Electronic Supplementary Information (ESI)

Eco-Friendly Synthesis of $CuInS_2$ and $CuInS_2$@ZnS Quantum Dots and their Effect on Enzyme Activity of Lysozyme

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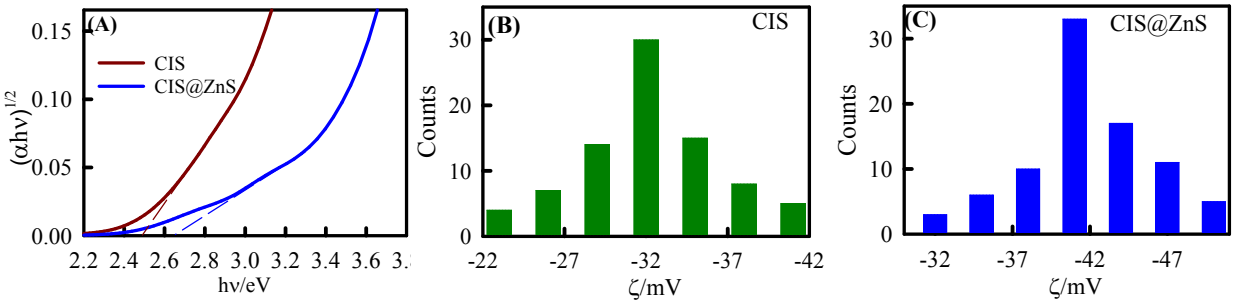


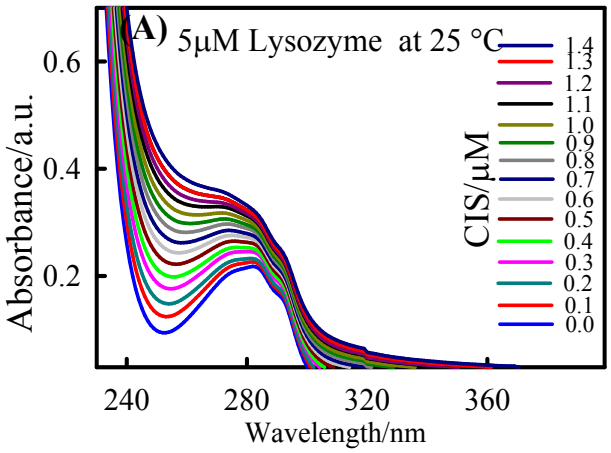
Figure S1: (A) Tauc band gap plot of CIS and CIS@ZnS QDs. Zeta potential of (B) CIS and (C) CIS@ZnS QDs. It is seen that the zeta potential value of CIS and CIS@ZnS is respectively -32 and -40mV.

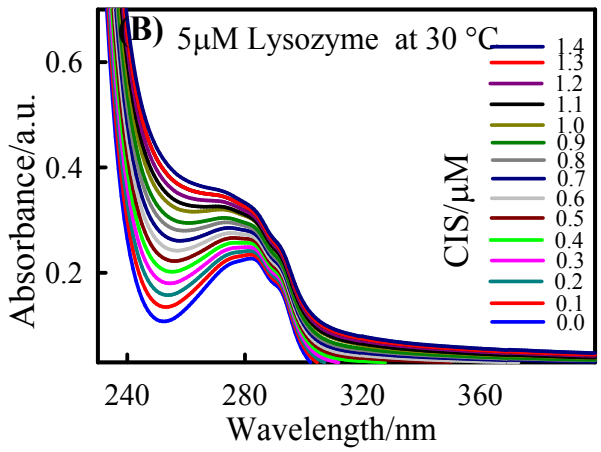
Table S1: Elemental identification of QDs obtained from SEM-EDX.

