

Supplementary data

**Responsive Carbon Dots embedded Hybrid Microgels for
dual sensing of Iron (III) and Ciprofloxacin**

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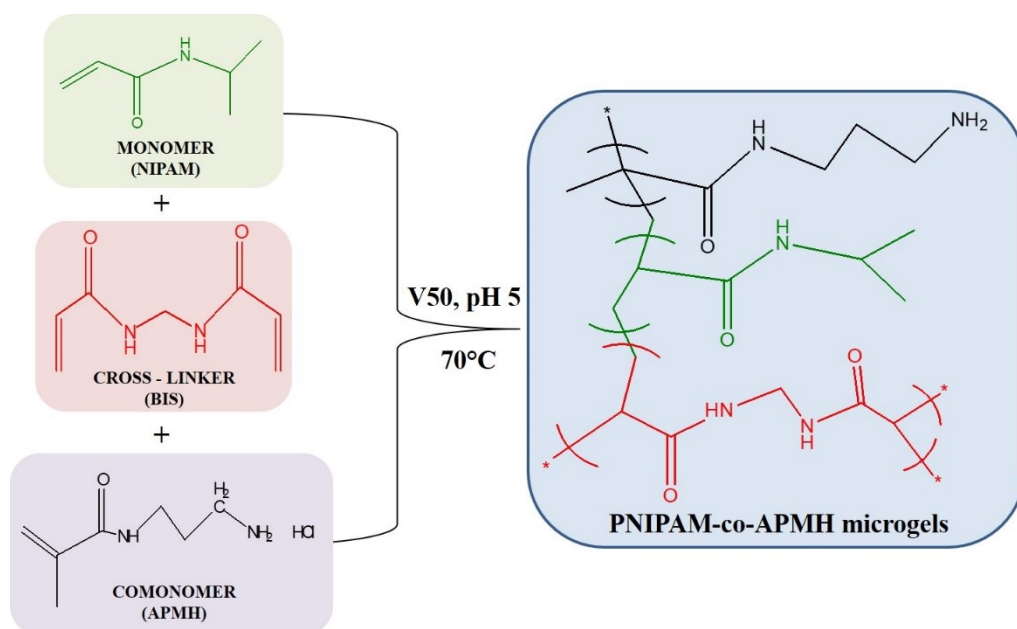


Fig S1. Polymerization scheme for the synthesis of PNIPAM-co-APMH microgels.

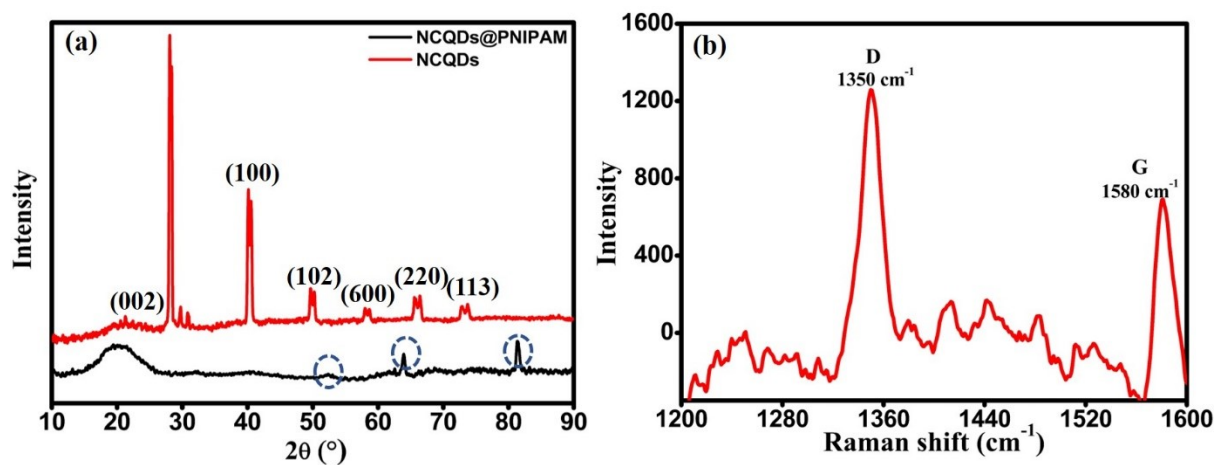


Fig S2. (a) XRD pattern for NCQDs and NCQDs@PNIPAM-co-APMH and (b) Raman spectra for NCQDs.

