

supplementary information

Fluorescence Sensor Array based on three kinds of Carbon Dots for Identification of Hydroxybenzaldehyde and Nitrobenzaldehyde Isomers

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Table S1	S2
Table S2	S2
Table S3	S3
Figure S1	S3
Figure S2	S4
Figure S3	S5
Figure S4	S5
Figure S5	S5
Figure S6	S6
Figure S7	S6
Figure S8	S6

1. Sensing performance

Table S1 Detection limit of CDs-1 for HNBIs

CDs-1	Linear Range(μM)	Linear Equation	R-Square	Detection Limit (μM)
1. <i>o</i> -hydroxybenzaldehyde	10.0-300.0	$(F_0-F)/F_0 = 2230.0 \times C1(\mu\text{M}) + 0.138$	0.963	3.2
2. <i>m</i> -hydroxybenzaldehyde	50.0-600.0	$(F_0-F)/F_0 = 1060.0 \times C2(\mu\text{M}) + 0.031$	0.969	6.8
3. <i>p</i> -hydroxybenzaldehyde	10.0-200.0	$(F_0-F)/F_0 = 6280.0 \times C3(\mu\text{M}) + 0.136$	0.942	12.0
4. <i>o</i> -nitrobenzaldehyde	50.0-600.0	$(F_0-F)/F_0 = 1010.0 \times C4(\mu\text{M}) + 0.038$	0.973	7.1
5. <i>m</i> -nitrobenzaldehyde	100.0-600.0	$(F_0-F)/F_0 = 2550.0 \times C5(\mu\text{M}) + 0.091$	0.966	9.1
6. <i>p</i> -nitrobenzaldehyde	50.0-600.0	$(F_0-F)/F_0 = 790.0 \times C6(\mu\text{M}) - 0.020$	0.989	2.8

Table S2 Detection limit of CDs-2 for HNBIs

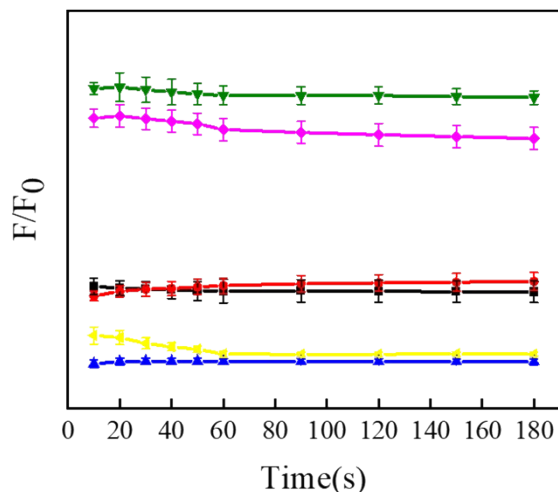
CDs-2	Linear Range(μM)	Linear Equation	R-Square	Detection Limit (μM)
1. <i>o</i> -hydroxybenzaldehyde	50.0-600.0	$(F_0-F)/F_0 = 859.0 \times C1(\mu\text{M}) + 0.315$	0.976	13.0
2. <i>m</i> -hydroxybenzaldehyde	50.0-600.0	$(F_0-F)/F_0 = 1034.0 \times C2(\mu\text{M}) + 0.100$	0.955	10.0
3. <i>p</i> -hydroxybenzaldehyde	20.0-300.0	$(F_0-F)/F_0 = 2270.0 \times C3(\mu\text{M}) + 0.263$	0.921	5.0
4. <i>o</i> -nitrobenzaldehyde	100.0-600.0	$(F_0-F)/F_0 = 1099.0 \times C4(\mu\text{M}) + 0.135$	0.941	10.0
5. <i>m</i> -nitrobenzaldehyde	50.0-500.0	$(F_0-F)/F_0 = 1140.0 \times C5(\mu\text{M}) + 0.120$	0.958	9.9
6. <i>p</i> -nitrobenzaldehyde	20.0-300.0	$(F_0-F)/F_0 = 2383.0 \times C6(\mu\text{M}) - 0.020$	0.988	4.8

