

Supporting Information

Surface Engineered Core-Shell Amphiphilic Carbon-dots: Solvatochromic Behavior and Applicability as Molecular Probe

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TEM images:

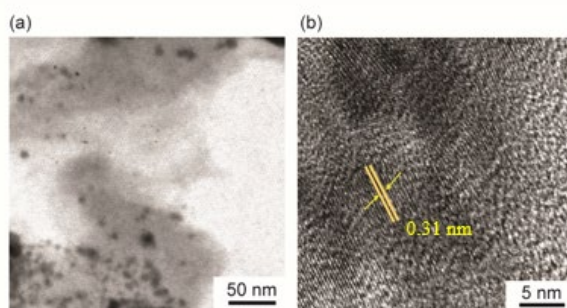


Figure S1. Transmission Electron Microscopy (TEM) image of *m*-phenylenediamine mediated C-Dots (a); high resolution TEM (b).

UV-Vis Spectroscopy:

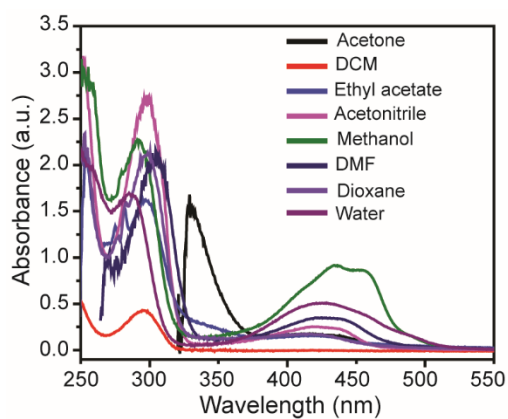


Figure S2. UV-Vis spectroscopy of *o*-phenylenediamine mediated C-Dots in a series of solvents.

NMR Spectra of AC-Dots:

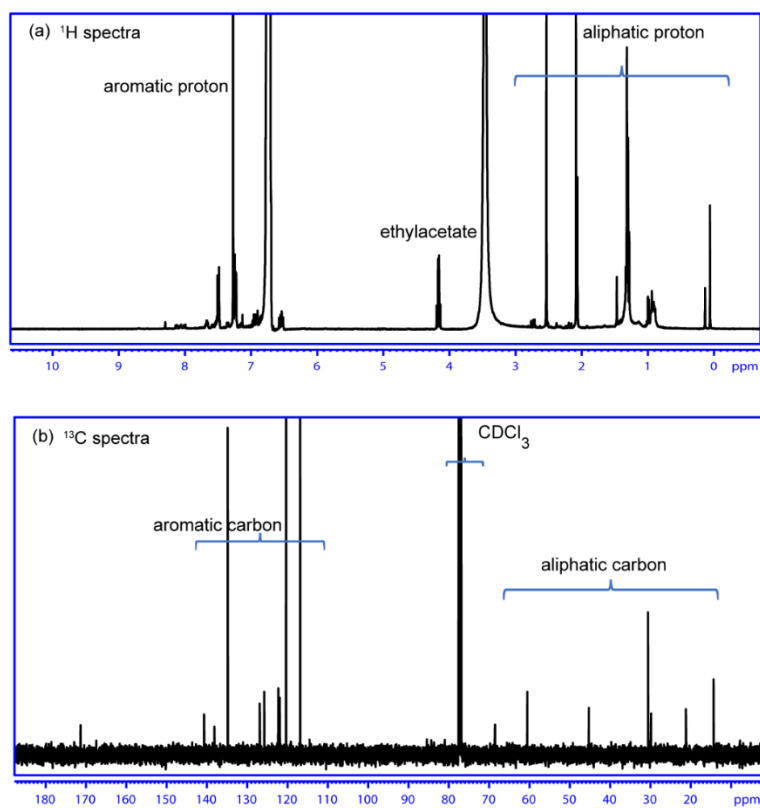


Figure S3. Nuclear Magnetic Resonance (NMR) spectra of AC-Dots, ^1H spectra (a) and ^{13}C spectra (b) in CDCl_3 solvent.

