Supplementary Information

A dually emissive MPA-CdTe QDs@N, S-GQDs nanosensor for sensitive and selective detection of 4-Nitrophenole by two-turn-off signals

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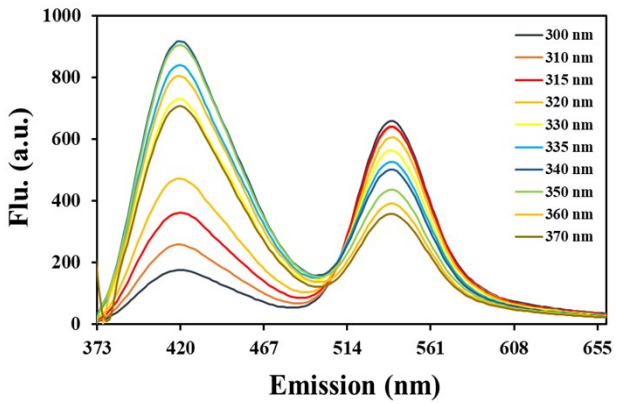

Figure S1 Fluorescence emission spectra of CdTe QDs @N, S-GQDs nanosensor at different excitation wavelengths.

As depicted in Fig. S2, the fluorescence intensity of both quantum dots rises as the pH level increases. The fluorescence intensity of N, S-GQDs (S2a) is almost stable when the pH is above 4. However, CdTe QDs (S2b) exhibit the strongest fluorescence between pH 5 ~ 6.5, after which the fluorescence intensity decreases with further increases in pH.

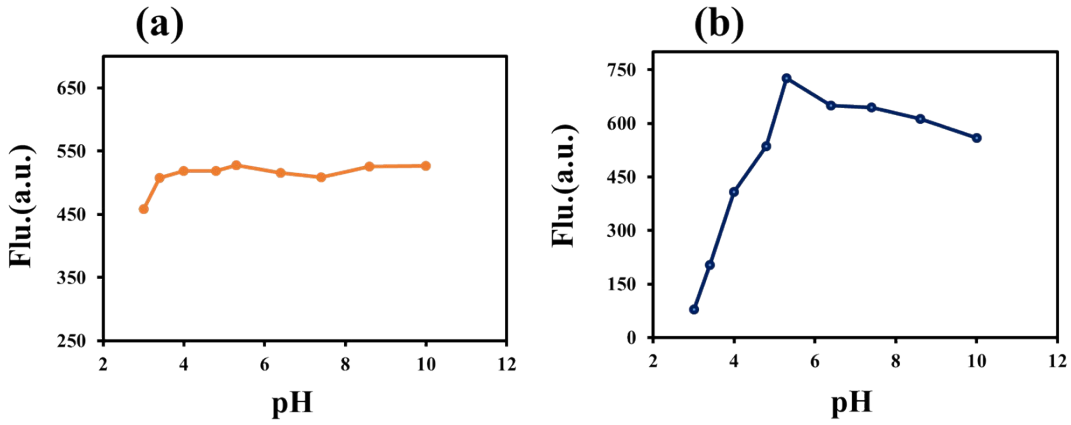

Figure S2 Fluorescence emission spectra of N, S-GQDs (S2a) and CdTe QDs (S2b) at different pH values (3.0, 3.4, 4.0, 4.8, 5.3, 6.4, 7.4, 8.6, 10).

As it is shown in Fig. S3(a) when the added volume of the sensor is changed by mistake or uncertainty (yellow cell), the related calibration curve of single QDs and GQDs fluorescence signal

is changed (Fig. S3c). However, the calibration curve for the ratio of the fluorescence signals (Fig. S3d) remains unchanged. It shows clearly the advantage of using the ratio plot.

The point is that when both the slopes of signal changes are high (similar high values of -0.050 and -0.048 in green and blue cells) the slope of the ratio plot is low (Fig. S4c, d). It would be preferable to have different values for these two slopes. It means a high slope for one (e.g., -0.05) and a low slope for the other (e.g., -0.01).

(a)

Sensor concn. ratio to first soln.	QD Initial	GQD Initial
1	2000	1500
1	2000	1500
1	2000	1500
0.8	1600	1200
1	2000	1500
1	2000	1500
1.1	2200	1650
1	2000	1500
1	2000	1500
0.9	1800	1350
1	2000	1500
1	2000	1500
1	2000	1500
1	2000	1500
1.2	2400	1800
1	2000	1500
1	2000	1500
1	2000	1500

After adding different concentration of analyte

(b)

	Slope		
	-0.05	-0.01	
	Signals		
Analyte Concn	QD	GQD	ratio
1	1900	1485	1.279
2	1800	1470	1.224
3	1700	1455	1.168
4	1280	1152	1.111
5	1500	1425	1.053
6	1400	1410	0.9929
7	1430	1534.5	0.9319
8	1200	1380	0.8695
9	1100	1365	0.8059
10	900	1215	0.7407
11	900	1335	0.6741
12	800	1320	0.6061
13	700	1305	0.5364
14	600	1290	0.4651
15	600	1530	0.3921
16	400	1260	0.3175
17	300	1245	0.2409
18	200	1230	0.1626