Table S3 Detection limit of CDs-3 for HNBI

CDs-3	Linear Range(μM)	Linear Equation	R-Square	Detection Limit (μM)
1. o-hydroxybenzaldehyde	100.0-600.0	$(F_0-F)/F_0 = 978.0 \times C_1(\mu\text{M}) + 0.120$	0.960	9.3
2. m-hydroxybenzaldehyde	100.0-600.0	$(F_0-F)/F_0 = 935.0 \times C_2(\mu\text{M}) + 0.273$	0.976	9.7
3. p-hydroxybenzaldehyde	10.0-100.0	$(F_0-I)/F_0 = 930.0 \times C_3(\mu\text{M}) + 0.088$	0.930	9.8
4. o-nitrobenzaldehyde	50.0-300.0	$(F_0-F)/F_0 = 1920.0 \times C_4(\mu\text{M}) + 0.058$	0.996	4.7
5. m-nitrobenzaldehyde	50.0-300.0	$(F_0-F)/F_0 = 1502.0 \times C_5(\mu\text{M}) + 0.015$	0.998	6.1
6. p-nitrobenzaldehyde	10.0-200.0	$(F_0-F)/F_0 = 3289.0 \times C_6(\mu\text{M}) + 0.228$	0.939	2.8

2. Sensor array construction

2.1 Stability of the sensing system



■ - OHB
 ● - MHB
 ▲ - PHB
 ▼ - ONB
 ◆ - MNB
 ◀ - ONB

2.2 TEM images of CDs

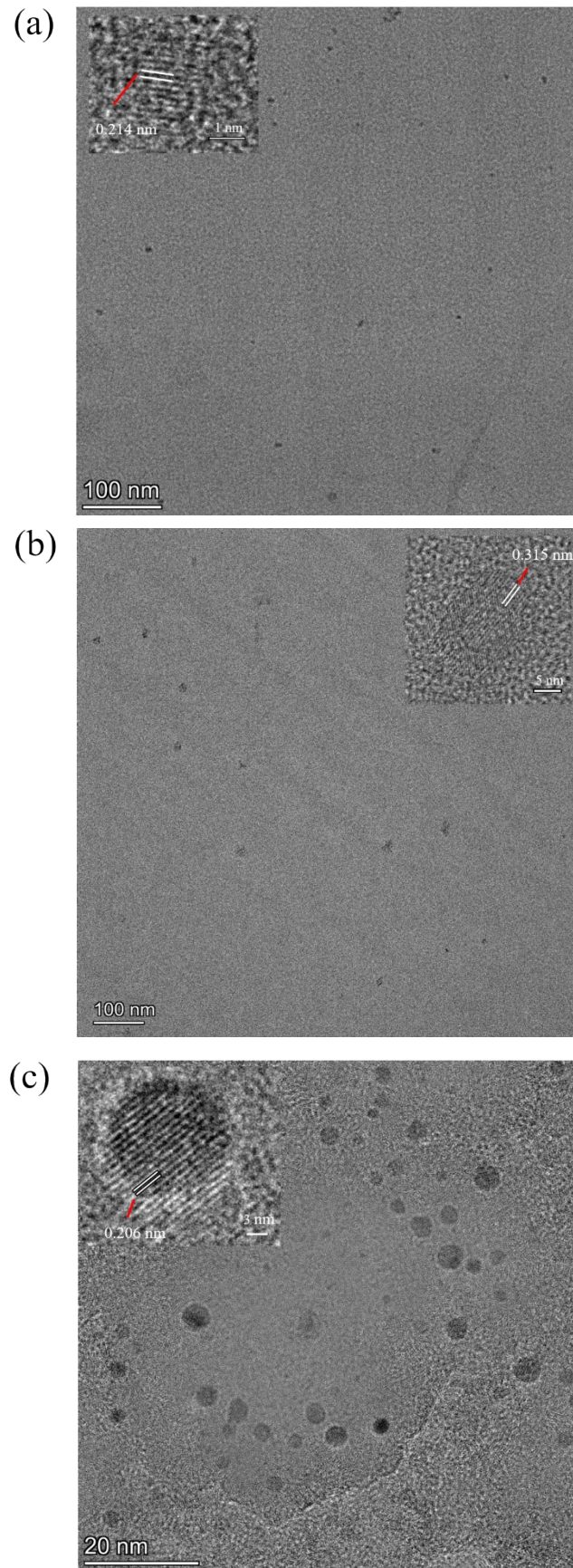


Figure S2 TEM images of (a) CDs-1, (b) CDs-2 and (c) CDs-3

2.3 FT-IR spectra of CDs-1, CDs-2 and CDs-3

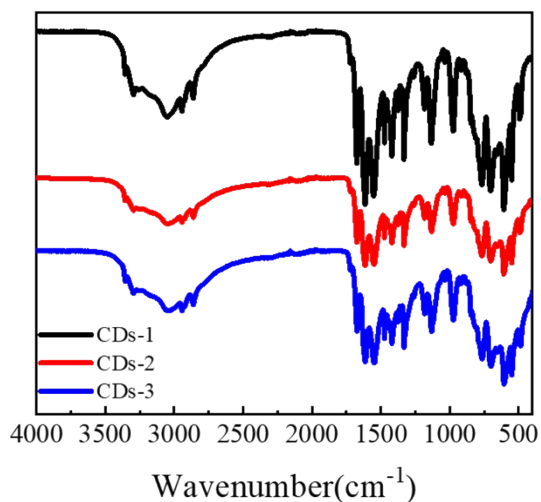


Figure S3 The FT-IR spectra of CDs-1, CDs-2 and CDs-3

2.4 UV-vis spectra of CDs-1, CDs-2, CDs-3

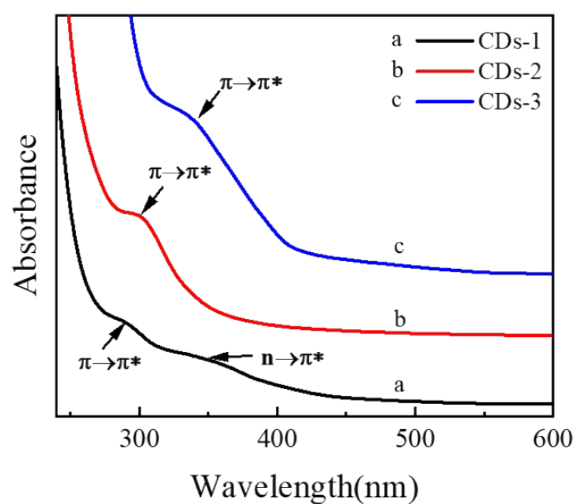


Figure S4 UV-vis spectra of CDs

2.5 The fluorescence spectra of CDs-1, CDs-2 and CDs-3

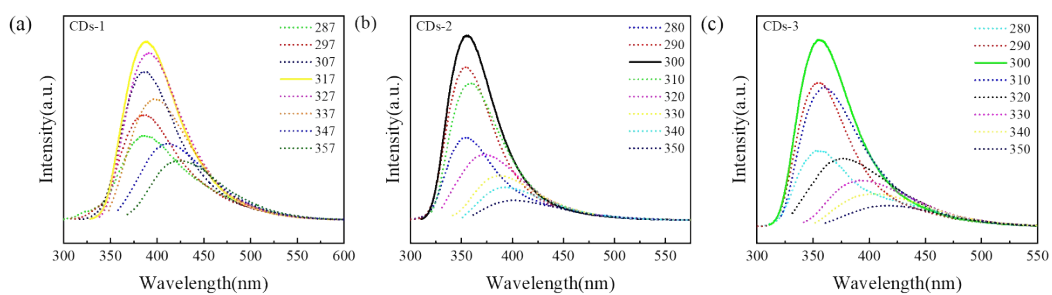


Figure S5 The fluorescence spectra of CDs-1, CDs-2 and CDs-3 under different excitation wavelengths

