Supplementary Material for

Preparation of Multifunctional N-doped Carbon Quantum Dots from *Citrus clementina* Peel: Investigating Targeted Pharmacological Activities and the Potential Application for Fe^{3+} Sensing

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Content of listed material

Figure S1. UV-HPLC chromatograms of Pure CQD retentate before dialysis (a), after (b) 24 hours and (c) 48 hours.

Figure S2. EDS mapping of nitrogen for a) CQD@Gly and b) CQD@Arg

Figure S3. XRD patterns of a) Pure CQD and b) CQD@Gly

Figure S4. Integrated fluorescence intensity vs. absorbance of CQDs samples (recorded at λ_{EX}=360 nm); calculated quantum yield (QY) of synthesized samples of CQDs using quinine sulfate as reference standard (φ_{QS} = 54 %)

Figure S5. Optical characterization of Pure CQD: a) Fluorescence emission spectra of Pure CQD at different excitation wavelengths ranging from 320 nm to 440 nm (increments of 20 nm); b) normalized fluorescence emission spectra, c) stability of Pure CQD in the high ionic medium of NaCl (0-1.0 mol dm^{-3}; λ_{EX} = 360 nm. λ_{EM} = 445 nm); d) effect of pH on fluorescence intensity (λ_{EX} = 360 nm, λ_{EM} = 445 nm)

Figure S6. Optical characterization of CQD@Gly: a) Fluorescence emission spectra of CQD@Gly at different excitation wavelengths ranging from 320 nm to 440 nm (increments of 20 nm); b) normalized fluorescence emission spectra, c) stability of CQD@Gly in the high ionic medium of NaCl (0-1.0 mol dm^{-3}; λ_{EX} = 360 nm, λ_{EM} = 430 nm); d) effect of pH on fluorescence intensity (λ_{EX} = 360 nm, λ_{EM} = 430 nm)

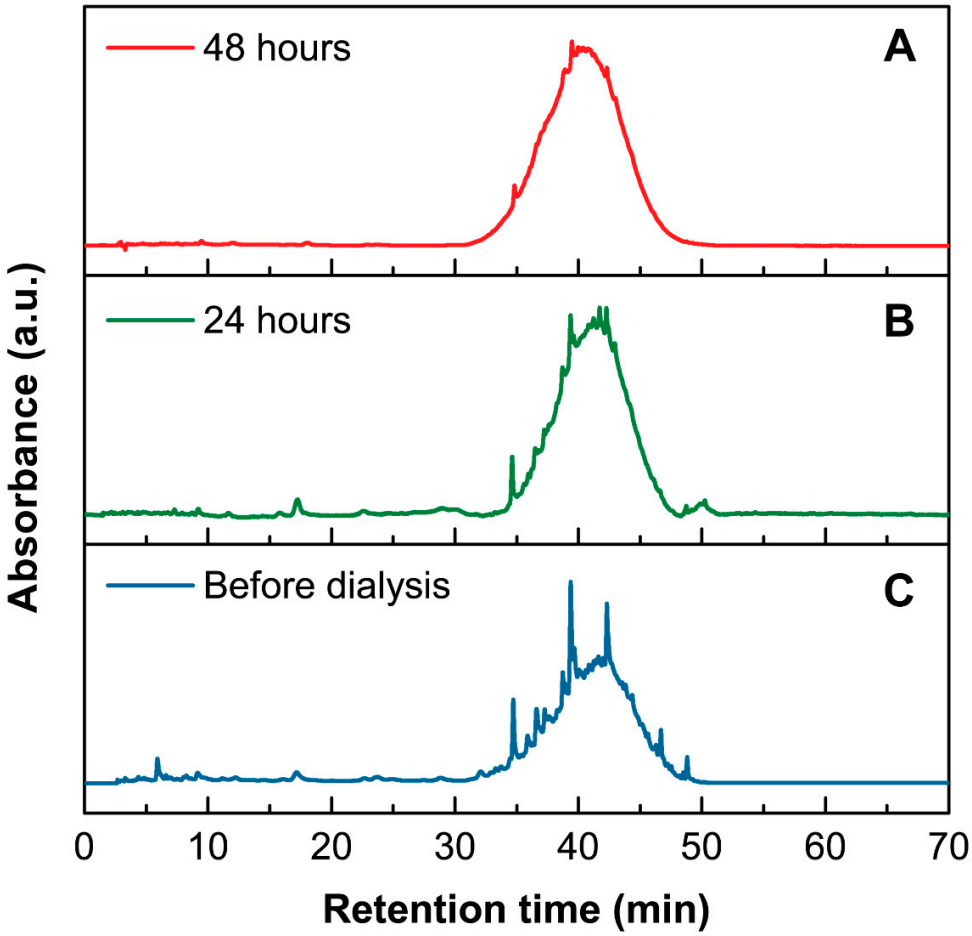

48 hours
A
24 hours
B
Before dialysis
C
Absorbance (a.u.)
0
10
20
30
40
50
60
70
Retention time (min)

Figure S1.

