Electronic Supplementary Material (ESI) for Soft Matter.

Electronic Supplementary Information

Self-assembly of surface functionalized amphiphilic carbon dots: tuning in the morphological manifestation

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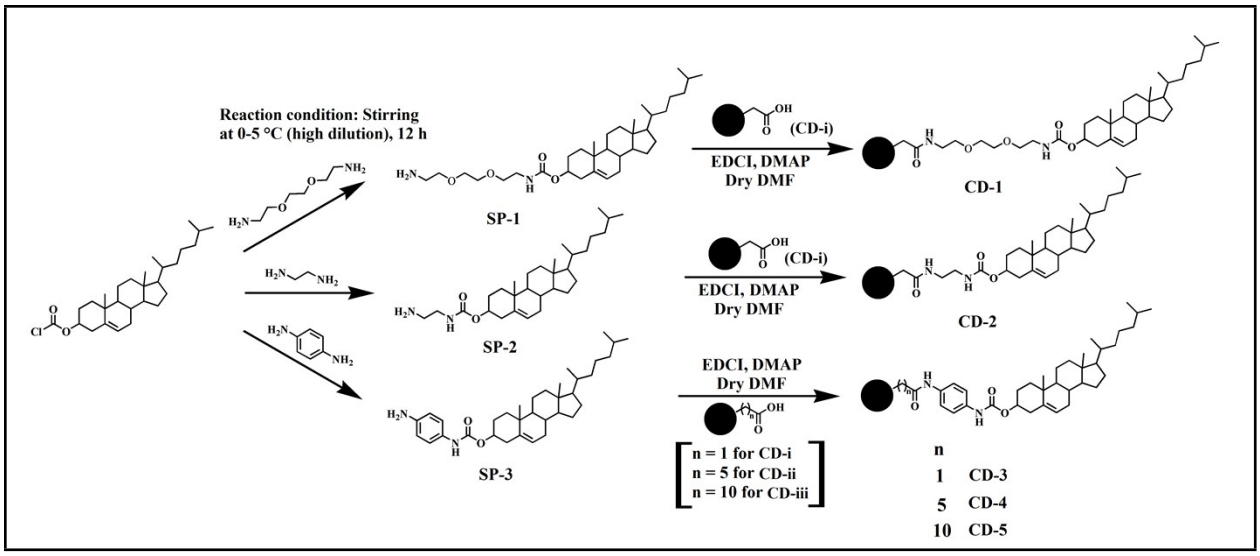
Table S1. Solubility of CD-**1**-**7** in different solvents[a]

Solvent	CD-1	CD-2	CD-3	CD-4	CD-5	CD-6	CD-7
DMSO	S	S	S	S	S	S	S
DMF	S	S	S	S	S	S	S
THF	S	S	S	S	S	S	S
Acetonitrile	Ins	Ins	Ins	Ins	Ins	Ins	Ins
n-Hexane	Ins	Ins	Ins	Ins	Ins	Ins	Ins
Ethanol	Ins	Ins	Ins	Ins	Ins	Ins	Ins
Toluene	S	S	S	S	S	S	S

[a]S = soluble, Ins = insoluble



Scheme S1. Synthetic scheme for CD-**1-5**.

Characterization of Surface Functionality of CD-1. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 0.79-1.64 (m, cholesteryl protons), 2.02-2.16 and 2.26-2.51 (m, allylic cholesteryl protons), 3.13-3.67 (m, oxyethelene protons), 4.00-4.04 (m, C<u>H</u>-O-(CO) of cholesteryl proton), 5.37-5.40 (t, vinylic proton of cholesteryl group)

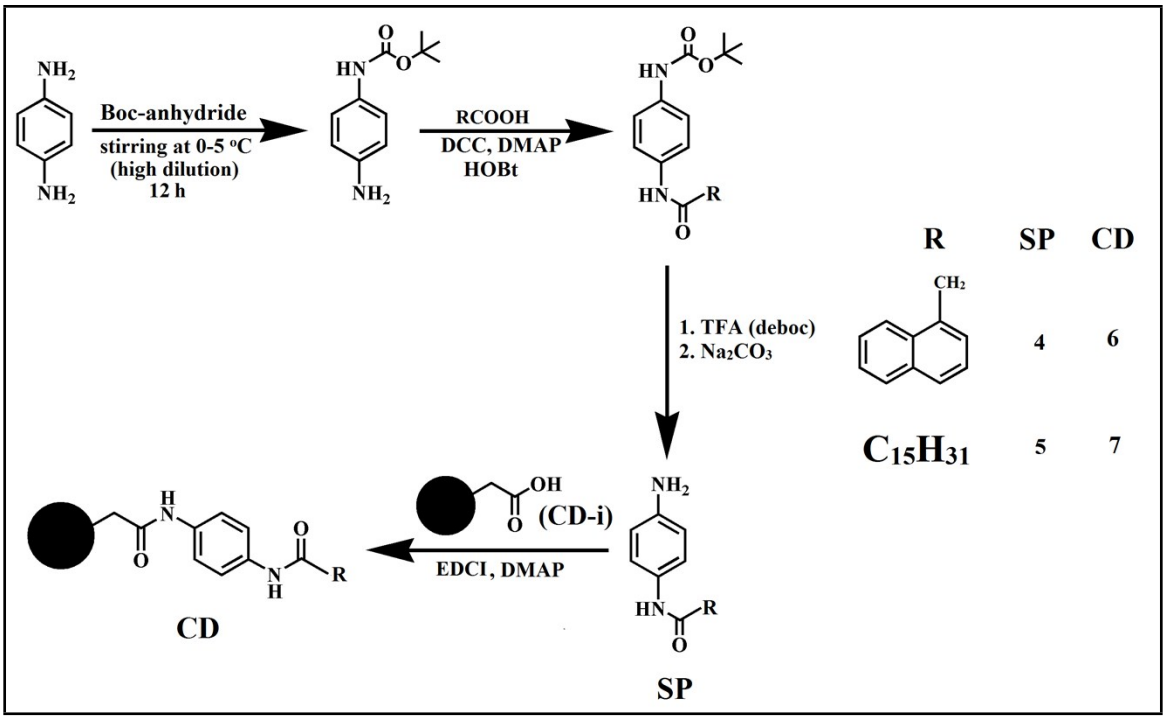
Characterization of Surface Functionality of CD-2. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 0.80-1.64 (m, cholesteryl), 2.03-2.17 and 2.26-2.51 (m, allylic cholesteryl protons), 3.22-3.25 and 3.46-3.48 (t, ethylenediamine protons), 4.09-4.11 (m, C<u>H</u>-O-(CO) of cholesteryl proton), 5.38-5.41 (t, vinylic proton of cholesteryl group)

