Supporting Information

β-Cyclodextrin-Capped ZnO-Doped Carbon Dot as an Advanced Fluorescent Probe for Selective Detection of Dopamine

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Table S1. Comparative literature survey of previous studies showing the value of limit of detection (LOD) of Dopamine Sensing.

Sensing Probe	Detection Technique	Detection limit	Reference
Carbon dots (CDs)	Fluorometric	33 μM	14
Carbon quantum dots (CQDs)	Fluorometric	0.2 mM	22
Nitrogen doped carbon dots (NCDs)	Fluorometric	89 pM	24
Pyrene derivatized carbon dots (CDs)	Fluorometric	0.18 µM	23
Nitrogen-doped carbon dots (N-C dots)	Fluorometric and Colorimetric	1.97 µg/mL	25
InP/ZnS quantum dots	Fluorometric	5 nM	15
β-Cyclodextrin functionalized gold nanoclusters (*β*-CD-AuNC)	Fluorometric	2 nM	7
β-cyclodextrin functionalized gold nanoclusters	Fluorometric	20 nM	6
APTES-capped ZnO-QDs	Fluorometric	12 nM	45
ZnO-associated carbon dots (CDZs)	Fluorometric	1.06 nM	16
Chiral ZnO nanoparticles (ZnO@Cys)	Fluorometric	0.791 µM	37
β-cyclodextrin /Nafion/polymer nanocomposite	Electrochemically	5.84 nM	10
Carbon Dots	Fluorometric	68 nM	21
Nanochain-assembled ZnO flowers	Electrochemically	6.0×10−8 M	12
Cyclodextrin functionalized carbon nanotubes	Electrochemically	6.7 µM	11

β-cyclodextrin-capped ZnO-doped carbon dot (ZnO-CD)	Fluorometric	285 nM	This work

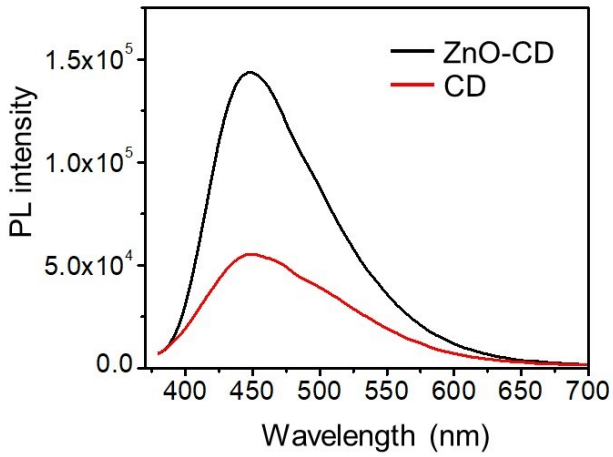

Figure S1. Comparative fluorescence study of ZnO-CD and CD (synthesized using only β-CD) under excitation of 360 nm. Results show that fluorescence intensity significantly increases after ZnO doping.

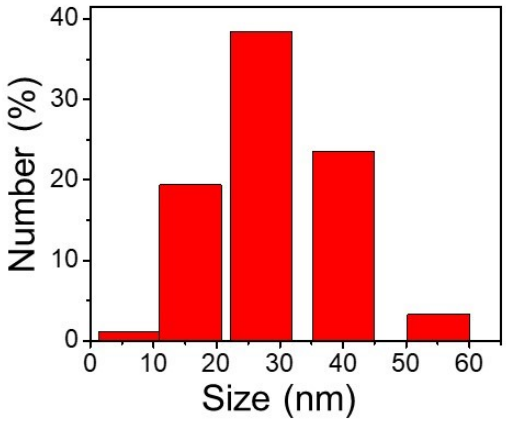

Figure S2. Hydrodynamic size of ZnO-CD as observed by DLS.