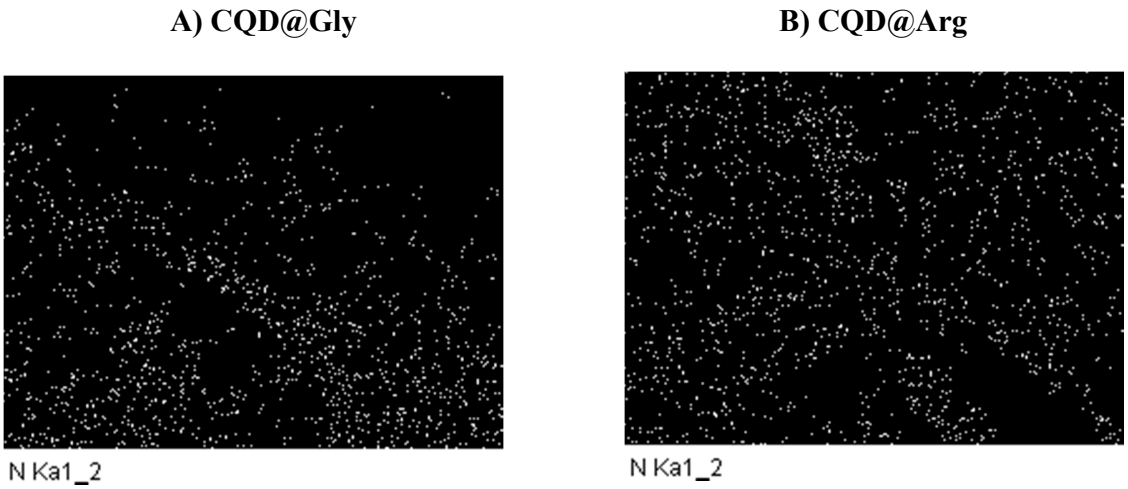


Figure S2.

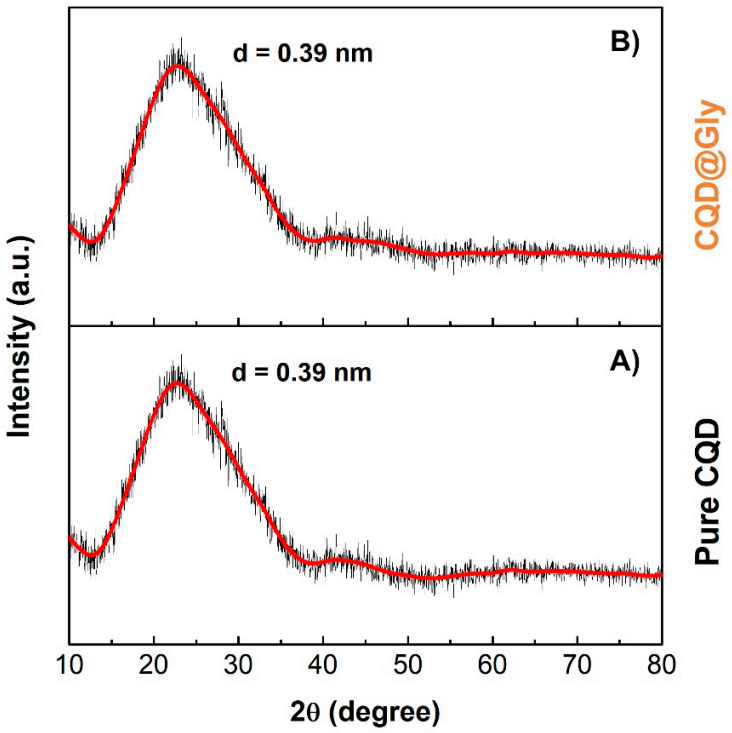


Figure S3.