Characterization of Surface Functionality of CD-3. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 0.88-1.64 (m, cholesteryl), 2.11-2.20 and 2.35-2.40 (m, allylic cholesteryl protons), 4.40-4.43 (m, C<u>H</u>-O-(CO) of cholesteryl proton), 5.36-5.42 (t, vinylic proton of cholesteryl group), 6.64-6.66 and 8.10-8.12 (d, aromatic protons of *p*-phenylenediamine)

Characterization of Surface Functionality of CD-4. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 0.88-1.64 (m, cholesteryl and methelyne protons of 6-aminocaproic acid residue), 2.11-2.20 and

2.35-2.40 (m, allylic cholesteryl protons and C$\underline{H}_2$-(CO) of 6-aminocaproic acid residue), 4.40-4.43 (m, C$\underline{H}$-O-(CO) of cholesteryl proton), 5.36-5.42 (t, vinylic proton of cholesteryl group), 6.67-6.69 and 8.11-8.13 (d, aromatic protons of *p*-phenylenediamine)

Characterization of Surface Functionality of CD-5. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 0.88-1.64 (m, cholesteryl and methelyne protons of 6-aminocaproic acid residue), 2.11-2.20 and 2.35-2.40 (m, allylic cholesteryl protons and C$\underline{H}_2$-(CO) of 6-aminocaproic acid residue), 4.40-4.43 (m, C$\underline{H}$-O-(CO) of cholesteryl proton), 5.36-5.42 (t, vinylic proton of cholesteryl group), 6.67-6.69 and 8.11-8.13 (d, aromatic protons of *p*-phenylenediamine)



Scheme S2. Synthetic scheme for CD-**6** and **7**.

Characterization of Surface Functionality of CD-6. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 3.67 (s, methelyne protons of naphthylacetic acid), 5.97-6.00 and 6.97-7.03 (m, aromatic protons of naphthyl), 6.16-6.18 and 7.61-7.63 (d, aromatic protons of *p*-phenylenediamine)

Characterization of Surface Functionality of CD-7. (*400 MHz, DMSO-d6, 25 °C*). *δ*/ ppm 0.79 (s, methyl protons of C16 alkyl chain), 0.89 (s, methelyne protons of C16 alkyl chain), 2.22-2.40 (m, C$\underline{H_2}$-C$\underline{H_2}$-(CO) of C16 alkyl chain), 6.26-6.28 and 7.68-7.70 (d, aromatic protons of *p*-phenylenediamine)

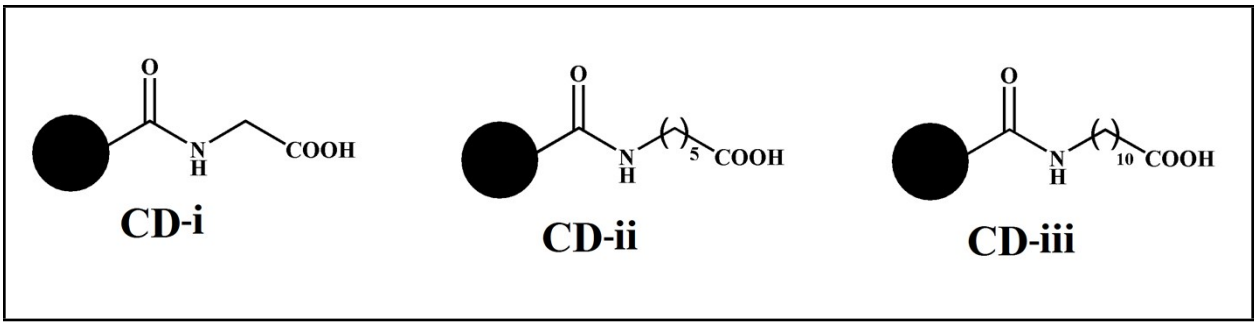


Figure S1. Structure of three precursor carbon dots (CD-**i-iii**).