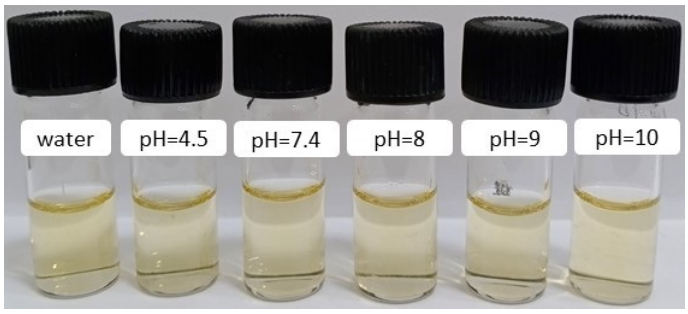

Figure S3. Colloidal stability of ZnO-CD in water and in different pH solutions, suggesting that ZnO-CD is colloidally stable at variable pH.

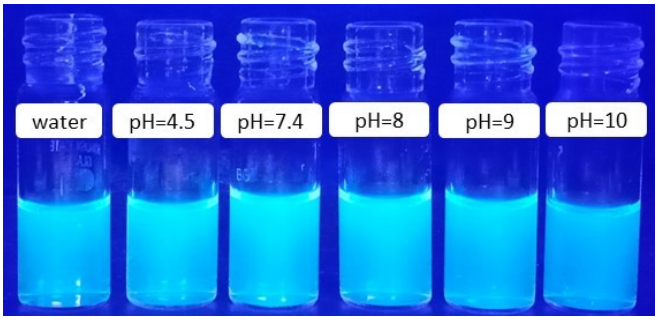

Figure S4. Corresponding photographic images of Figure 3(d), fluorescence of ZnO-CD is stable at different pH.

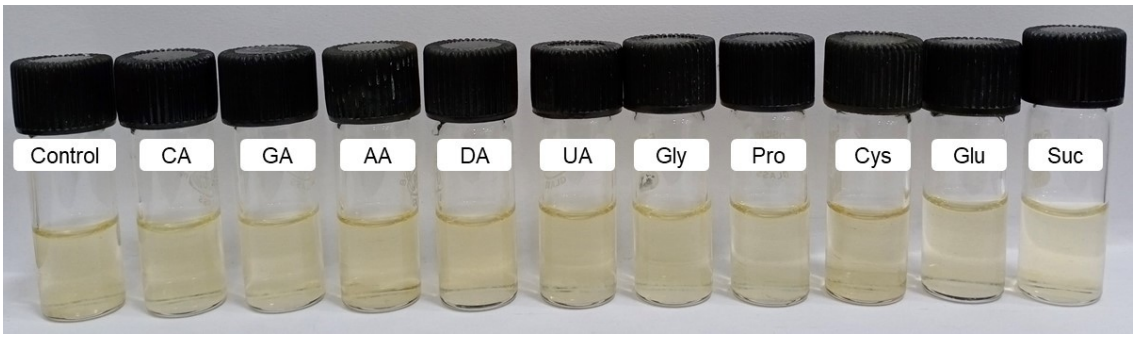

Figure S5. Digital photographic image of ZnO-CD in absence and presence of different biomolecules under day light.

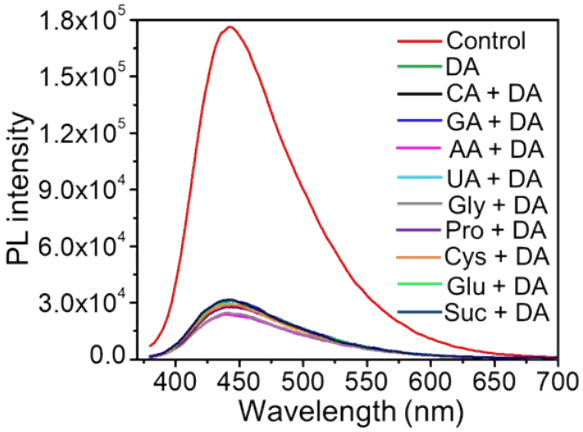

Figure S6. Fluorescence spectra of ZnO-CD before and after adding of DA along with different biomolecule under excitation of 360 nm. Results shows the fluorescence quenching of ZnO-CD in all cases, concludes DA sensing is not hampered in presence of interfering biomolecule.