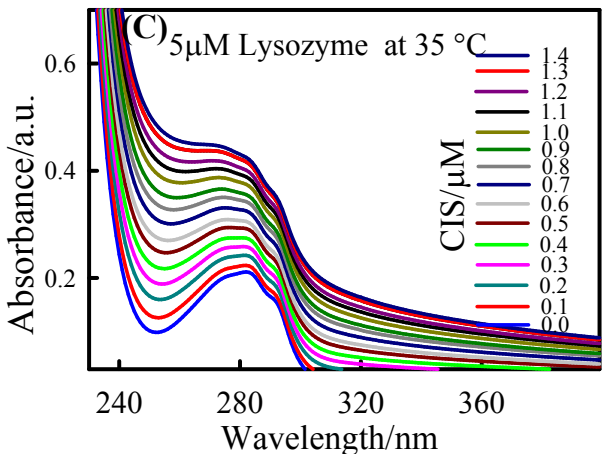
Feed molar Ratio (at same S and Zn) Cu: In: S: Zn	CIS EDX weight%				CIS@ZnS EDX weight%			
	Cu	In	S	Zn	Cu	In	S	Zn
0.1:0.4:0.5:1.0	5±0.4	25±1	68±3	X*	4±0.3	21±1	42±2	32±2

X* neither used as precursor nor found from EDAX.