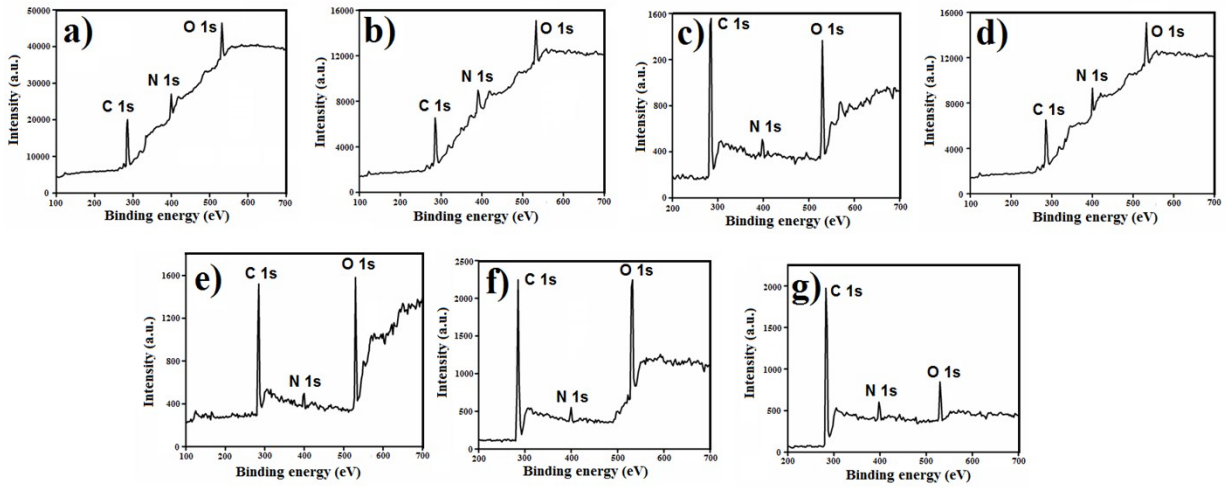


Figure S2. XPS spectra of a) CD-**1**, b) CD-**2**, c) CD-**3**, d) CD-**4**, e) CD-**5**, f) CD-**6** and g) CD-**7** in DMSO.

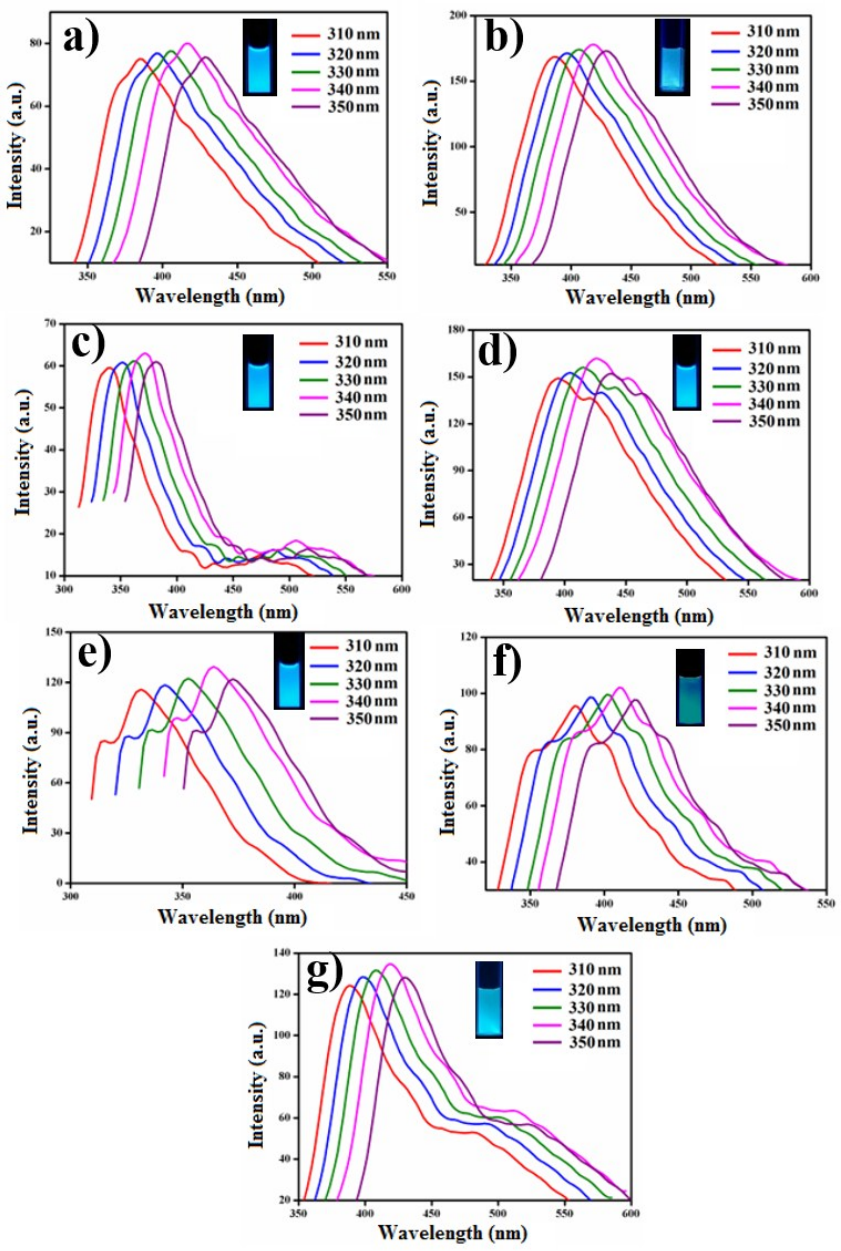


Figure S3. Excitation dependent emission spectra of a) CD-**1**, b) CD-**2**, c) CD-**3**, d) CD-**4**, e) CD-**5**, f) CD-**6** and g) CD-**7** in DMSO. Corresponding blue fluorescence of CD-**1**-**7** in DMSO under UV irradiation (inset).