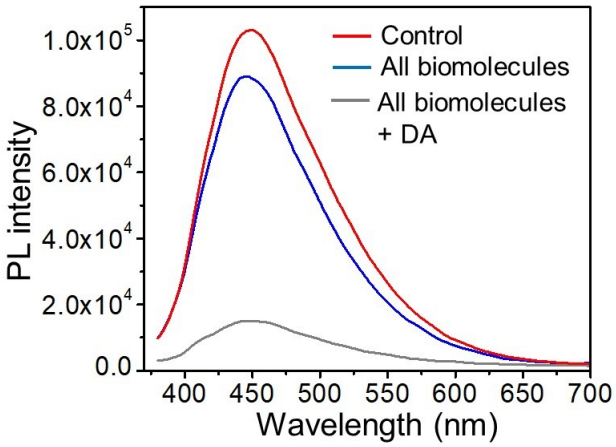

Figure S7. Fluorescence spectra of ZnO-CD before and after adding of DA along with all biomolecule together under excitation of 360 nm. Results show the fluorescence quenching of ZnO-CD after adding of DA in presence of all biomolecules in solution, concludes DA sensing is not hampered in presence of interfering biomolecules.

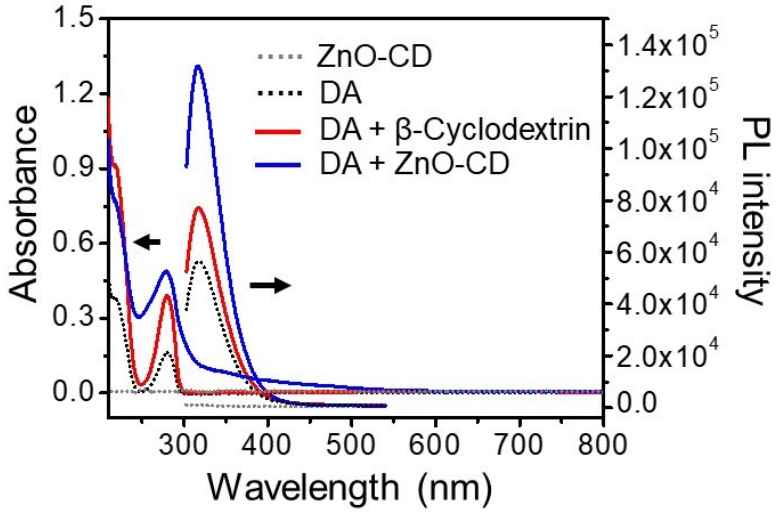

Figure S8. Evidence of Host-Guest interaction of DA with ZnO-CD. The same concentration of DA is incubated with *β*-CD and ZnO-CD, by maintaining the *β*-CD concentration same. The absorption/emission spectra of DA are measured. Results show that the host−guest interaction leads to increased absorbance at 280 nm and increased emission spectra at 318 nm. For the ZnO-CD sample, sample is dissolved in HCl followed by neutralization with a basic solution prior to spectral measurements.

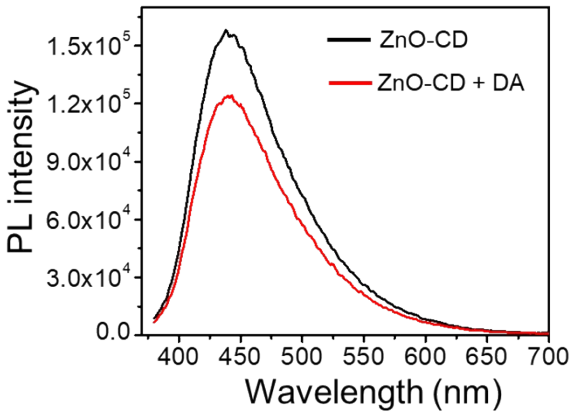

Figure S9. DA sensing experiment has been performed in water. Results show that fluorescence of ZnO-CD is not significantly quenched in presence of DA in water, suggesting that slightly alkaline pH is required for DA sensing.