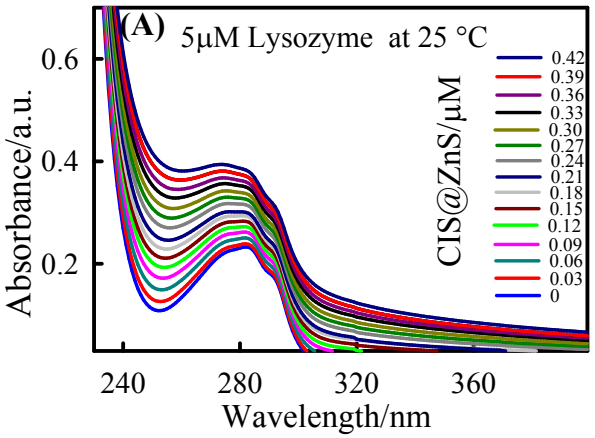
CIS QDs

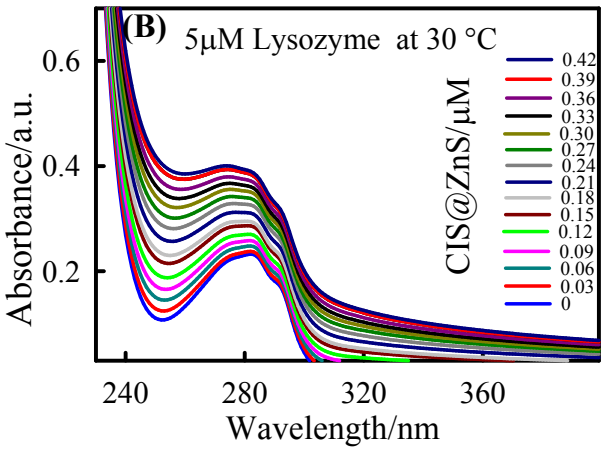


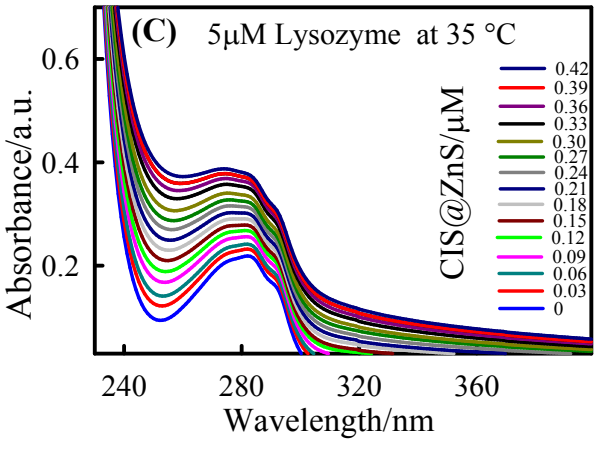




CIS@ZnS QDs







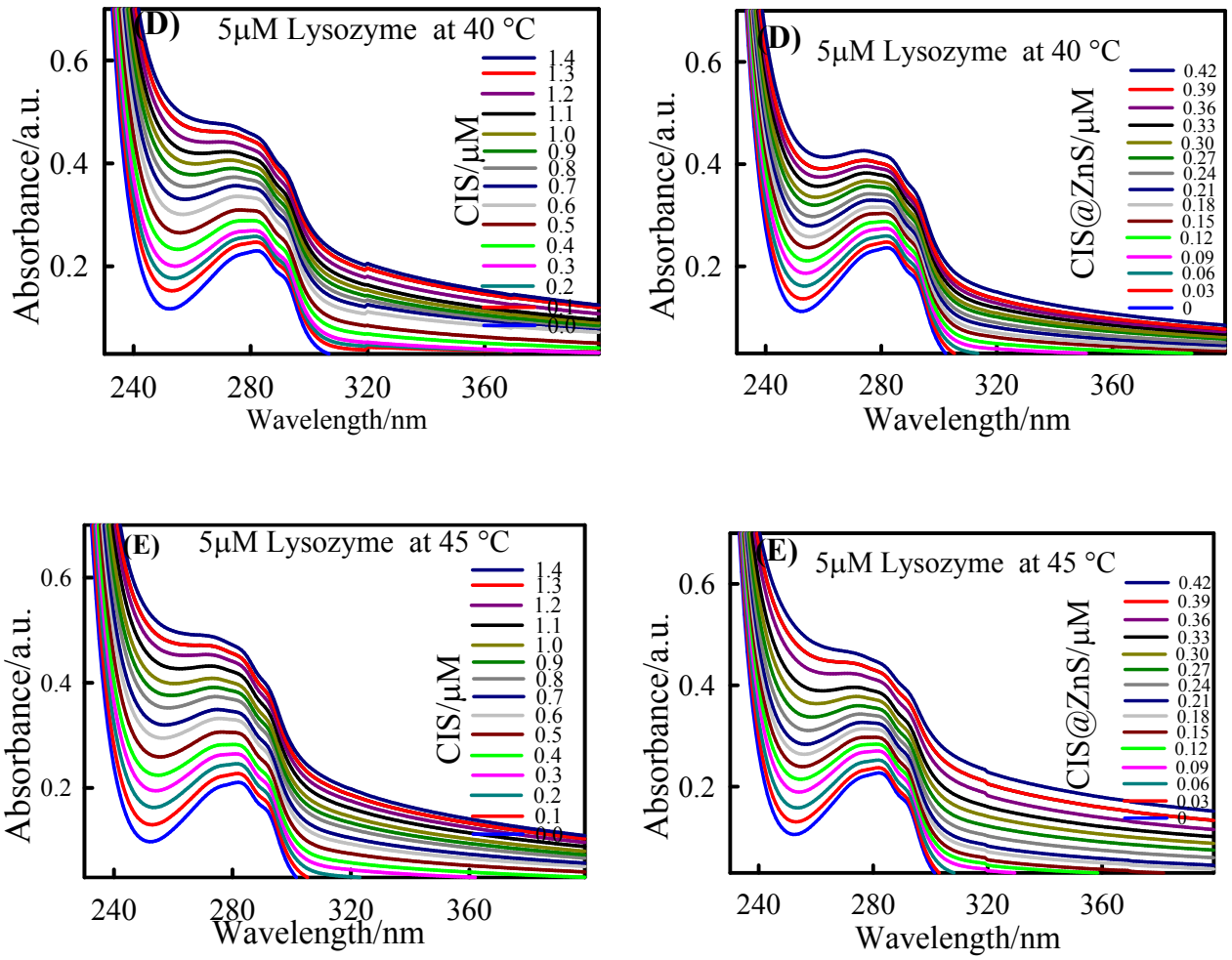


Figure S2: Absorption spectra of lysozyme (5 μM) in the presence of different concentrations of CIS (left side) and CIS@ZnS (right side) QD at different temperatures (A) 298, (B) 303, (C) 308, (D) 313 and (E) 318 K.