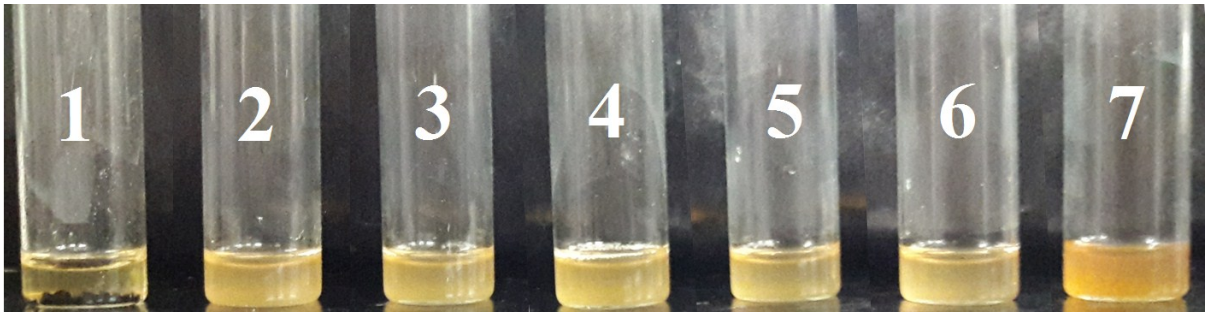


Figure S4. Visual appearance of CD-**1**-**7** in DMSO-water (2:1, v/v).

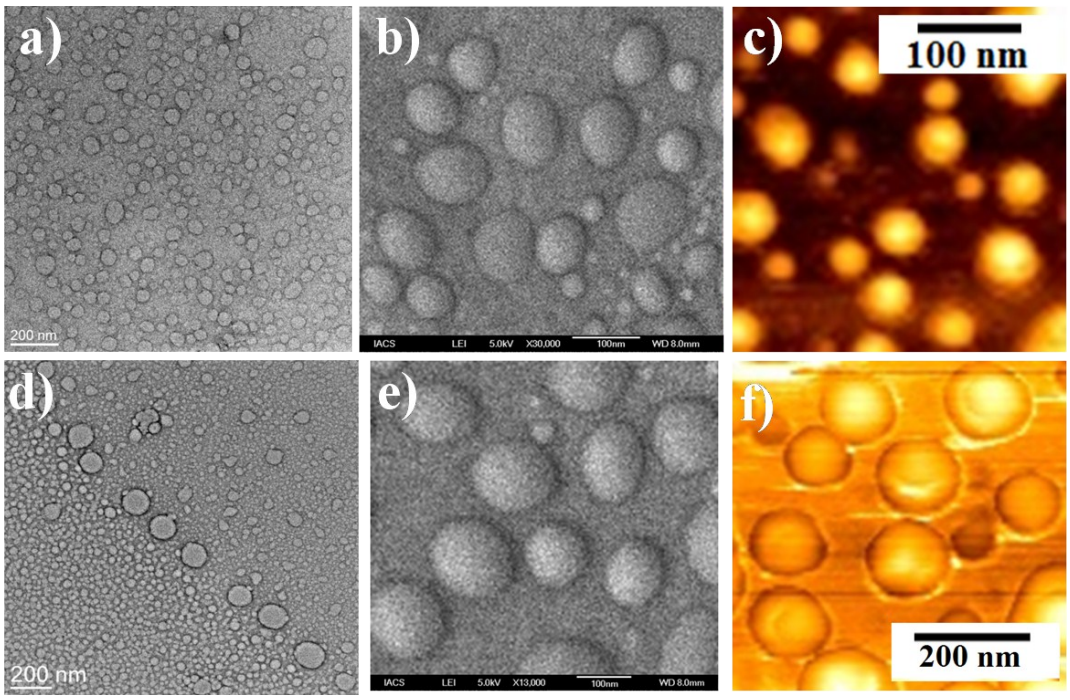


Figure S5. a) TEM, FESEM, AFM images of self-assembly in DMSO-water mixture (2:1, v/v) for (a-c) CD-**2**, (d-f) CD-**4**. All TEM images are negetively stained.

