

Supplementary Information

Nitrogen and sulfur-doped carbon quantum dots as fluorescent nanoprobe for spectrofluorimetric determination of olanzapine and diazepam in biological fluids and dosage forms: Application to content uniformity testing

Galal Magdy^{1*}, Noura Said¹, Ramadan A. El-Domany², Fathalla Belal³

¹
Pharmaceutical Analytical Chemistry Department, Faculty of Pharmacy, Kafrelsheikh University, Kafrelsheikh, P.O. Box 33511, Egypt.

²
Microbiology and Immunology Department, Faculty of Pharmacy, Kafrelsheikh University, Kafrelsheikh, P.O. Box 33511, Egypt.

³
Pharmaceutical Analytical Chemistry Department, Faculty of Pharmacy, Mansoura University, Mansoura, P.O. Box 35516, Egypt.

***Corresponding author:** Galal Magdy

E-mail address: galal_magdy@pharm.kfs.edu.eg

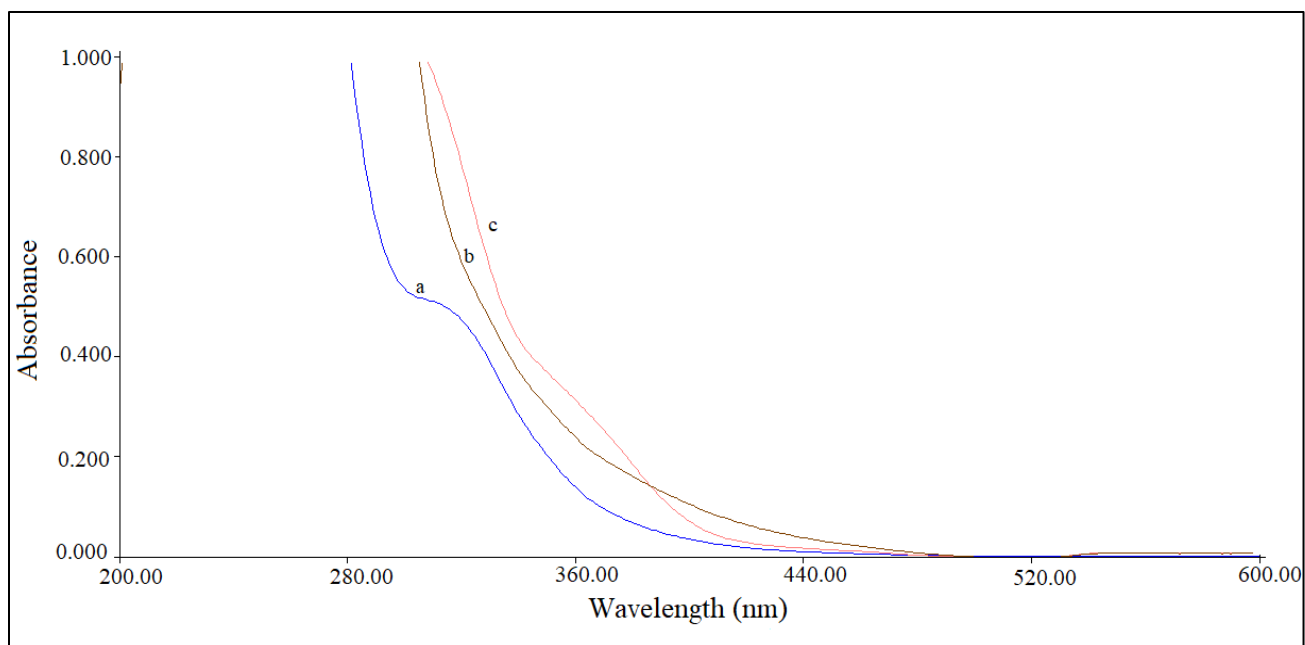


Figure S1 UV-Vis absorption spectra of (a) NS@CQDs, (b) a mixture of NS@CQDs with 100.0 μM OLZ, (c) a mixture of NS@CQDs with 100.0 μM DZP.