2.6 UV-vis spectra of CDs-1 with ONB

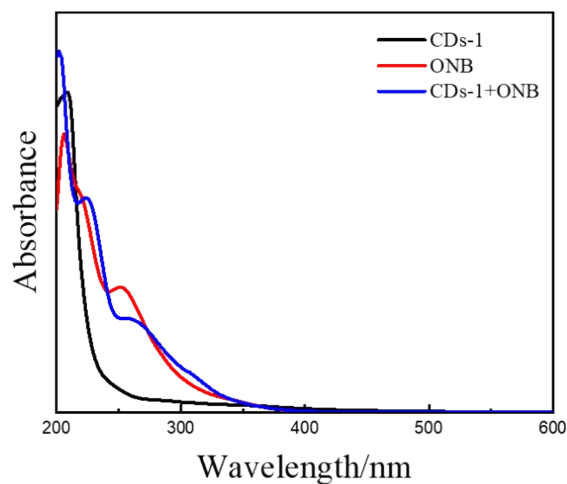


Figure S6 UV-vis spectra of CDs-1 with ONB

2.7 Fluorescence lifetime results

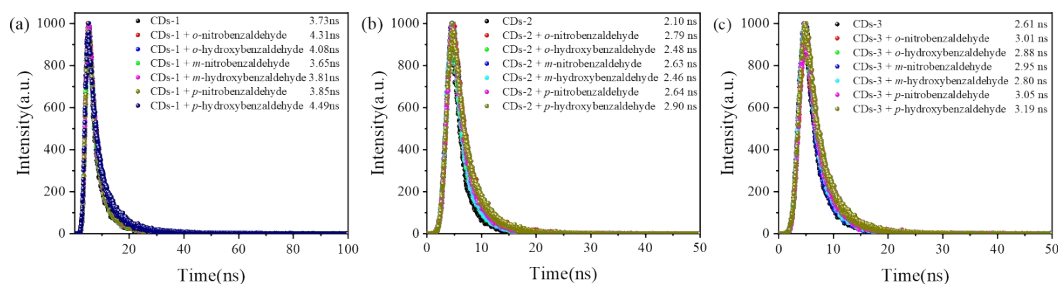


Figure S7 The fluorescence lifetime of CDs before and after adding six kinds of hydroxybenzaldehyde and nitrobenzaldehyde isomers respectively

2.8 Scatter plot of benzaldehyde derivative isomers at different concentrations

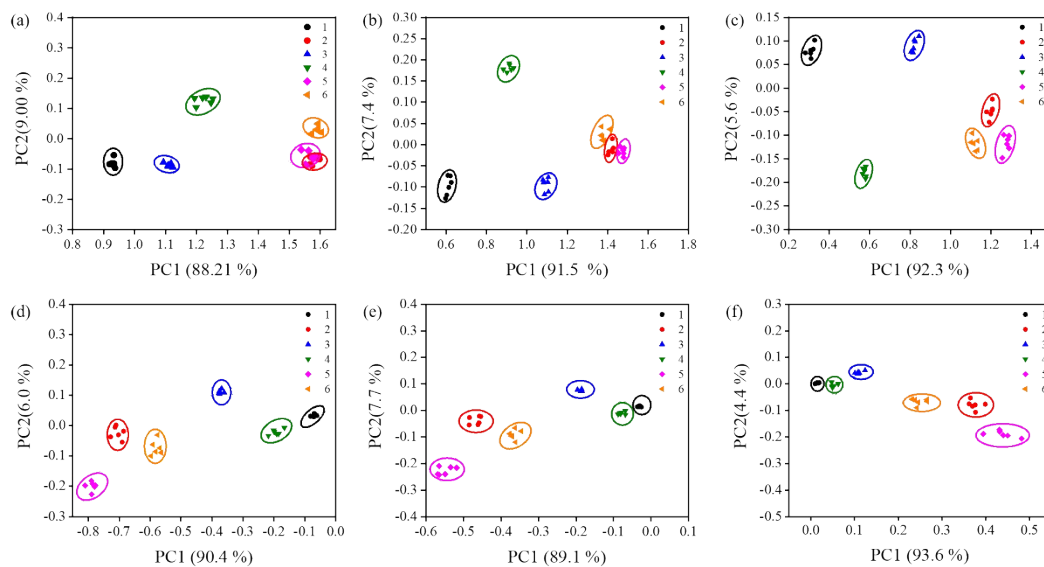


Figure S8 Scatter plot of hydroxybenzaldehyde and nitrobenzaldehyde isomers generated by PCA. (a) 0.05 mM; (b) 0.1 mM; (c) 0.2 mM; (d) 0.5 mM; (e) 0.8 mM; (f) 1 mM (1: PNB; 2: MNB; 3: ONB; 4: PHB; 5: MHB 6: OHB)