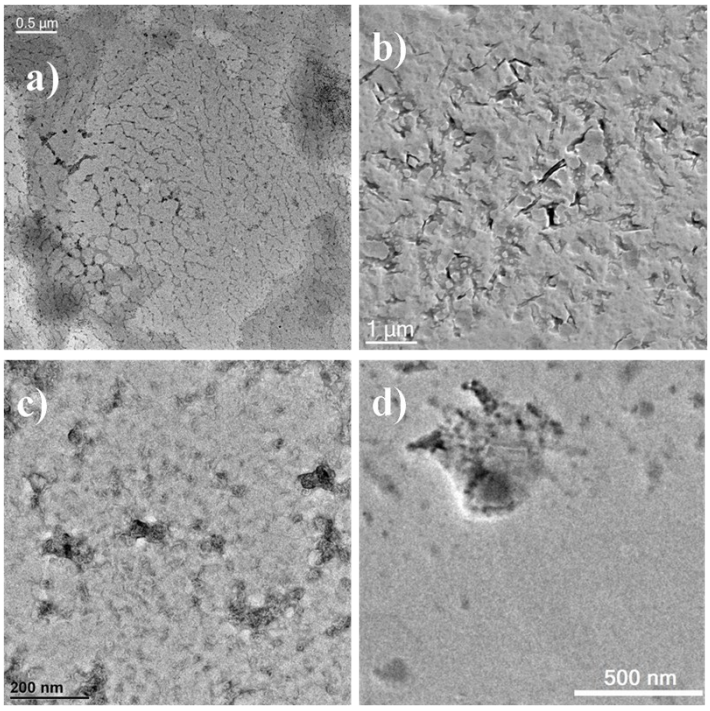


Figure S6. a) TEM images of a) SP-**2** (ethylenediamine-cholesterol), b) SP-**3** (*p*-phenylenediamine-cholesterol), c) SP-**4** (*p*-phenylenediamine-naphthyl), d) SP-**5** (*p*-phenylenediamine-alkyl chain) in DMSO-water mixture (2:1, v/v). All TEM images are negetively stained.

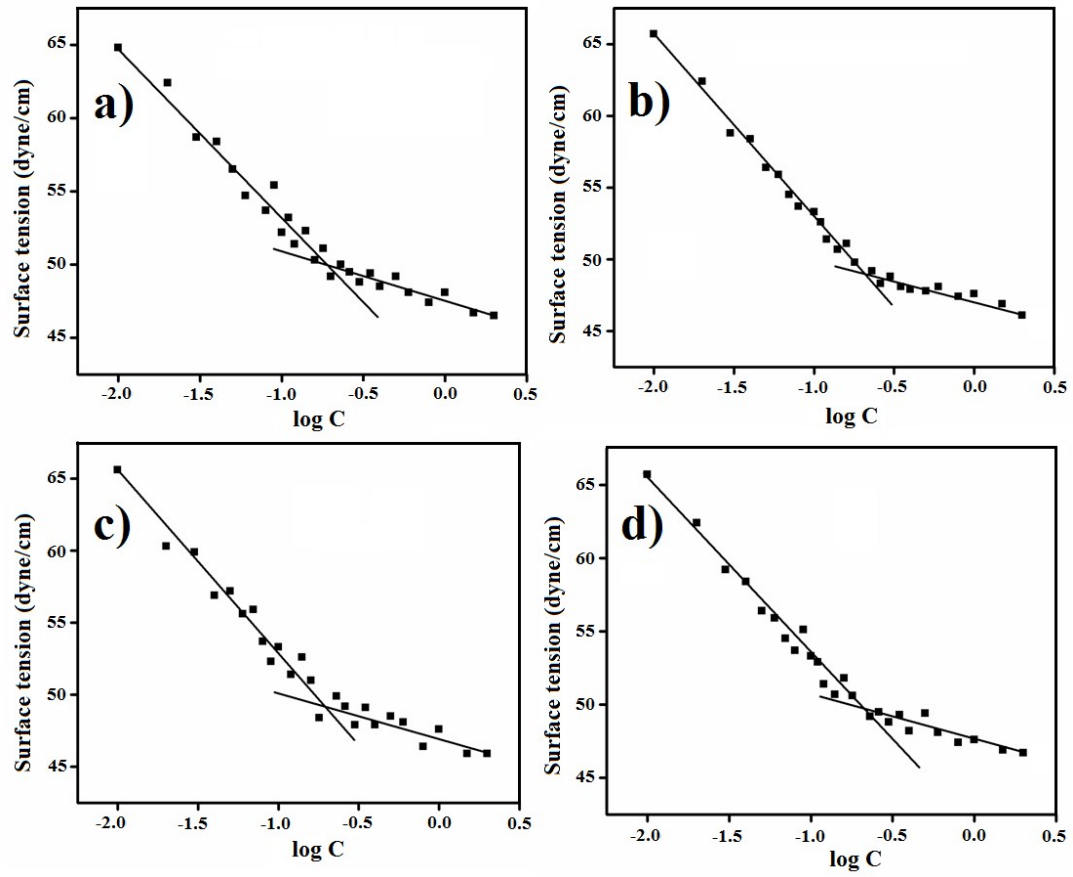


Figure S7. Plot of surface tension versus log concentration of a) CD-**3**, (b) CD-**5**, c) CD-**6** and d) CD-**7** in DMSO-water mixture (2:1, v/v) at 25 °C.