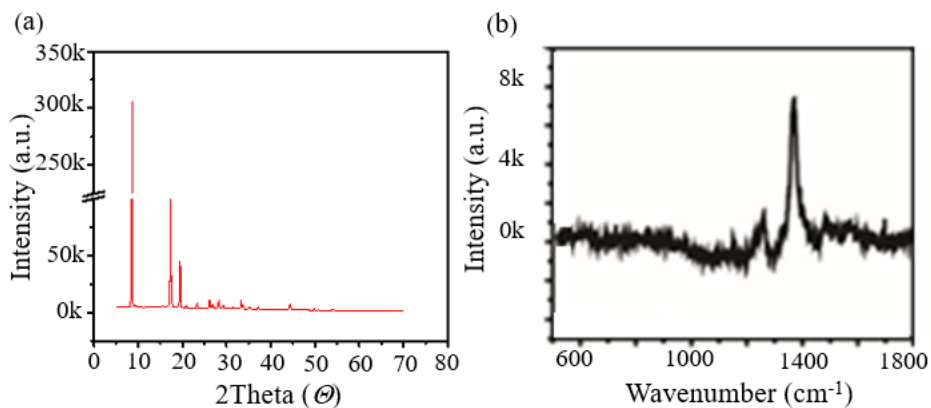


Figure S4. Powder X-ray diffraction (a) and Raman spectroscopy (b) of AC-Dots. (*o*-isomer).

Solvent dependent fluorescence study of *o*-phenylenediamine with citric acid mediated C-Dots (AC-Dots):