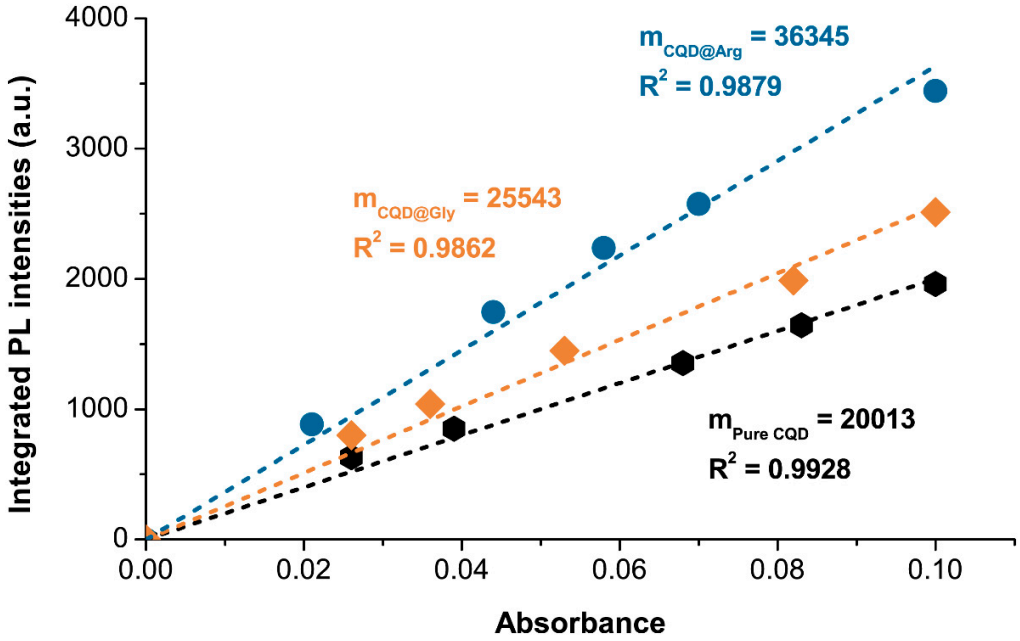

4000
3000
2000
1000
0
Integrated PL intensities (a.u.)
0.00
0.02
0.04
0.06
0.08
0.10
Absorbance
m CQD@Arg = 36345
R2 = 0.9879
m CQD@Gly = 25543
R2 = 0.9862
m Pure CQD = 20013
R2 = 0.9928

Figure S4.