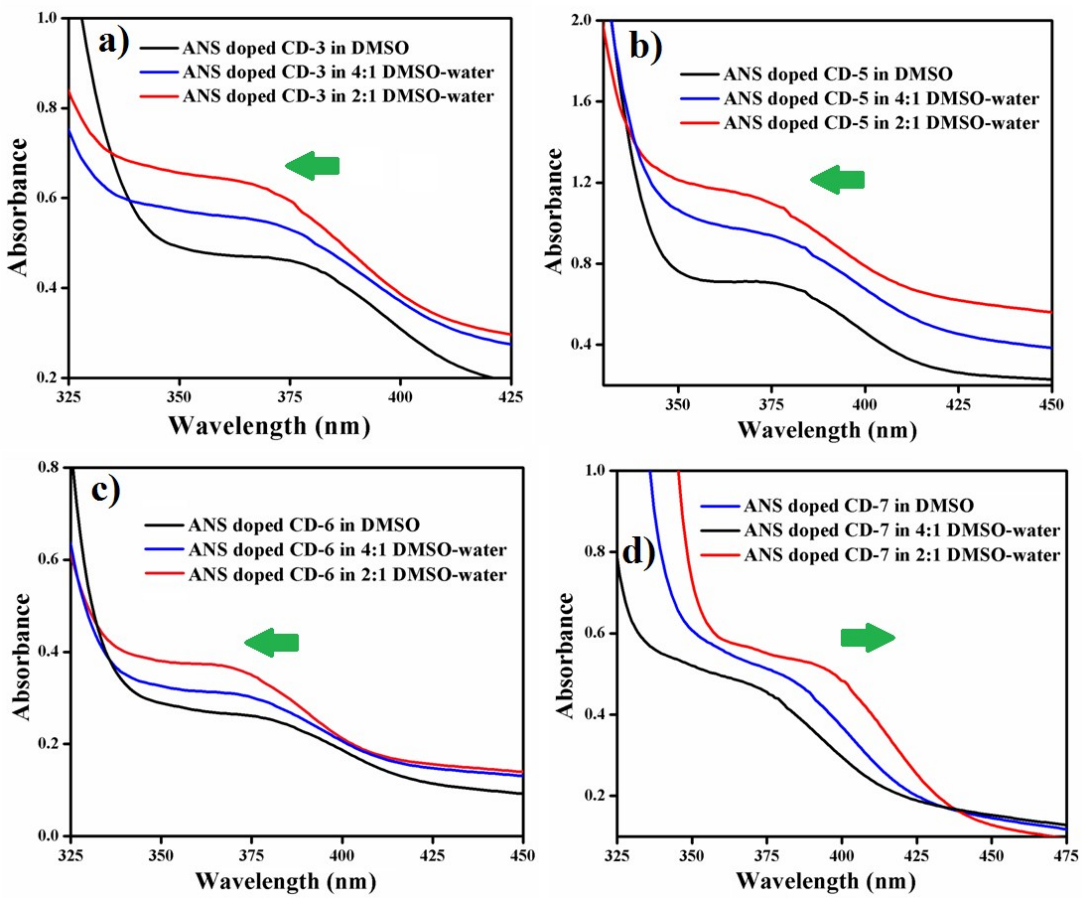


Figure S8. Solvent dependent UV-vis spectra of ANS doped a) CD-**3**, (b) CD-**5**, c) CD-**6** and d) CD-**7**.

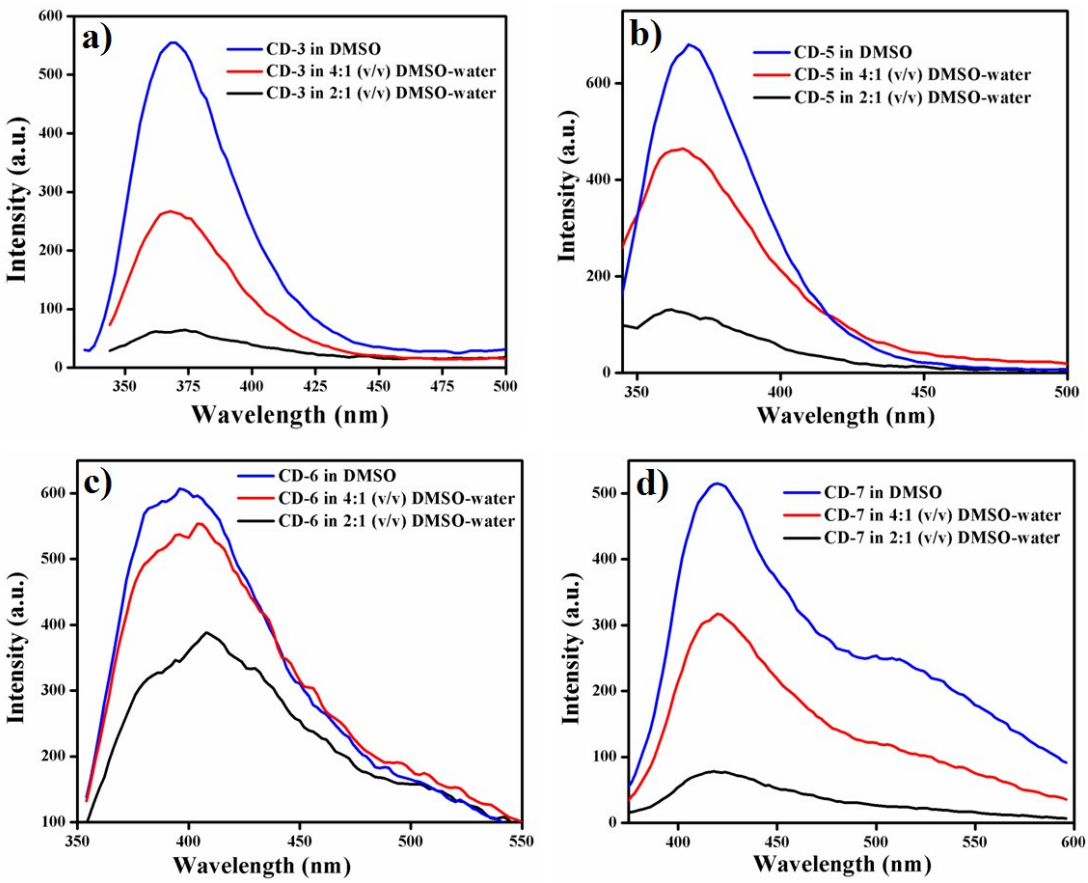


Figure S9. Fluorescence spectra of a) CD-**3**, (b) CD-**5**, c) CD-**6** and d) CD-**7** in different solvent systems.

