Luminescent Magnetic Nanoparticles Encapsulated in MOFs for Highly Selective and Sensitive Detection of ClO⁻/SCN⁻ and Anti-

Counterfeiting

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Scheme S1 Synthetic Route of 1d.





Fig. S1 ¹H NMR spectra of 2-benzoylbenzoic acid (BBA) in DMSO-d₆.

Fig. S2 FT-IR spectra of BBA-PEG-DBA (1a) (top), Eu-BBA-PEG-DBA (1b) (middle) and Eu-BBA-PEG-DBA-Fe₃O₄ (1c) (bottom).



Fig. S3 Fluorescence emission spectra of **1c** (green), nano-ZIF-8 (red) and nano-ZIF-8 in the presence of ClO⁻ (50 μ M) (blue) in ultrapure water. ($\lambda_{ex} = 284$ nm).



Fig. S4 (a) SEM image of pure ZIF-8. (b) TEM image of Fe_3O_4 nanoparticles.



Fig. S5 (a) A calibration profile of fluorescence emission intensity of nano-ZIF-8 at 613 nm versus ClO⁻ concentration. (b) A calibration profile of fluorescence emission intensity of nano-ZIF-8-ClO⁻ system at 613 nm versus SCN⁻ concentration.



Fig. S6 Determination of the detection limit of 1d for sensing ClO⁻ in ultrapure water. ($\lambda_{ex} = 284$ nm).



Fig. S7 (a) Fluorescence emission spectra of nano-ZIF-8 in the absence and presence of ClO⁻ (1 *equiv.*) and other various interference anions (5 *equiv.*) in ultrapure water. (b) Fluorescence emission spectra of nano-ZIF-8-ClO⁻ system in the absence and presence of SCN⁻ (1 *equiv.*) and other various interference anions (5 *equiv.*) in ultrapure water. ($\lambda_{ex} = 284$ nm).



Fig. S8 Effect of time on the fluorescence responses at 613 nm of nano-ZIF-8 to ClO⁻ (50 μ M) (a) and nano-ZIF-8-ClO⁻ system to SCN⁻ (50 μ M) (b) in ultrapure water. (λ_{ex} = 284 nm).

| Fluorescent probe | Interfering ions | LOD (nM) | Sobution | Application | Reference |
|--|------------------|----------|----------------------|-----------------------------------|--------------|
| Coumarin derivative | No interferences | 40 | PBS/CH, CN (V/V 7:3) | Real water samples | [90] |
| | | | | Test strips | |
| | | | | Biological samples | |
| СМВІ | SH-, SO1+, ONOO- | 33 | PBS/210H(V/V 9:1) | Living cells | [91] |
| R0610 | No interferences | 28.8 | PBS/PLOH (V/V 7:3) | Living cells | [92] |
| 4'-Hydroxy-3'-(2,4-dinitrophe nylhydrazone)methyl-4-biphe nylcarbonitrile (HMB) | No interferences | 49 | PBS/DMS0 (V/V 99:1) | Living cells | [93] |
| nano-ZIF-8 | No interferences | 0.133 | Ultrapure water | Solid-state Real water samples | This work |
| | | | | Anti-conterfeiting | |

Table S1 Comparison of the efficiency of nano-ZIF-8 with those previously reported probes for sensing ClO⁻.

Table S2 Comparison of the efficiency of nano-ZIF-8-ClO⁻ system with those previously reported probes for sensing SCN⁻.

| Fhiorescent probe | Interfering ions | LOD (nM) | Solution | Application | Reference |
|---|--------------------------|----------|-----------------------|---------------------|-----------|
| Citrate-stabilized AuNPs and | Hg ¹ ' (ED TA | 140 | PBS(pH 7.0, 10 mM) | Real water samples | [94] |
| amino-functionalized CDs | solved this problem) | 36 | | | |
| RTA | No interferences | 10 | HEPES/DMS0 (V/V 3:7) | Living cells | [95] |
| [{Ru(bpy)1}1(µ1-L')](PF4). | No interferences | 735 | HEPES/CH,CN (V/V 1:1) | | [96] |
| [{Ru(bpy)1}1(µ1-L ¹)](PF4). | F-,HSO1- | | HEPES/CH,CN (V/V 1:1) | | [96] |
| Nano-ZIF-8-C10 | No interferences | 0.204 | Ultrapure water | Solid-state | This |
| | | | | Real water samples | work |
| | | | | Anti-counterfeiting | |