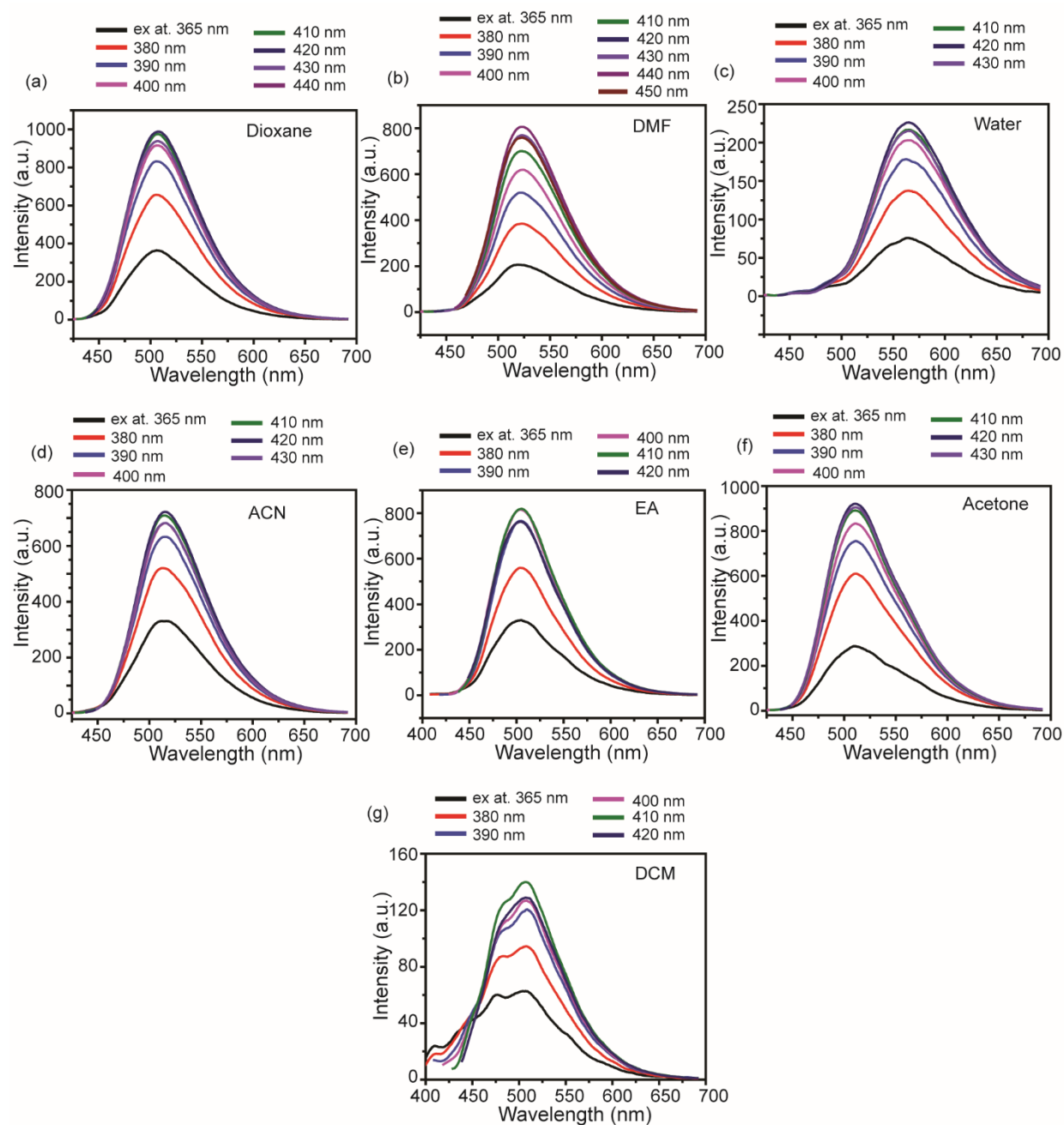


Figure S5. Solvatochromism study of *o*-phenylenediamine with citric acid mediated C-Dots (AC-Dots) in different solvents, Dioxane (a); DMF (b); water (c); acetonitrile (d); ethyl acetate (EA) (e); acetone (f) and DCM (g).

Fluorescence study of only Citric acid mediated C-Dots.

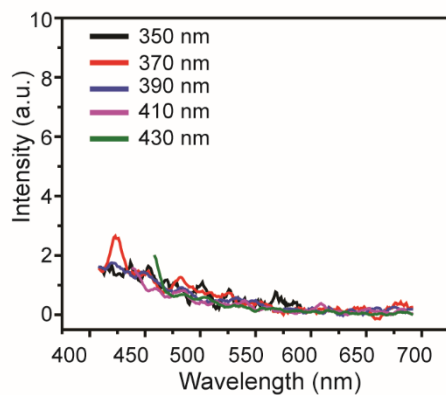


Figure S6. Fluorescence study of only citric acid C-Dots in 5mM PBs at pH 7.4.

pH and Salt study:

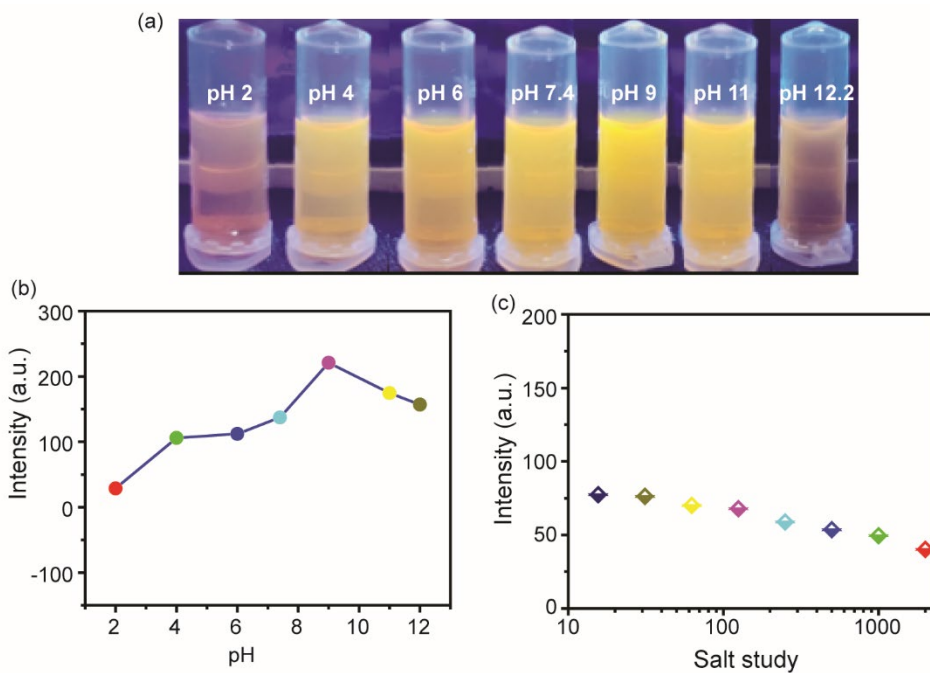


Figure S7. Stability image of AC-Dots (a) in presence different pH (b) and various salt concentration (c).

Protein titration plot.