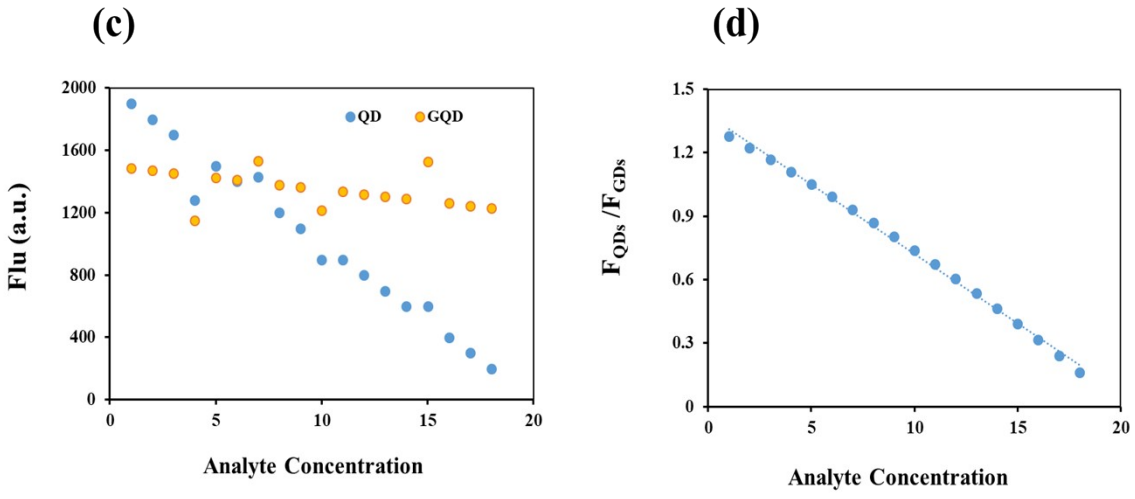

Figure S3. (a, b) simulated data, (c) calibration curve for single QDs and GQDs fluorescence signal (d) calibration curve for ratio of fluorescence signal (F_{QDs}/F_{GQDs}).

(a)

Slope	-0.05	-0.039
	Signals	
Analyte Concn	QD	GQD	ratio
1	1900	1441.5	1.318
2	1800	1383	1.302
3	1700	1324.5	1.283
4	1280	1012.8	1.264
5	1500	1207.5	1.242
6	1400	1149	1.218
7	1430	1199.55	1.192
8	1200	1032	1.163
9	1100	973.5	1.130
10	900	823.5	1.093
11	900	856.5	1.051
12	800	798	1.002
13	700	739.5	0.9466
14	600	681	0.8811
15	600	747	0.8032
16	400	564	0.7092
17	300	505.5	0.5935
18	200	447	0.4474

(b)

Slope	-0.05	-0.048
	Signals	
Analyte Concn	QD	GQD	ratio
1	1900	1428	1.331
2	1800	1356	1.327
3	1700	1284	1.324
4	1280	969.6	1.320
5	1500	1140	1.316
6	1400	1068	1.311
7	1430	1095.6	1.305
8	1200	924	1.299
9	1100	852	1.291
10	900	702	1.282
11	900	708	1.271
12	800	636	1.258
13	700	564	1.241
14	600	492	1.219
15	600	504	1.190
16	400	348	1.149
17	300	276	1.087
18	200	204	0.9804

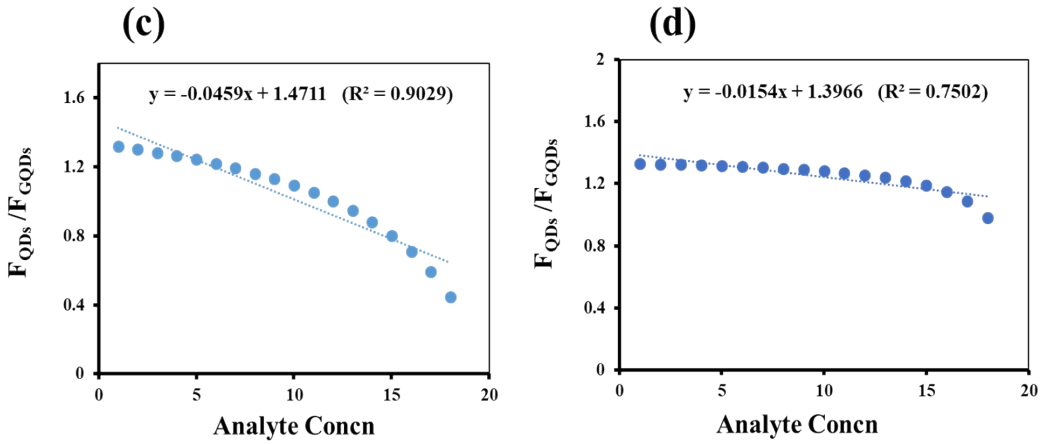

Figure S4. (a, b) The simulated data (Fig. S3 b) with different slope values (-0.039 and -0.048) for GQDs and (a, b) Corresponding calibration curve for the F_{QDs}/F_{GQDs} (c, d).