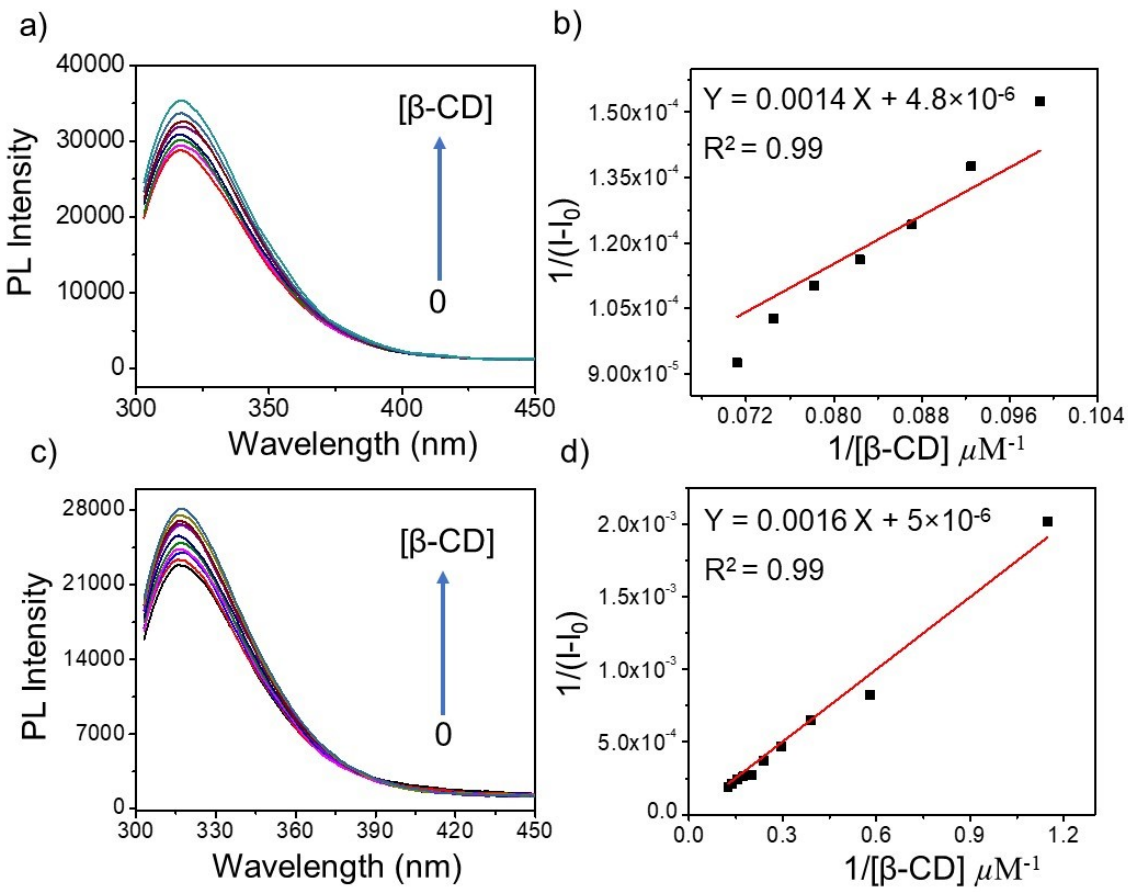

Figure S10. a) Fluorescence spectra of dopamine in water in absence and presence of different concentrations of β-CD, coming from β-CD-capped ZnO-CD. b) linear fitting curve obtained by plotting $1/(I-I_0)$ of DA at 318 nm (under excitation 283 nm) vs 1/[β-CD]. c) Fluorescence spectra of dopamine in PBS buffer (pH=8) in absence and presence of different concentrations of β-CD, coming from β-CD-capped ZnO-CD. d) linear fitting curve obtained by plotting $1/(I-I_0)$ of DA at 318 nm (under excitation 283 nm) vs 1/[β-CD]. I_0 and I denote PL intensity of DA in absence and presence of β-CD-capped ZnO-CD, respectively.