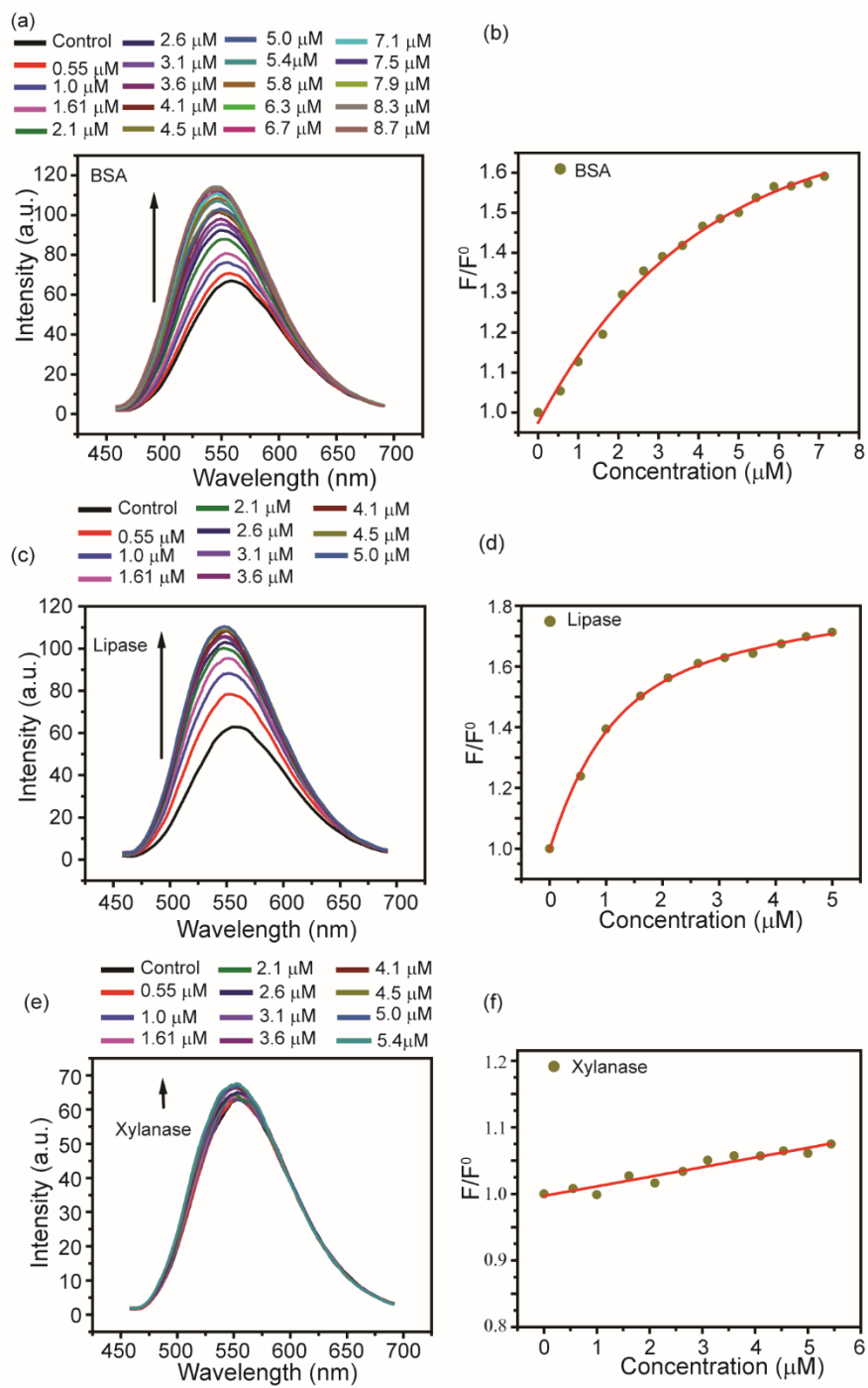


Figure S8. Protein titration plot of BSA, lipase and xylanase (a) and (c) with AC-Dots and curve fitting plot of (b) and (d) of respective protein in 5 mM PBs pH at 7.4.

Protein titration plot.