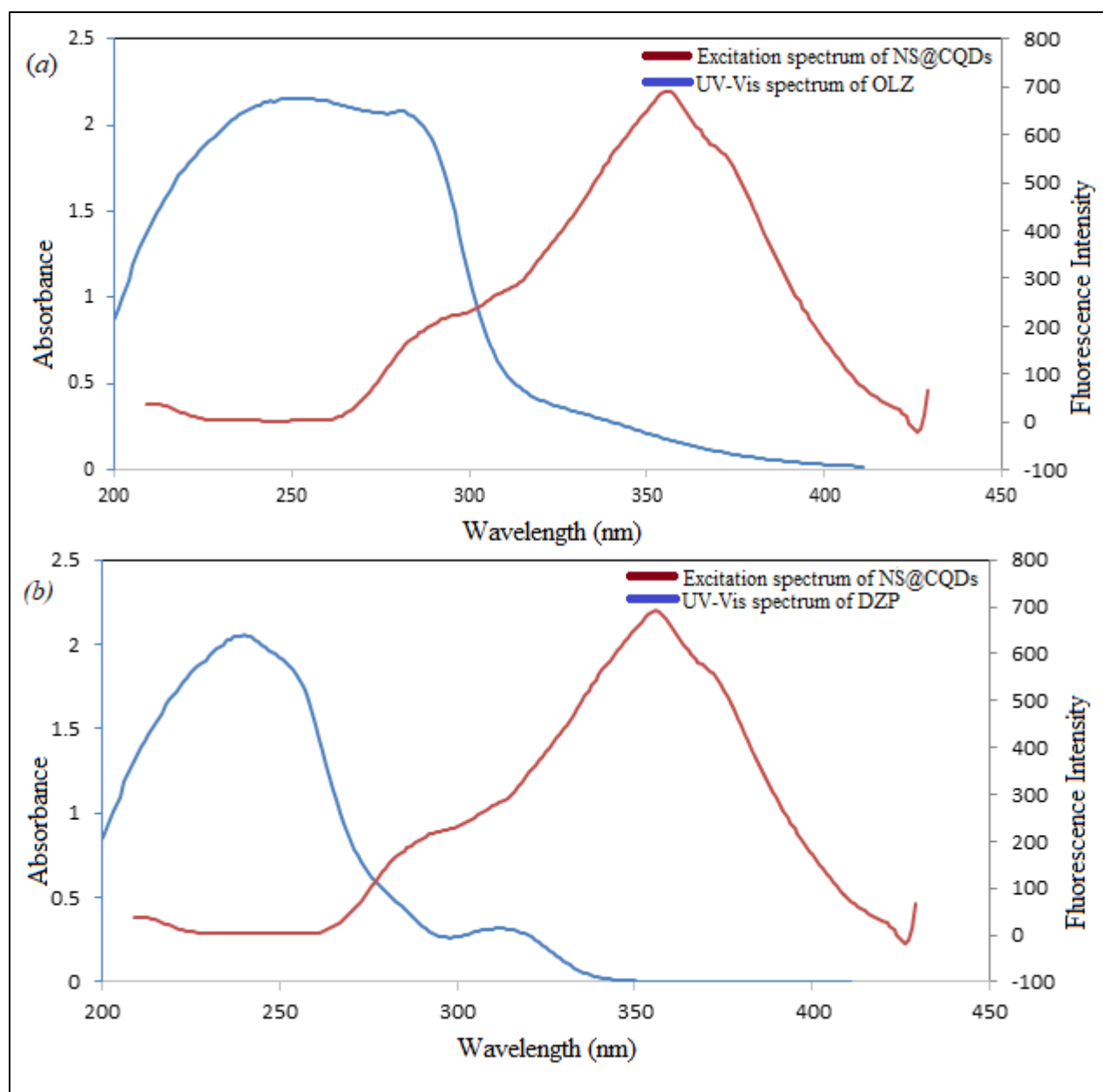


Figure S2 A Co-plot of the excitation spectrum of the NS@CQDs and (a) the absorption spectrum of OLZ (200.0 μM), (b) the absorption spectrum of DZP (100.0 μM).

