Electronic Supplementary Material (ESI) for Analytical Methods.

Supporting Information

A dual-mode green emissive fluorescent probes for real-time detection of doxycycline in milk by smartphone sensing platform

Ruiqing Sun[a], Ping Liu[a], Yingjia Dong[a], Qingli Yang[*, a], Yongchao Ma[*, b]

[a] College of Food Science and Engineering, Qingdao Agricultural University, Qingdao, 266109, People's Republic of China

[b] College of Chemistry and Pharmaceutical Sciences, Qingdao Agricultural University, Qingdao, 266109, People's Republic of China

***Corresponding author:**

E-mail address: rice407@163.com (Q. Yang); yongchaoma@126.com (Y. Ma)

Calculation of limit of detection (LOD): The LOD was estimated based on the following equation:

$$LOD = 3S_B/K \qquad \text{Eq. (A)}$$

where K is the slop of the calibration curve between the F_0/F and DOX concentration, and S_B represents the standard deviation of a blank which is F_0/F in absent of DOX (n = 3).

The quenching efficiencies from IFE: The IFE was corrected according to following equation:

$$CF = \frac{F_{cor}}{F_{obsd}} = \frac{2.3dA_{ex}}{1 - 10^{-dA_{ex}}} 10^{gA_{em}} \frac{2.3sA_{em}}{1 - 10^{-sA_{em}}} \qquad \text{Eq. (B)}$$

where F_{obsd} and F_{cor} represent the observed FL intensity of NCNSs at 475 nm and the corrected FL intensity by removing IFE from F_{obsd} and CF is the corrected factor. A_{ex} and A_{em} are the absorbance at an excitation wavelength of 360 nm and emission wavelength of 475 nm, respectively. d represents the cuvette width (1.0 cm); g is the distance from the edge of the excitation beam to the edge of the cuvette (0.4 cm); and the thickness of excitation beam (s) is 0.1 cm. CF is the corrected factor and CF cannot exceed 3 to make sure that the correction is convincing. The relevant parameters and results are listed in Table S2.

The observed and corrected quenching efficiencies (E_{obsd} and E_{cor}) were evaluated by following formula:

$$E = (1 - F/F_0) \times 100\% \qquad \text{Eq. (C)}$$

where F_0 and F are the FL intensities of NCNSs in the absence and presence of DOX, respectively. E_{obsd} and E_{cor} represents the observed quenching efficiency and the corrected quenching efficiency, respectively.

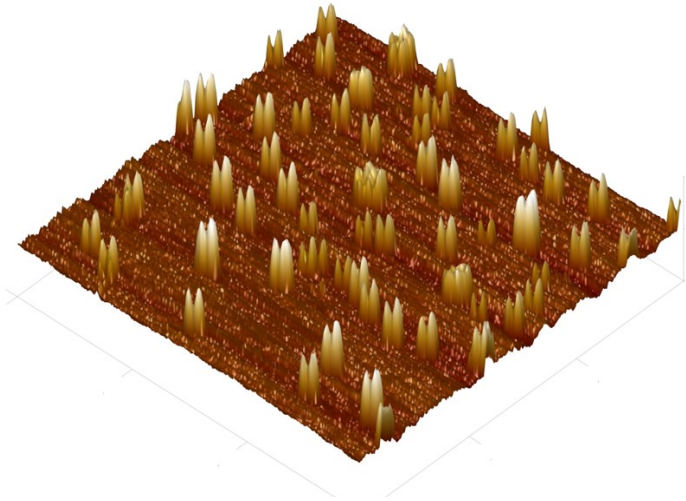

Fig. S1. *3D AFM images of NCNSs.*

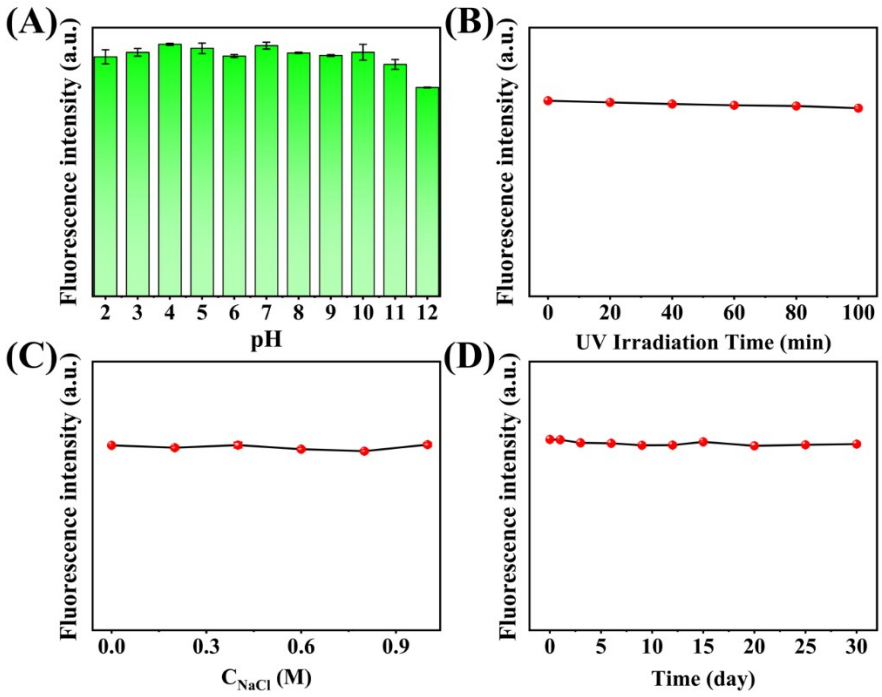

Fig. S2. Fluorescence stability of NCNSs at different (A) solution pH; (B) UV irradiation time; (C) concentration of NaCl and (D) storage time stress.