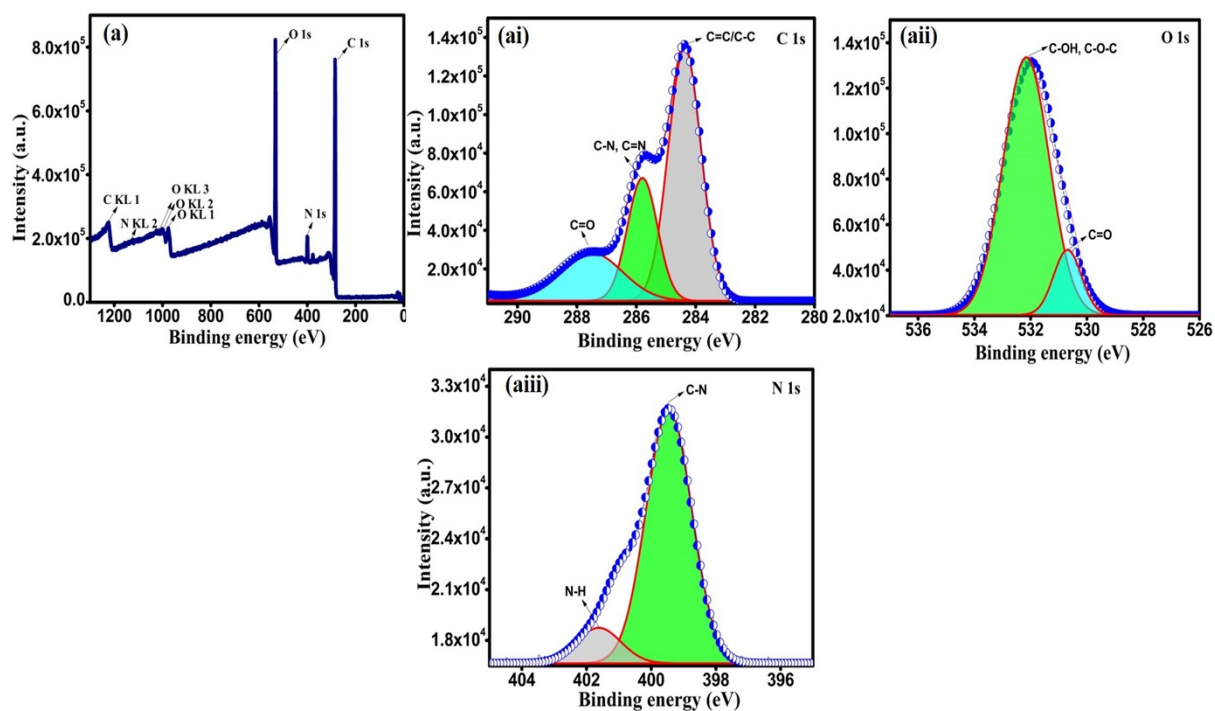


Fig S3. (a) XPS wide scan and (ai-aiii) high-resolution XPS spectra of C_{1s} , O_{1s} and N_{1s} for NCQDs.