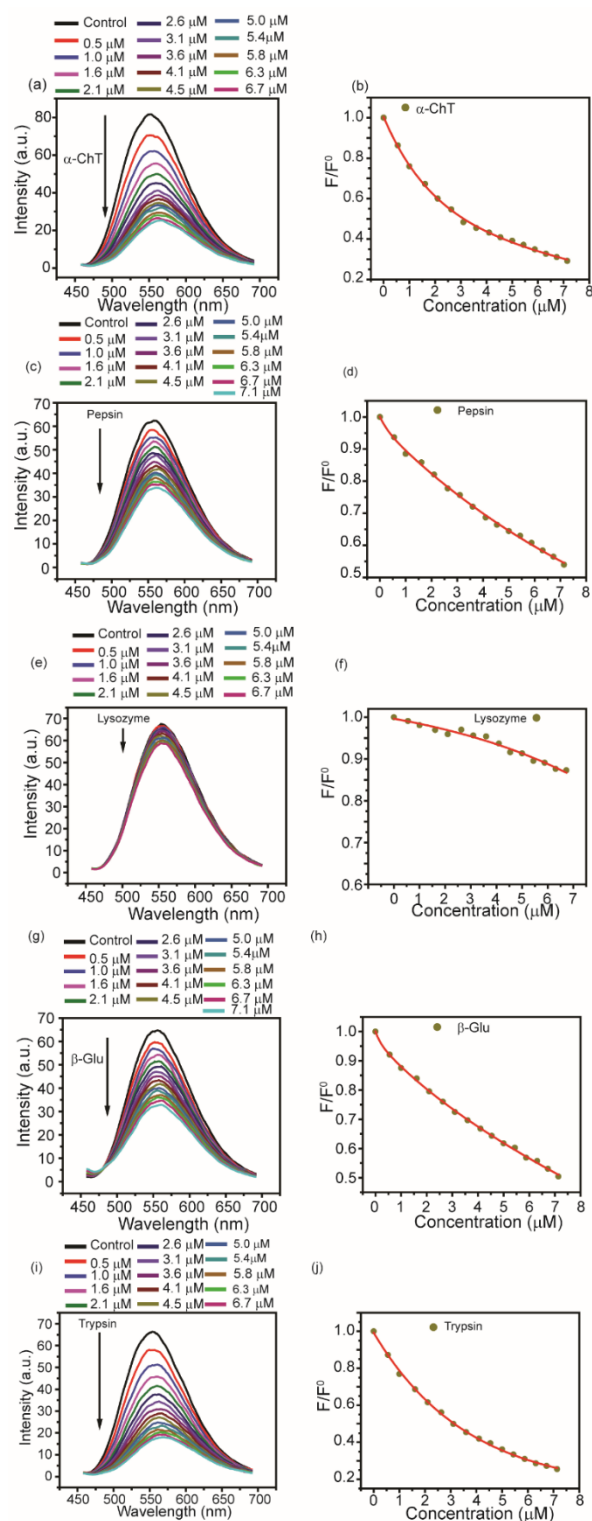


Figure S9. Protein titration plot of α -Chymotripsin pepsin, lysozyme, β -glucanase and trypsin (a), (c), (e) and (g) with AC-Dots and curve fitting plot of (b), (d), (f) and (h) of respective protein in 5 mM PBs pH at 7.4.

Protein titration plot.