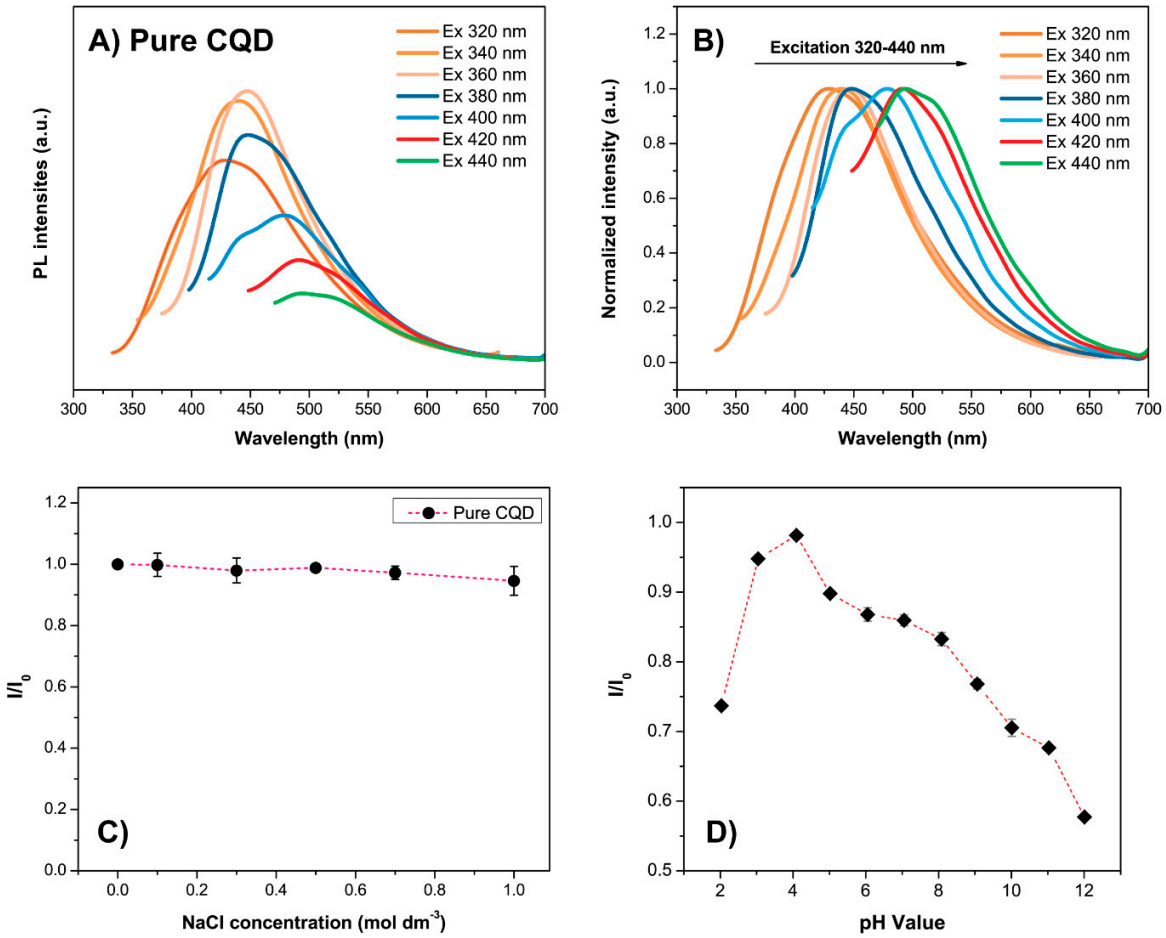

A) Pure CQD
Ex 320 nm
Ex 340 nm
Ex 360 nm
Ex 380 nm
Ex 400 nm
Ex 420 nm
Ex 440 nm
PL intensites (a.u.)
Wavelength (nm)
B)
Excitation 320-440 nm
Normalized intensity (a.u.)
C)
Pure CQD
I/I0
NaCl concentration (mol dm-3)
D)
pH Value

Figure S5.