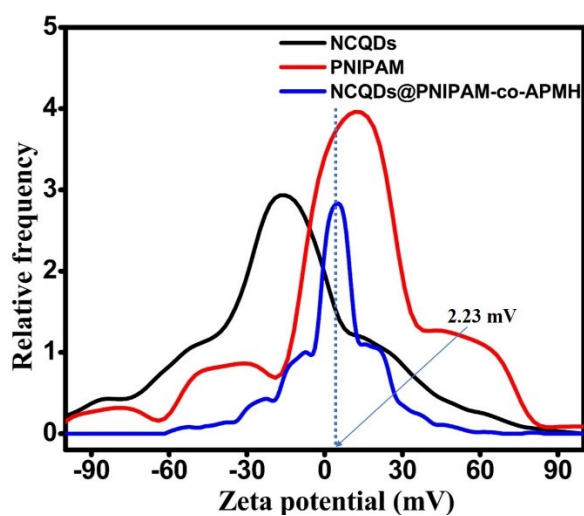


Fig S4. Zeta potential curves for pure NCQDs, pure PNIPAM and NCQDs@PNIPAM-co-APMH.

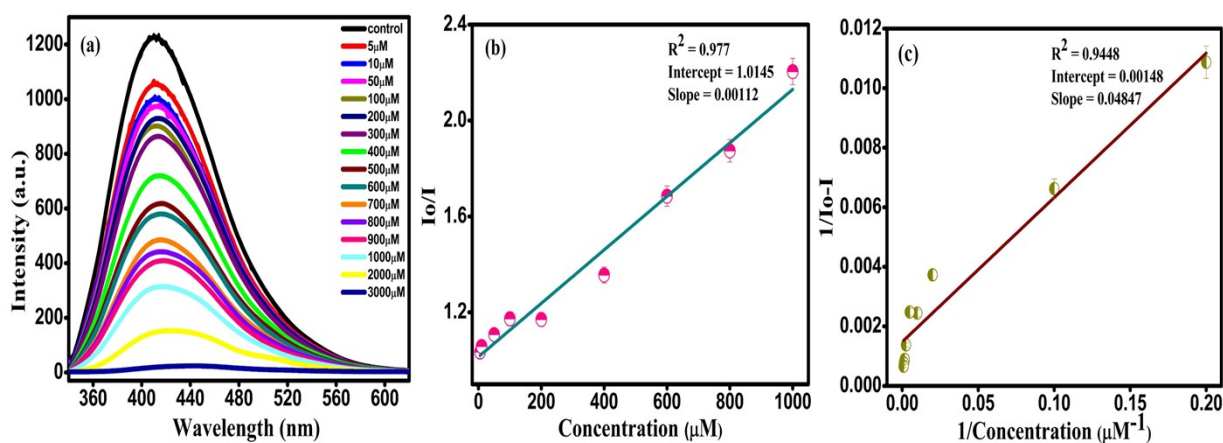


Fig S5. (a) Concentration dependent emission spectra of NCQDs in presence of Fe^{3+} ions, (b) stern-volmer plot and (c) Benesi-Hilderbrand plot for NCQDs.

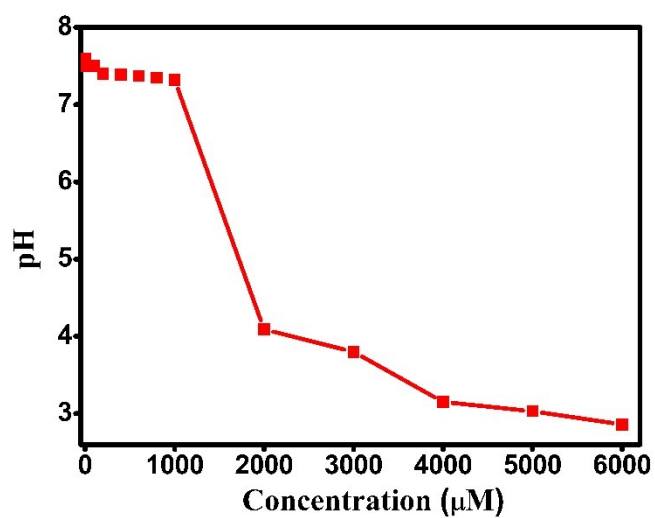


Fig S6. Graph showing pH variation study with the concentration of Fe^{3+} ions.

