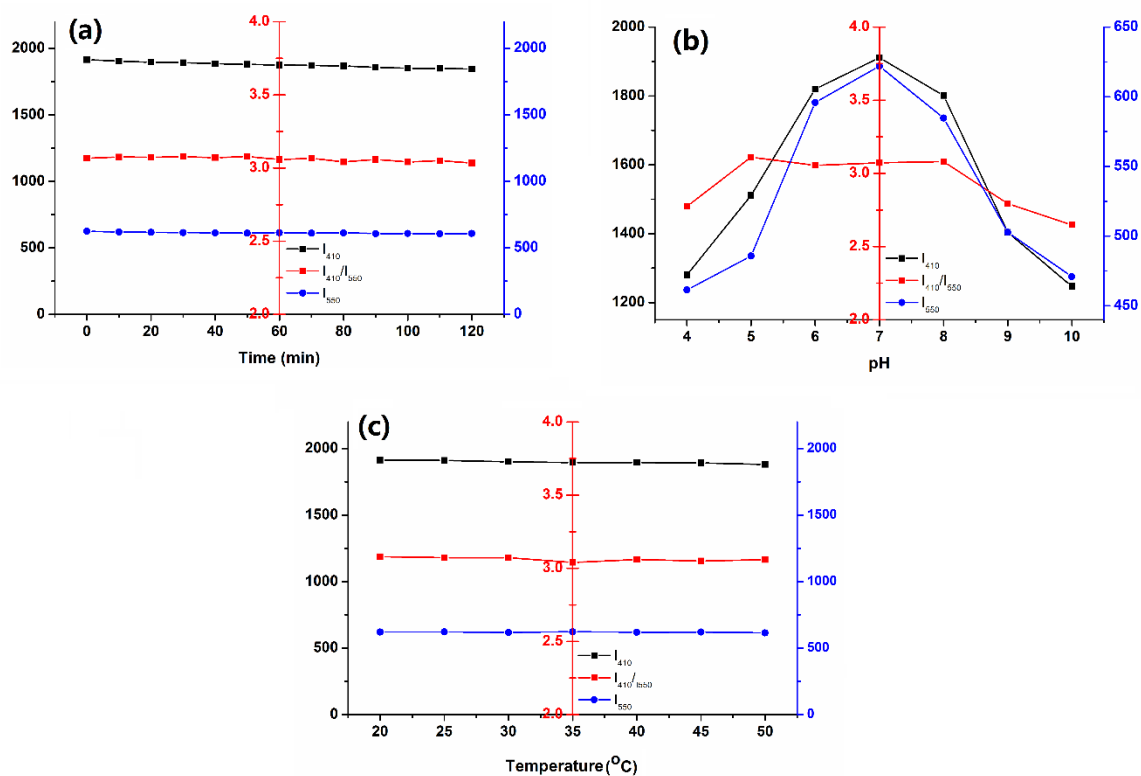
Property	CDs	rCDs	oCDs	GQDs
Intensity (S1/R1)	Moderate	High	Moderate	High
Excitation dependency	√	√	√	×
Emission (nm)	458	410	496	550
QY (%)	8.6	18.4	5.2	18.9
FWHM (nm)	158	91	154	80

## 8. TCSPC based lifetime spectra of GSH-*f*-rCD/GQD after addition of As(III)



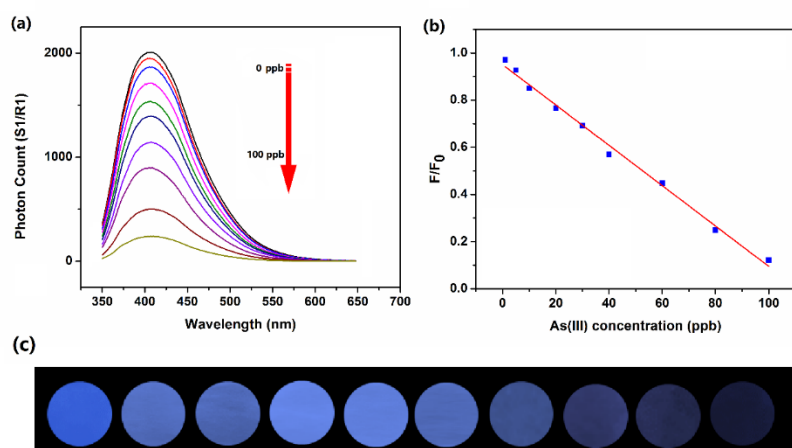
**Figure S6:** Time-resolved fluorescence spectra of GSH-*f*-rCD/GQD and GSH-*f*-rCD/GQD after the addition of As(III). The trend shows decrease in lifetime with increasing As(III).

## 9. Effect of external parameters (time, light, pH and temperature) on $I_{410}/I_{550}$



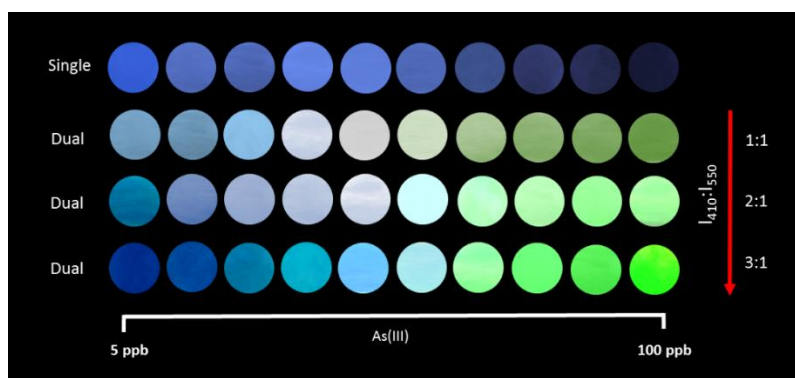
**Figure S7:** Effect of various conditions on  $I_{410}$ ,  $I_{550}$  and  $I_{410}/I_{550}$ : (a) UV radiation/time, (b) pH and (c) temperature.

## 10. Analytical performance of single emitting GSH-*f*-rCDs for As(III)



**Figure S8:** Detection performance of single emitting GSH-*f*-rCDs: (a) quenching of fluorescence intensity, (b) linearity curve (0.5-100 ppb, LOD=0.47 ppb), (c) Visual detection on test paper through change in luminescence intensity (5-100 ppb).

## 11. Effect of $I_{410}/I_{550}$ ratio on the detection of As(III)



**Figure S9:** Effect of  $I_{410}/I_{550}$  ratio on detection of As(III): Single emitting GSH-*f*-rCD shows change in intensity in the blue elimination, dual emitting GSH-*f*-rCD/GQD provides change in colour, however colour separation is more pronounced at  $I_{410}:I_{550}=3:1$ .