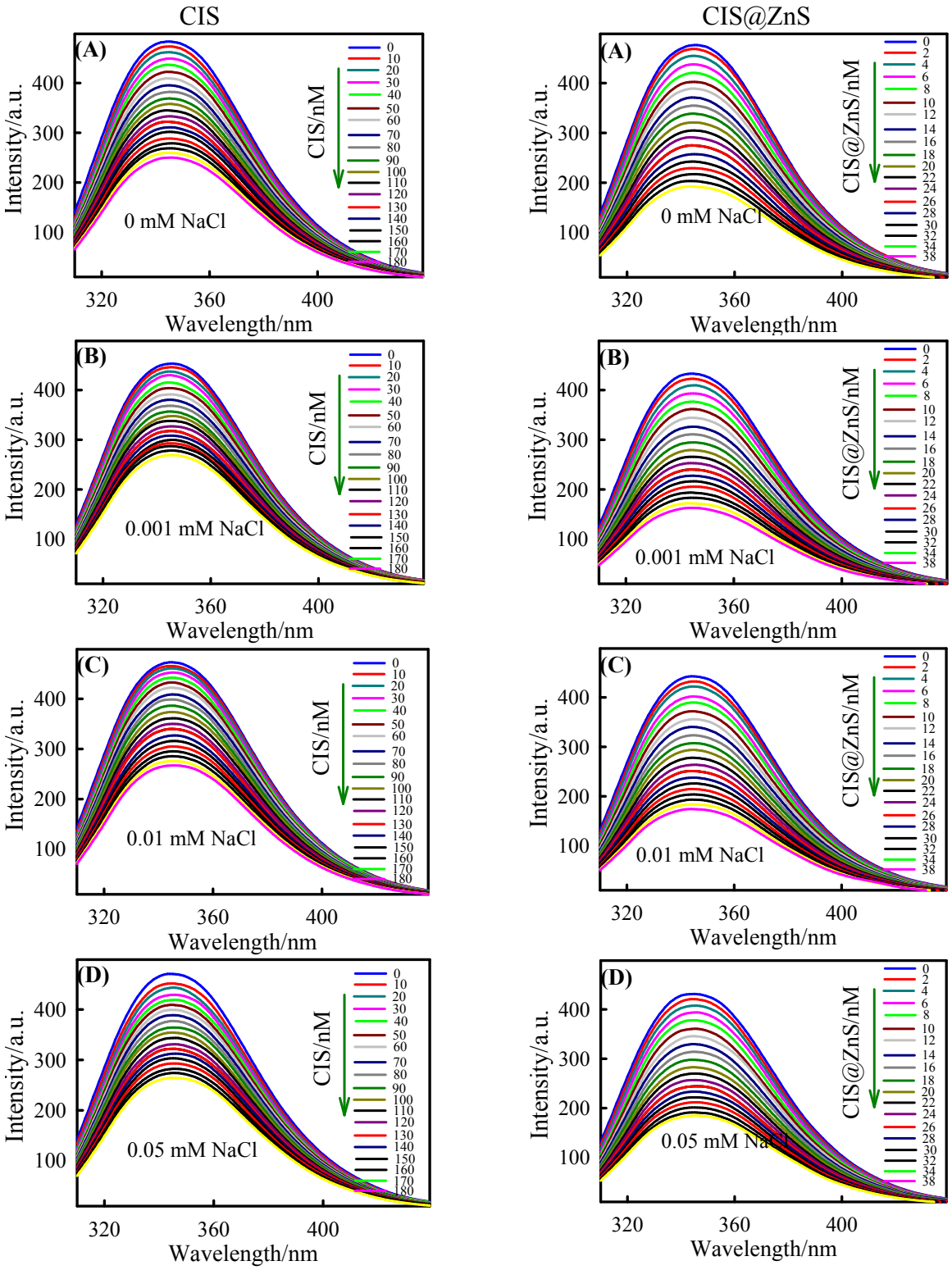


Figure S3: Emission spectra of lysozyme (5 μM) in the presence of different concentrations of CIS (left side) and CIS@ZnS (right side) QDs at 298k temperature in the presence of different concentration of salt.

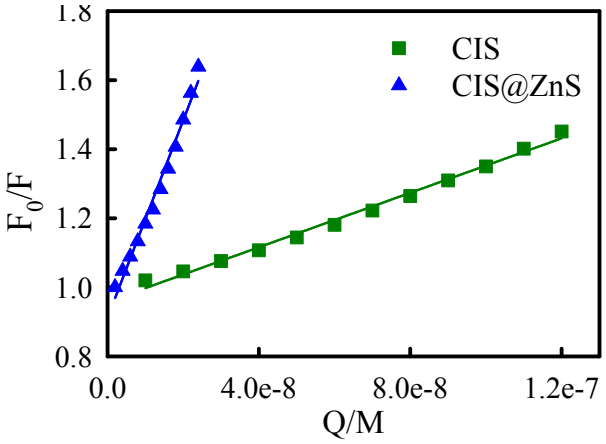


Figure S4: Stern–Volmer plots for quenching constant, derived from fluorescence data of lysozyme (5 μM) as function of concentration of CIS and CIS@ZnS core-shell QDs at 298 K in absence of salt.