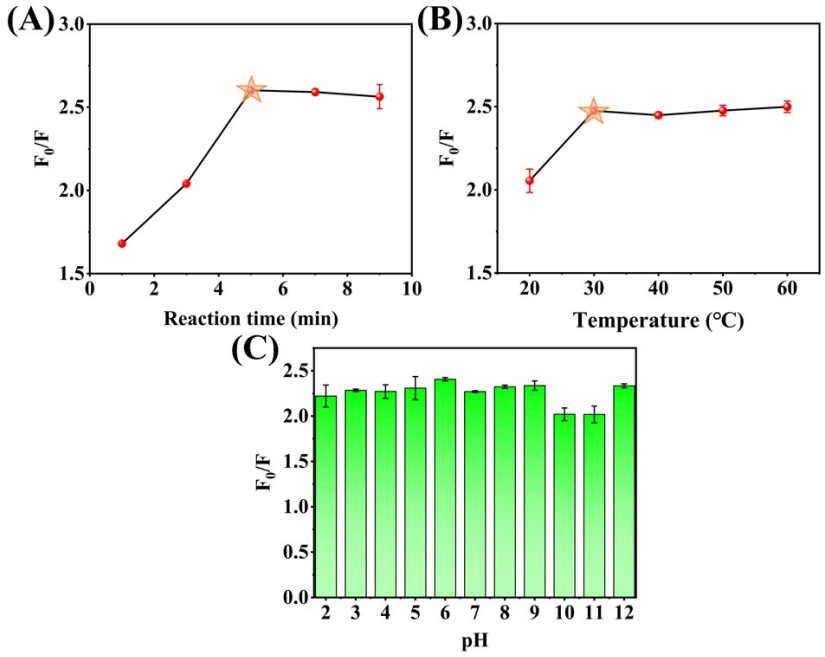

Fig. S3. The effect of (A) reaction time; (B) temperature and (C) solution pH on the F_0/F in the presence of DOX.

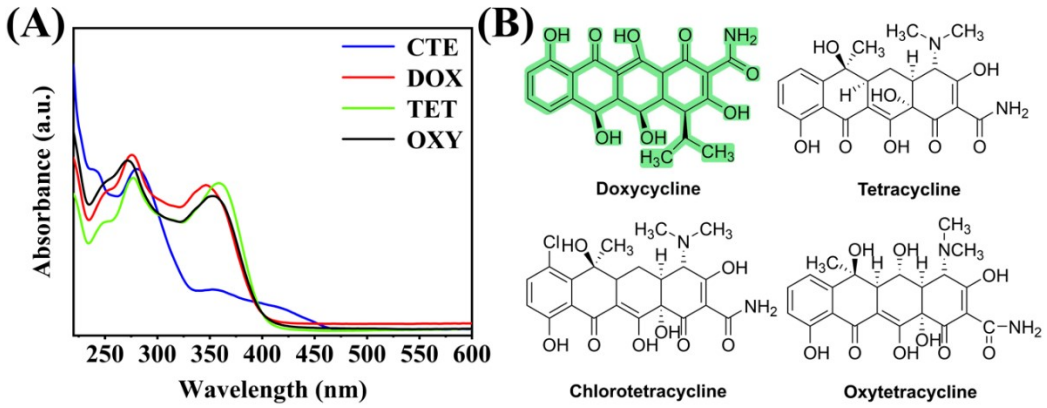

Fig. S4. (A) UV-vis absorption spectra and (B) the corresponding chemical structures as indicated.

Table S1. Comparison of the reported fluorescence probes with NCNSs for DOX detection.

Materials used	Method applied	Linear range (μmol L^{-1})	LOD (μmol L^{-1})	Reference
W_xO_y QDs	Fluorescence	0-50	0.019	[1]
N-CQDs	Fluorescence	3.32-32.26	0.2367	[2]
CDs@HZIF-8	Ratiometric	0.5-55	0.03058	[3]
MOFs (BUT-178、BUT-179)	Fluorescence	0.5-60	0.309 / 0.048	[4]
OSiNDs	Ratiometric	1-35	0.08	[5]
BNQDs	Ratiometric	2.5-50	0.028	[6]
Semiconductor@MOFs nanoporous	Fluorescence	0-45	0.026	[7]
AuNCs-Apt	Colorimetry	1-16	0.0460	[8]
AuNPs-Apt	Colorimetry	0.05-3	0.0329	[9]
PEI[a]/TetX2[b]/NPGCE[c]	Electrochemical	0.5-5	0.018	[10]
NCNSs	Fluorescence	0-150	0.0127	This work

Table S2. IFE correction of NCNSs in the present of DOX with different concentrations.

DOX (μmol L^{-1})	A_{ex}	A_{em}	CF	$F_{observed}$	$F_{corrected}$	$E_{observed}$	$E_{corrected}$
0	0.326	0.065	1.517	45666068	69297104	0	0
5	0.360	0.067	1.573	41668401	65556126	0.088	0.054
10	0.395	0.067	1.629	38987864	63493912	0.146	0.084
15	0.423	0.066	1.672	38060133	63629350	0.167	0.082
20	0.466	0.067	1.744	36351107	63394236	0.204	0.085
30	0.527	0.067	1.846	34074752	64210780	0.254	0.092
40	0.585	0.067	1.947	31311184	60956311	0.314	0.120
60	0.715	0.068	2.183	27636634	60342045	0.395	0.129
80	0.847	0.068	2.434	24656820	60018706	0.460	0.134
100	0.981	0.068	2.700	22331248	57602544	0.533	0.169

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