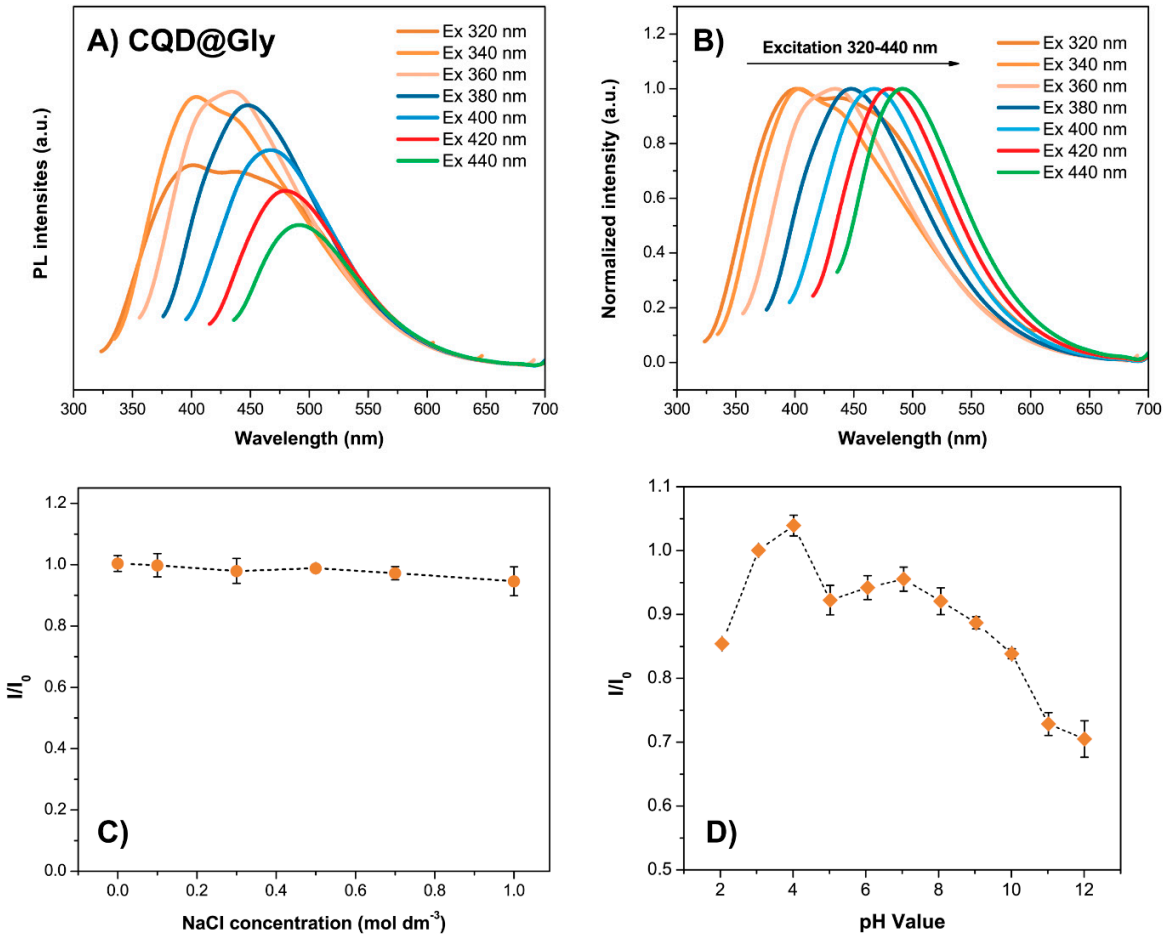

A) CQD@Gly
Ex 320 nm
Ex 340 nm
Ex 360 nm
Ex 380 nm
Ex 400 nm
Ex 420 nm
Ex 440 nm
PL intensites (a.u.)
Wavelength (nm)
B)
Excitation 320-440 nm
Normalized intensity (a.u.)
C)
I/I0
NaCl concentration (mol dm-3)
D)
pH Value

Figure S6.

Table content

Table S1. Photographs of prepared CQDs with calculated quantum yields under a) daylight and b) under UV light (365 nm). The photograph (c) shows text written using CQD@Arg under UV light (365 nm)

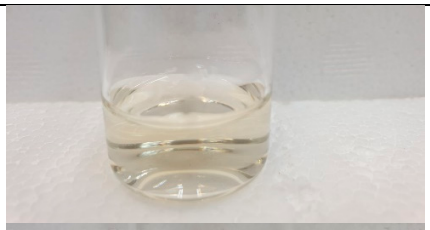
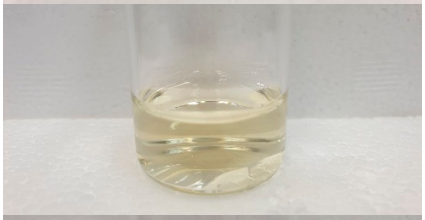
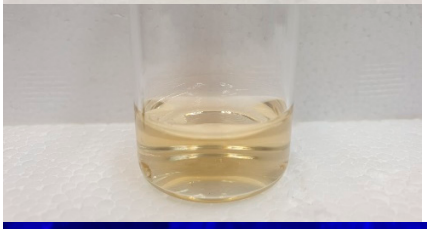
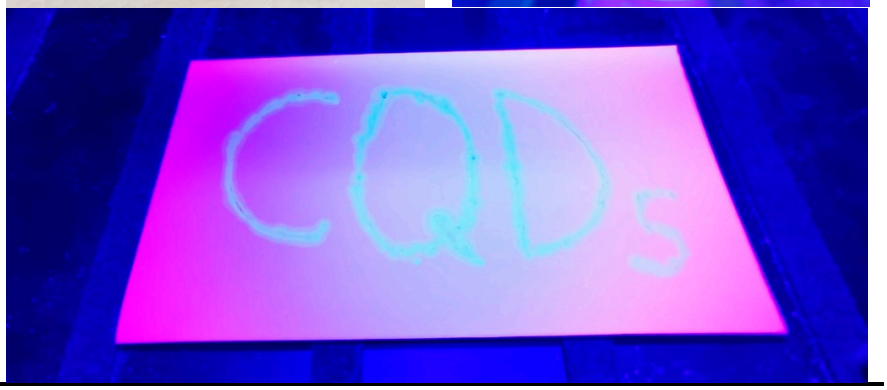
Sample	A	B
Pure CQD (QY: 1.17 %)		
CQD@Gly (QY: 1.53 %)		
CQD@Arg (QY: 2.17 %)		
Fluorescent Ink (C)		

Table S2. Elemental analysis of as-prepared CQDs

	Weight%			Atomic%		
Sample	**C (%)**	**O (%)**	**N (%)**	**C (%)**	**O (%)**	**N (%)**
Pure CQD	52.20	39.03	-	61.89	34.74	-
CQD@Gly	59.81	31.80	3.16	67.74	27.04	3.07
CQD@Arg	58.76	28.64	4.94	67.45	24.68	4.87