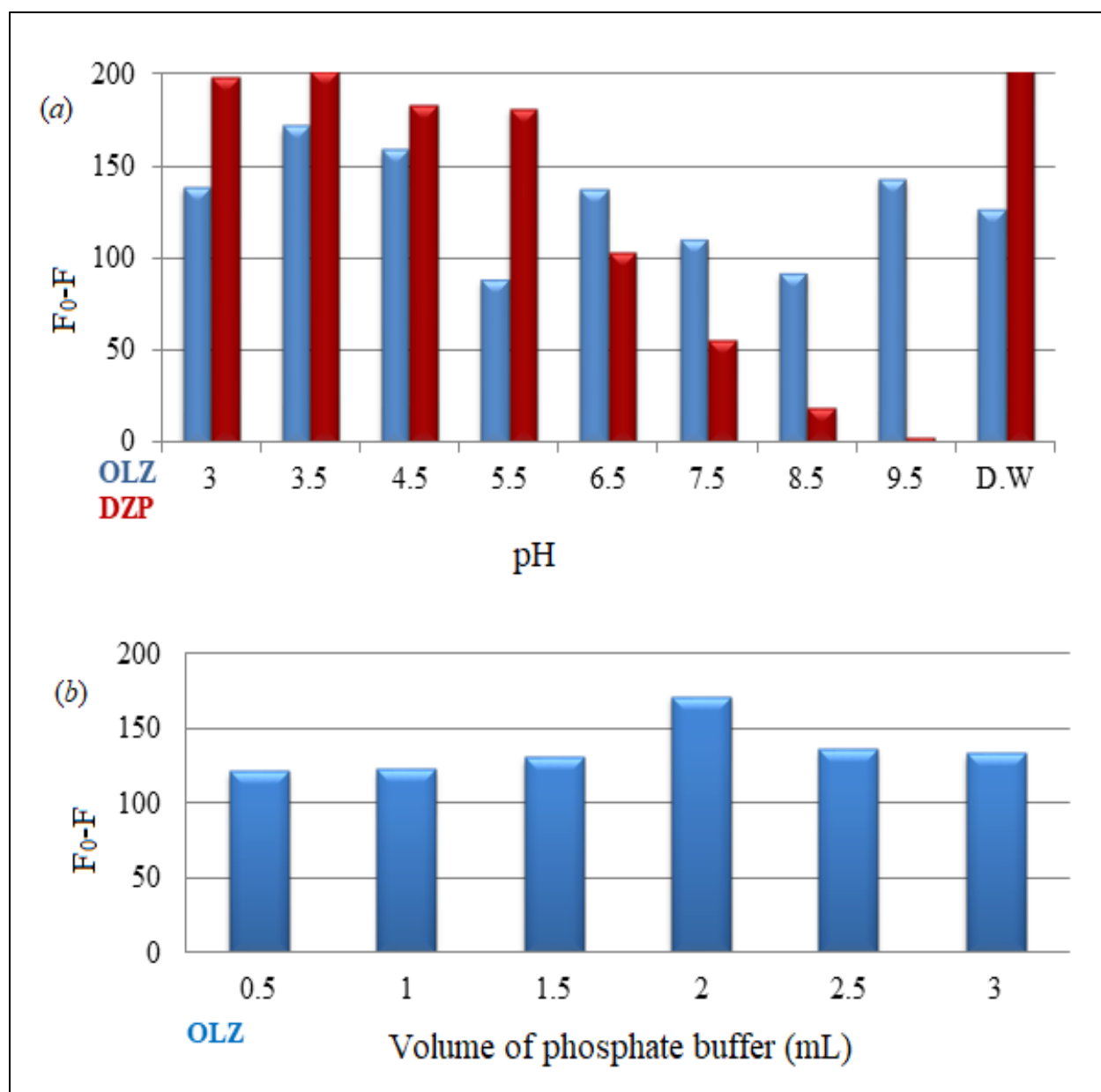


Figure S3 (a) Effect of pH on fluorescence quenching of NS@CQDs by OLZ (100.0 μM) and DZP (100.0 μM), (b) Effect of volume of phosphate buffer (pH 3.5) on fluorescence quenching of NS@CQDs by OLZ (100.0 μM).