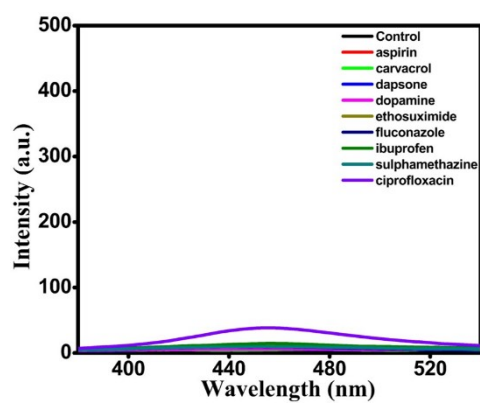


Fig S7. The emission spectra of NCQDs- Fe^{3+} complex in presence of different drugs.

Table S1. Detection of CIP using previously available fluorescent sensors.

S. No.	Material used as sensor	LOD (μM)	Reference
1.	Cd-Se carbon dots	0.60	[1]
2.	Carbon dots from tejapata leaves	6.06	[2]
3.	MIN-s@PEGDA	6.86	[3]
4.	Citrate functionalized Zr-MOF	9.40	[4]
5.	Cd-Te quantum dots modified with glutathione and mercaptopropionic acid	0.90	[5]
6.	NCQDs@PNIPAM-co-APMH	0.41	This work

References:

1. H. Xia, M. Peng, N. Li and L. Liu, CdSe quantum dots-sensitized FRET system for ciprofloxacin detection, *Chem. Phys. Lett.*, 2020, **740**, 137085.
2. N. Chaudhary, D. Verma, J.G. Sharma and P.R. Solanki, A novel bioinspired carbon quantum dots based optical sensor for ciprofloxacin detection, *Mater. Lett.*, 2022, **308**, 131090.
3. Q.D. Huang, C.H. Lv, X.L. Yuan, M. He, J.P. Lai and H. Sun, A novel fluorescent optical fiber sensor for highly selective detection of antibiotic ciprofloxacin based on replaceable molecularly imprinted nanoparticles composite hydrogel detector, *Sens. Actuators B: Chem.*, 2021, **328**, 129000.
4. B.T. Liu, D. Nagarajan, S. Kaliyamoorthy and B. Rathinam, Citrate functionalized zirconium-based metal organic framework for the fluorescent detection of ciprofloxacin in aqueous media, *Micromachines*, 2022, **13**, 2097.
5. X.L. Yuan, X.Y. Wu, M. He, J.P. Lai and H. Sun, A ratiometric fiber optic sensor based on CdTe QDs functionalized with glutathione and mercaptopropionic acid for on-site monitoring of antibiotic ciprofloxacin in aquaculture water, *Nanomater.*, 2022, **12**, 829.

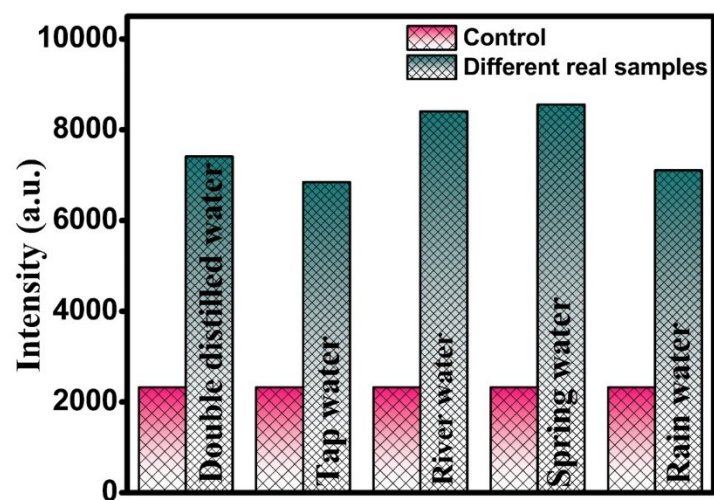


Fig S8. Analysis of CIP using NCQDs@PNIPAM-co-APMH -Fe³⁺ in real water samples.