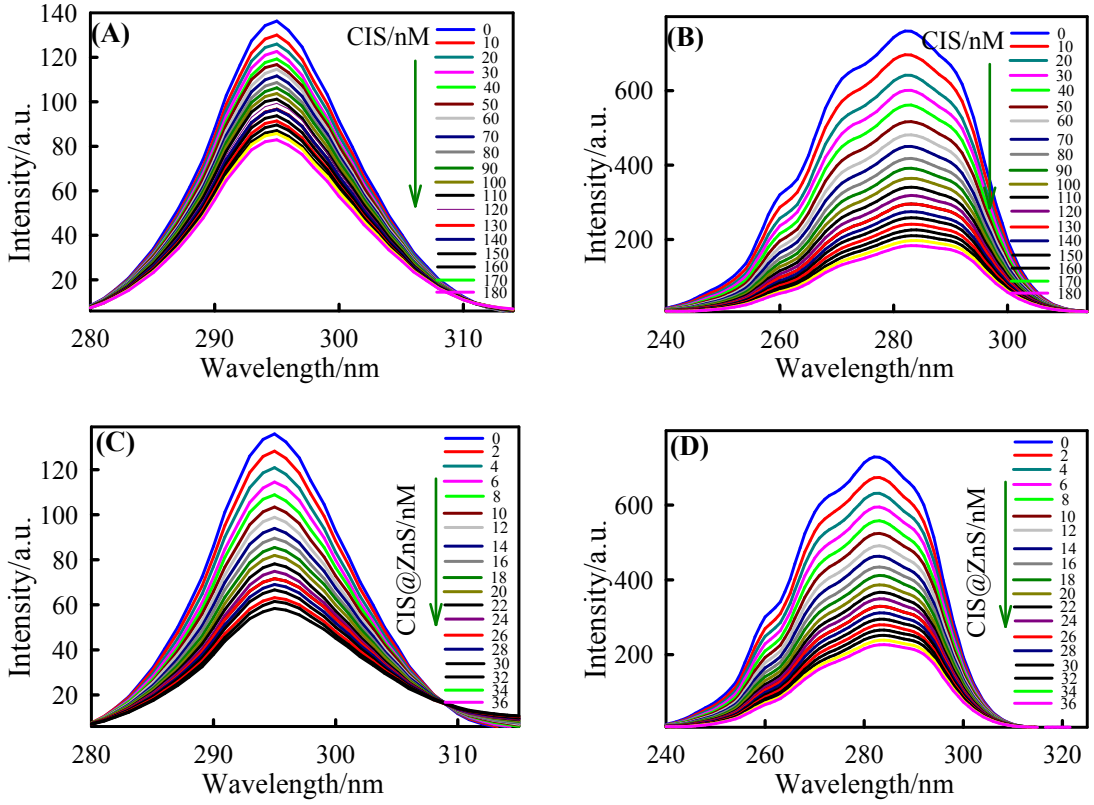


Figure S5: Synchronous fluorescence quenching spectra at Δλ=15 nm (Tyrosine) and Δλ=60 nm (Tryptophan) of Lysozyme (5 μM), in the absence and presence of CIS QD (10 to 180 nM) and CIS@ZnS core-shell QDs (2 to 36 nM).

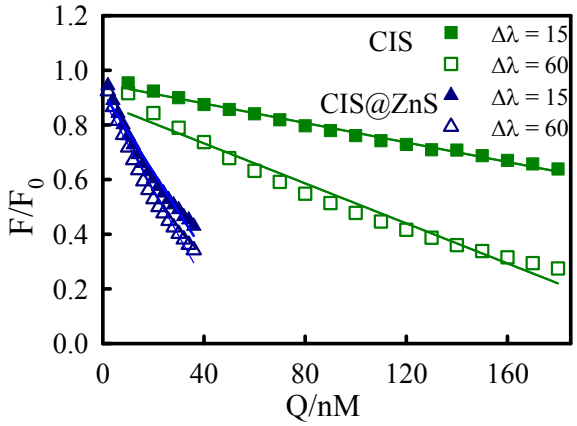


Figure S6: Dependence of the ratio between the Synchronous fluorescence quenching intensity as a function of CIS and CIS@ZnS core-shell QD concentration. Note the more slope in case of Δλ = 60 nm indicates the quenching is mostly due to tryptophan residues of proteins.