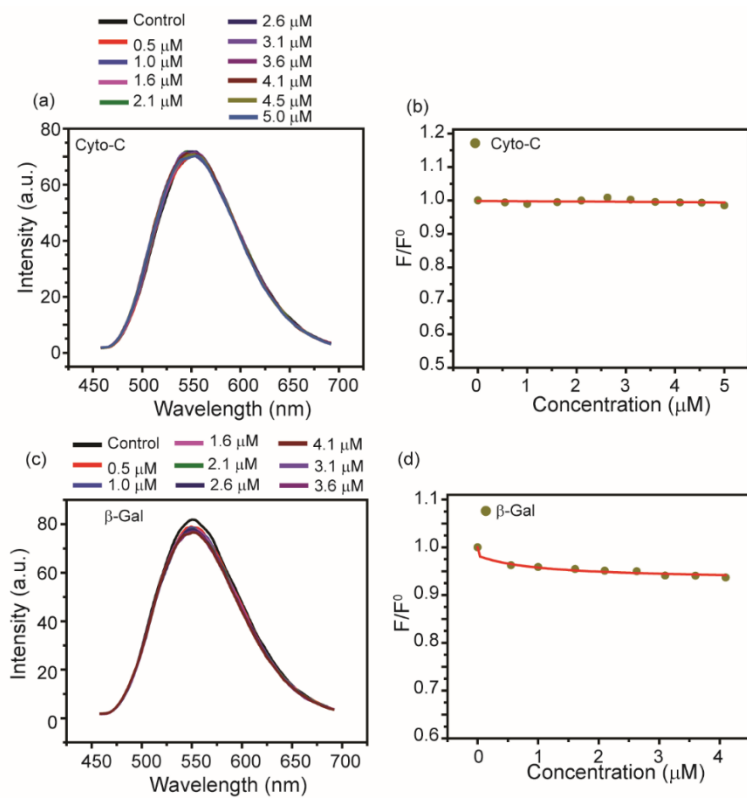


Figure S10. Protein titration plot of Cytochrome-C (a) and β -galactosidase (b) with AC-Dots and curve fitting plot of same protein (c, d) respectively in 5 mM PBs pH at 7.4.

Blue shift in fluorescence spectre of AC-Dots.

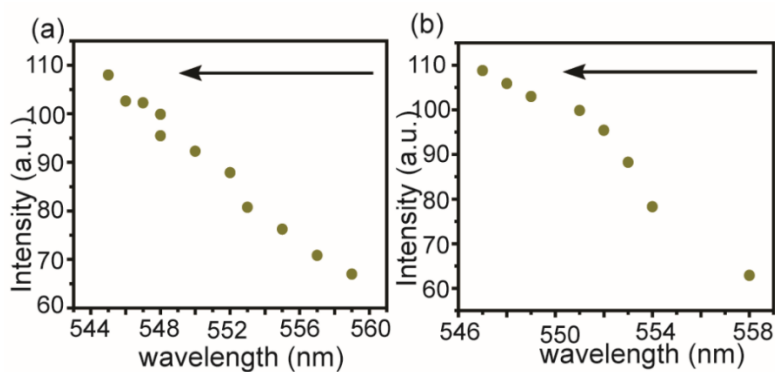


Figure S11. Blue shift in fluorescence spectre of AC-Dots in presence of BSA (a) and Lipase (b) in sodium phosphate buffer pH 7.4.

Red shift in fluorescence spectre of AC-Dots.

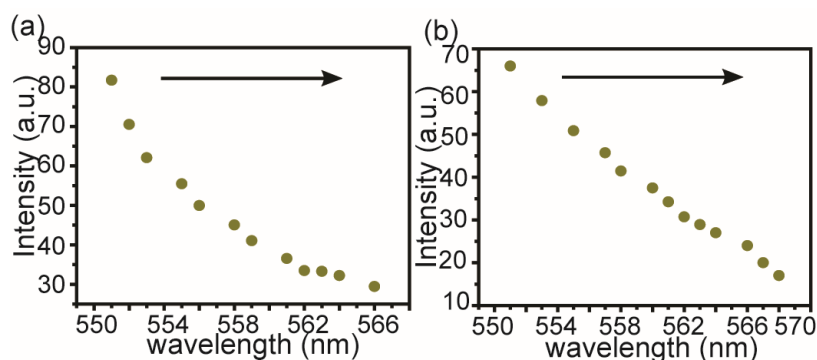


Figure S12. Red shift in fluorescence spectre of AC-Dots in presence of α -ChT (a) and Trypsin (b) in sodium phosphate buffer pH 7.4.

Table S1: Binding constant determination of proteins with AC-Dots using fluorescence spectroscopy.

Name of proteins	Binding constant ($\times 10^4$ mol $^{-1}$)	Name of proteins	Binding constant ($\times 10^4$ mol $^{-1}$)
Bovine serum	10.2 \pm 0.420	Lysozyme	1.9 \pm 0.072
β -Glucanase	12.57 \pm 0.150	Pepsin	11.09 \pm 0.120
β -Galactosidase	2.01 \pm 0.201	Ribonuclease	3.36 \pm 0.091
α -Chymotrypsin	32.1 \pm 0.310	Trypsin	33.67 \pm 0.900
Cytochrome-C	0.1 \pm 0.006	Xylanase	1.3 \pm 0.068
Lipase	20.3 \pm 2.100	-	-

Table S2: Temperature dependent fluorescence study of proteins with AC-Dots.

Temperature	BSA (binding constant) $\times 10^4$ mol $^{-1}$	α -ChT (binding constant) $\times 10^4$ mol $^{-1}$
298 k	43.2 \pm 0.08	31.9 \pm 0.601
310 k	12.97 \pm 0.34	7.4 \pm 0.40

Circular Dichroism (CD) study of different proteins with AC-Dots.

