Novel carbon quantum dot fluorescence nanosensor for selective detection of flumioxazin in real samples

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Fig S1 FTIR spectra of CQD, CQD-N$_3$

Fig S2 (a) Change in Zeta-potential of CQD and CQD-N$_3$ with pH, (b) Particle size distribution graph of CQD-N$_3$. 
Fig S3 FTIR spectra of (a) CQD, (b) CQD-N$_3^-$, (c) CQD-N$_3^-$+Cu+AA+Flumioxazin

Fig. S4 (a) Quenching effect of Cu$^{2+}$ on CQD-N$_3^-$, (b) Regain of quenching in presence of AA

Fig. S5 Change in intensity of the probe w.r.t. pH
Compound 1:

**Fig.S6** (a) $^1$H NMR spectra of compound 1, (b) $^{13}$C NMR spectra compound 1

$^1$H NMR (400 MHz, CDCl$_3$) δ 3.57 (d, $J = 4$ Hz, 4H), 3.17 – 3.11 (m, 2H), 2.40 (d, $J = 4$ Hz, 4H), 2.18 (d, $J = 4$ Hz, 1H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 78.3, 73.5, 66.6, 52.0, 46.9. IR (ATR): ν = 3278, 2862, 1673, 1456, 1297, 1109 cm$^{-1}$. 

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Fig.S6 (c) PL turn on of CQD-N$_3$ with different conc. Of compound 1, (d) Linear response of compound 1 in HEPES buffer.

Compound 2:
Fig. S7. (a) \(^1\)H NMR spectra of compound 2, (b) \(^{13}\)C NMR spectra compound 2.

\(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 8.01 - 7.95 (m, 2H), 6.90 – 6.84 (m, 2H), 5.90 (s, 1H), 4.89 (d, 2H, \(J = 2.4\) Hz), 2.50 (t, 1H); \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta\) 166.03, 160.63, 132.22, 121.45, 115.38, 77.76, 74.99, 52.37. IR (ATR): \(\nu = 3337, 3268, 2119, 1693, 1604, 1446, 1099\) cm\(^{-1}\).

Fig. S7 (c) PL response of CQD-N\(_3\) with different conc. of compound 2, (d) Linear response of compound 2 in HEPES buffer.

Compound 3
**Fig.S8** (a) $^1$H NMR spectra of compound 3, (b) $^{13}$C NMR spectra compound 3.

$^1$H NMR (400 MHz, CDCl$_3$) δ 7.86 - 7.80 (m, 2H), 7.64 - 7.56 (m, 1H), 7.55 - 7.47 (m, 2H), 4.17 (d, 4H, $J = 4$ Hz), 2.15 (t, 2H); $^{13}$C NMR (100 MHz, CDCl$_3$) δ 137.9, 133.2, 129.1, 127.8, 75.9, 74.2, 36.2. IR (ATR): ν = 3268, 2119, 1446, 1337, 1159, 1089 cm$^{-1}$.

**Fig.S8** (c) PL turn on of CQD-N$_3$ with different conc. Of compound 3, (d) Linear response of compound 3 in ethanol solvent.
Compound 4

Fig. S9 (a) $^1$H NMR spectra of compound 4, (b) $^{13}$C NMR spectra compound 4.
$^1$H NMR(400 MHz, CDCl$_3$) $\delta$ 7.93-7.85 (m, 2H), 7.80 -7.73 (m, 2H), 4.47 (s, 2H), 2.25 - 2.24 (t, 1H); $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 167.0, 134.2, 131.9, 123.6, 71.5, 27.0. IR (ATR): $\nu$ = 3298, 2981, 1703, 1406, 1128, 940 cm$^{-1}$.

Fig. S9 (c) PL turn on of CQD-N$_3$ with different conc. Of compound 4, (d) Linear response of compound 4 in ethanol solvent.

Fig. S10 PL turn on of CQD-N3 in cucumber with different conc. of FXN
Fig. S11 PL turn on of CQD-N3 in strawberry with different conc. of FXN

Fig. S12 PL turn on of CQD-N3 in apple with different conc. of FXN