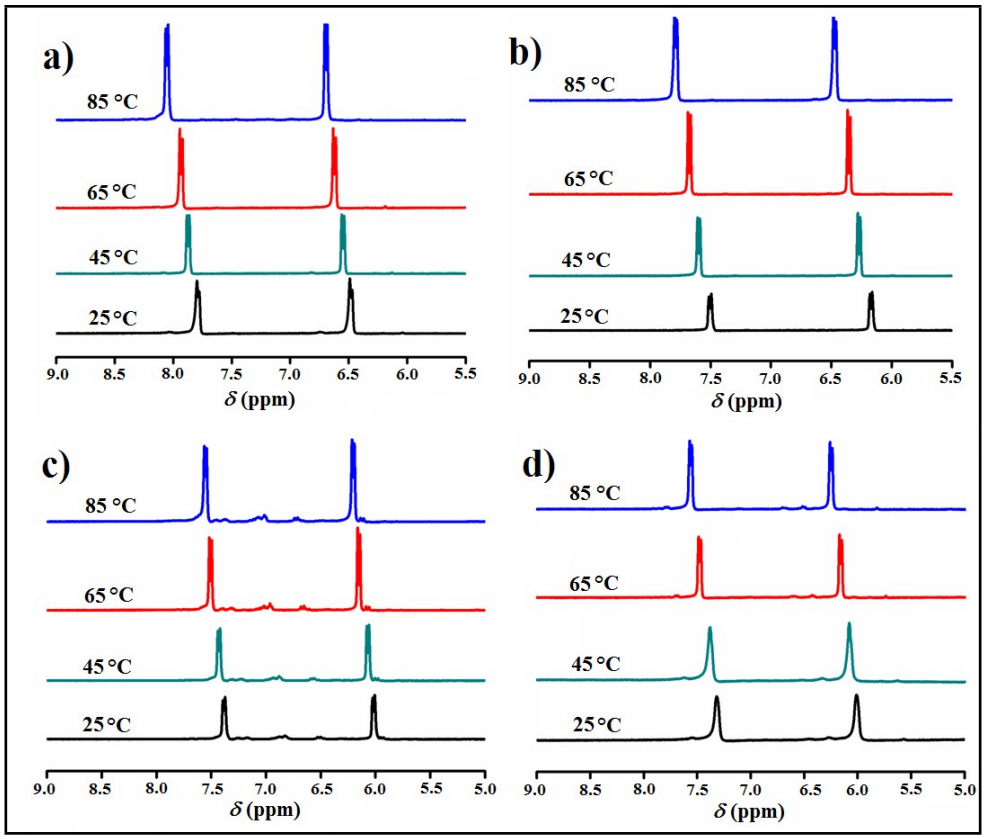


Figure S10. Temperature dependent ^{1}H-NMR spectra of a) CD-**3**, (b) CD-**5**, c) CD-**6** and d) CD-**7**.