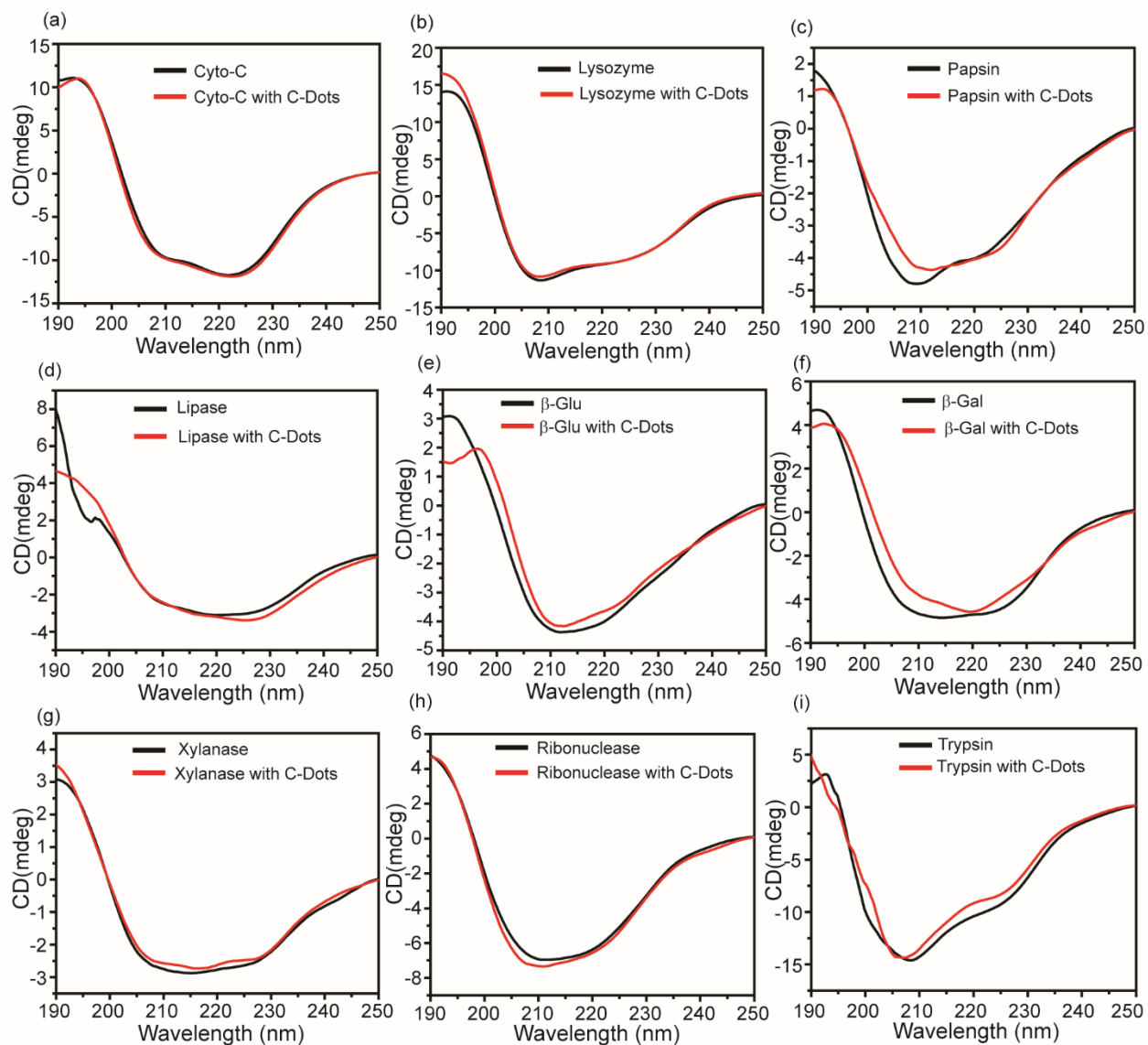


Figure S13. Circular Dichroism (CD) study of cyto-c (a); lysozyme (b); pepsin (c); lipase (d) β -glu (e); β -gal (f); xylanase (g); ribonuclease (h) and trypsin (i) with AC-Dots and native proteins in 5 mM PBs pH at 7.4.