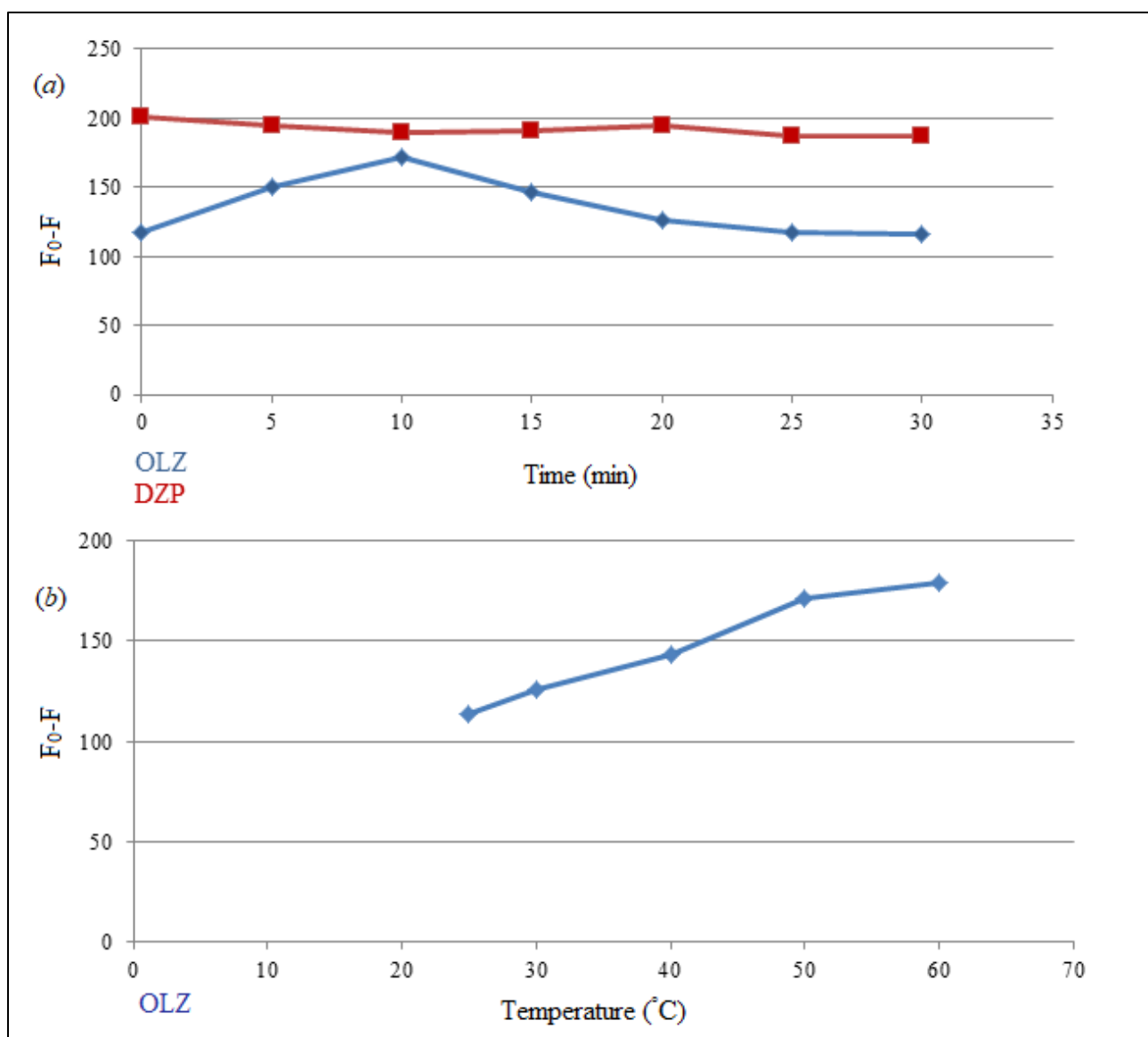


Figure S4 (a) Effect of incubation time on fluorescence quenching of NS@CQDs by OLZ (100.0 μM) and DZP (100.0 μM), (b) Effect of temperature on fluorescence quenching of NS@CQDs by OLZ (100.0 μM).

Table S1: Intra-day and inter-day precision data for the determination of the cited drugs by the proposed method.

Analyte	Conc. taken (μM)	Intra-day ^a			Inter-day ^b		
		Conc. found (μM) $\pm$ SD	% RSD	% error ^c	Conc. found (μM) $\pm$ SD	% RSD	% error ^c
OLZ	25.0	24.87 $\pm$ 0.76	0.76	0.44	24.92 $\pm$ 0.44	0.44	0.26
	85.0	84.91 $\pm$ 0.56	0.56	0.32	85.01 $\pm$ 0.94	0.94	0.54
	185.0	185.34 $\pm$ 0.89	0.89	0.51	185.12 $\pm$ 0.64	0.64	0.37
DZP	25.0	24.97 $\pm$ 0.75	0.75	0.43	25.09 $\pm$ 1.12	1.12	0.64
	50.0	50.23 $\pm$ 0.45	0.45	0.26	50.03 $\pm$ 0.55	0.55	0.32
	75.0	75.39 $\pm$ 1.57	1.57	0.91	75.31 $\pm$ 0.81	0.81	0.47

Each result is the average of three separate determinations.

^a Within day.

^b Three successive days.

^c % error = % RSD/ $\sqrt{n}$.

Table S2: Robustness evaluation of the proposed method.

Factor	OLZ	
1- NS@CQDs volume (100.0 μL $\pm$ 5)	% Recovery	%RSD
95.0 μL	100.36	0.94
100.0 μL	100.72	0.88
105.0 μL	100.52	0.99
2- Incubation time (10 min $\pm$ 2 min)	% Recovery	%RSD
8 min	100.60	0.97
10min	100.72	0.88
12min	100.40	0.98
3- Phosphate buffer pH (3.5 $\pm$ 0.2)	% Recovery	%RSD
3.3	100.05	1.02
3.5	100.72	0.88
3.7	100.38	1.02
4- Volume of phosphate buffer (2.0 mL $\pm$ 0.2 mL)	% Recovery	%RSD
1.8 mL	100.53	1.02
2.0 mL	100.72	0.88
2.2 mL	100.39	1.09
5- Temperature (50°C $\pm$ 2°C)	% Recovery	%RSD
48°C	100.55	1.03
50°C	100.72	0.88
52°C	100.43	1.09
Factor	DZP	
1- NS@CQDs volume (100.0 μL $\pm$ 5)	% Recovery	%RSD

95.0 µL	100.10	0.97
100.0 µL	99.66	0.93
105.0 µL	100.17	1.08
2- Incubation time (1min ± 0.5 min)	% Recovery	%RSD
0.5 min	100.25	1.09
1 min	99.66	0.93
1.5 min	100.28	1.04