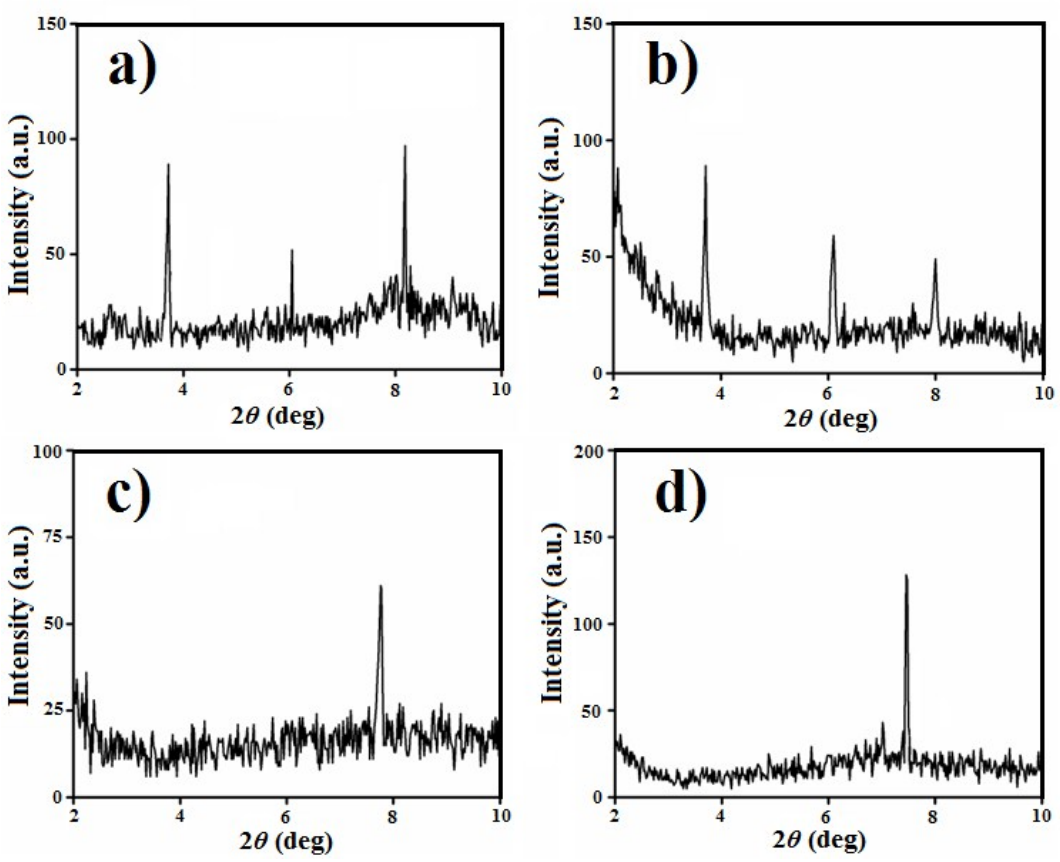


Figure S11. Small angle XRD pattern of self-assemblies of a) CD-**3**, b) CD-**5**, c) CD-**6**, d) CD-**7** in DMSO-water (2:1, v/v).

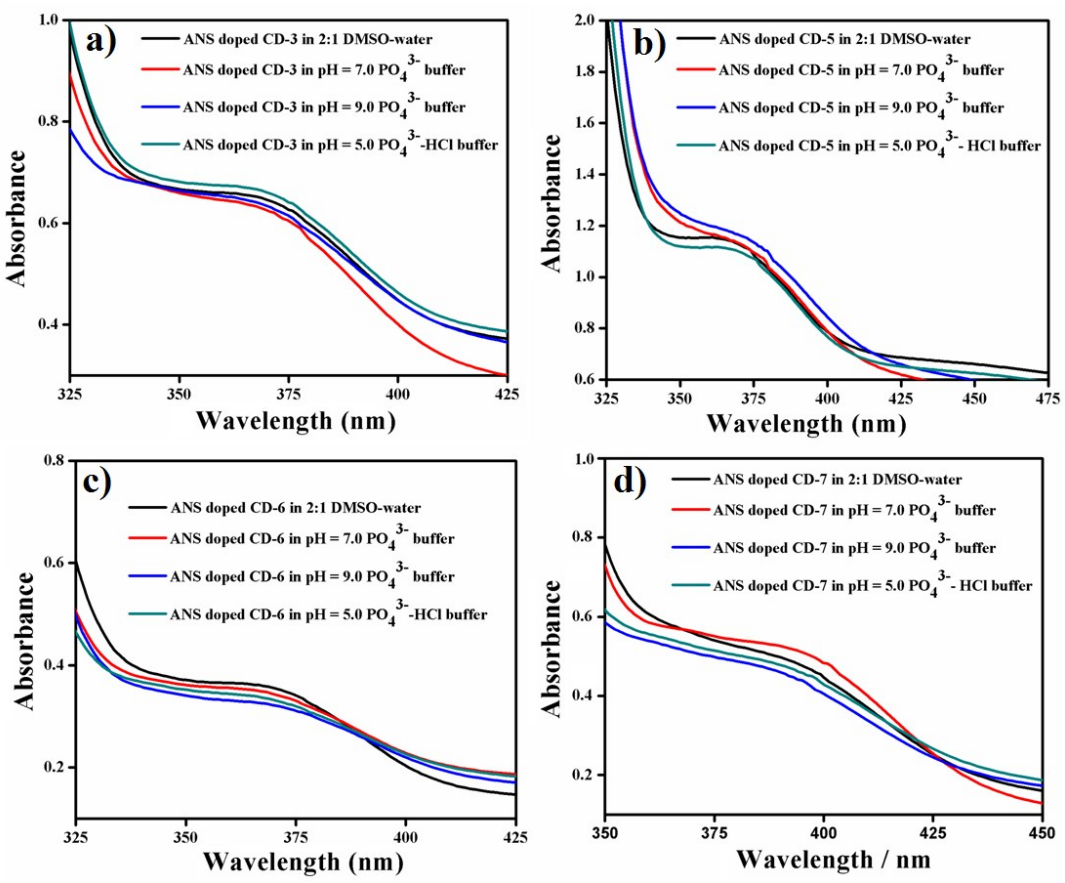


Figure S12. pH Dependent UV-visible spectra of ANS doped a) CD-**3**, b) CD-**5**, c) CD-**6**, d) CD-**7** in phosphate buffer (pH = 7.0 and 9.0) and phosphate-HCl buffer (pH = 5.0).

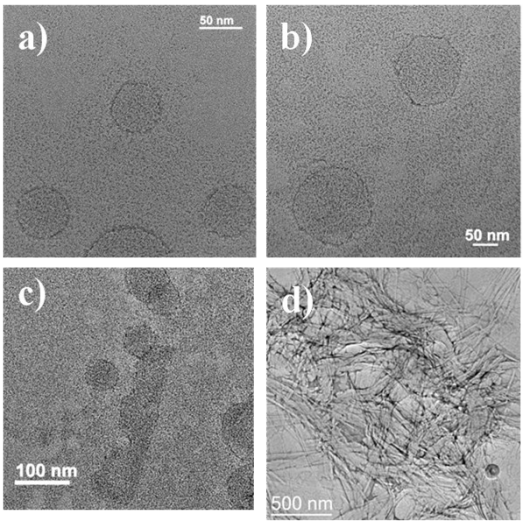


Figure S13. TEM images of a) CD-**3**, b) CD-**5**, c) CD-**6**, d) CD-**7** in phosphate-HCl buffer (pH = 5.0). All TEM images are negetively stained.