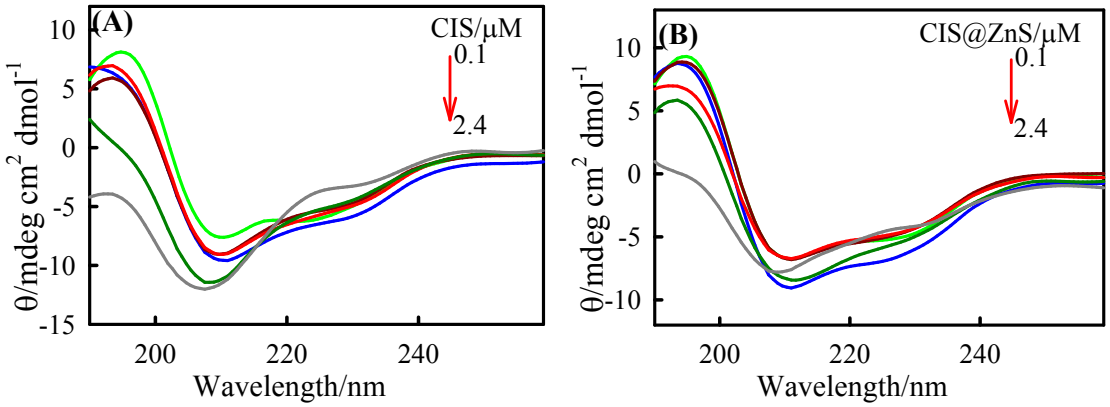


Figure S7: Dependence of secondary structure (helicity) of lysozyme (5 μM) on **(A)** CIS and **(B)** CIS@ZnS core-shell QDs with concentration (0, 0.1, 0.6, 1.2, 1.8 and 2.4 μM) at 298 K. Note the gain of secondary structure due to complexation of proteins with QDs.

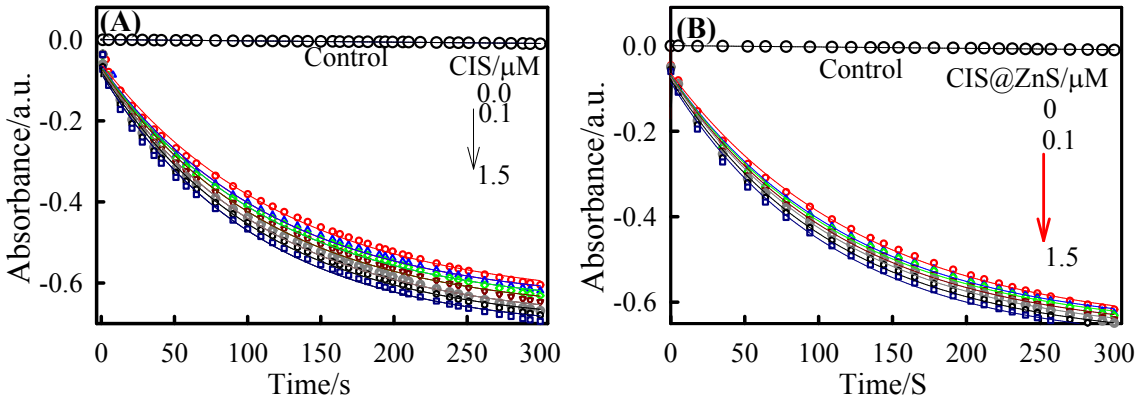


Figure S8: Enhancement in the enzymatic activity of lysozyme (5 μM) in presence of different concentrations of **(A)** CIS QDs (0, 0.1, 0.3, 0.6, 0.9, 1.2, 1.5 μM). **(B)** CIS@ZnS core-shell QDs (0, 0.1, 0.3, 0.6, 0.9, 1.2, 1.5 μM).