Electronic Supplementary Material (ESI) for Analytical Methods.

Supplementary materials

Fast detection of *E.coli* by a novel fluorescent sensor based on the FRET system between UCNPs and GO@Fe_3O_4 in urine specimen

1. Calculation of quenching efficiency

The calculation of quenching efficiency was performed as follows: The fluorescence intensity of mPEG-UCNP-Apt at 475 nm was recorded as F_1. After incubation with GO@Fe_3O_4, the fluorescence intensity of supernatant separated by magnetic was recorded as F_2. And the quenching efficiency was calculated as follows:

$$\text{Quenching efficiency}(\%) = (F_1 - F_2)/F_1.$$

2. The ultraviolet spectrum of GO@Fe_3O_4

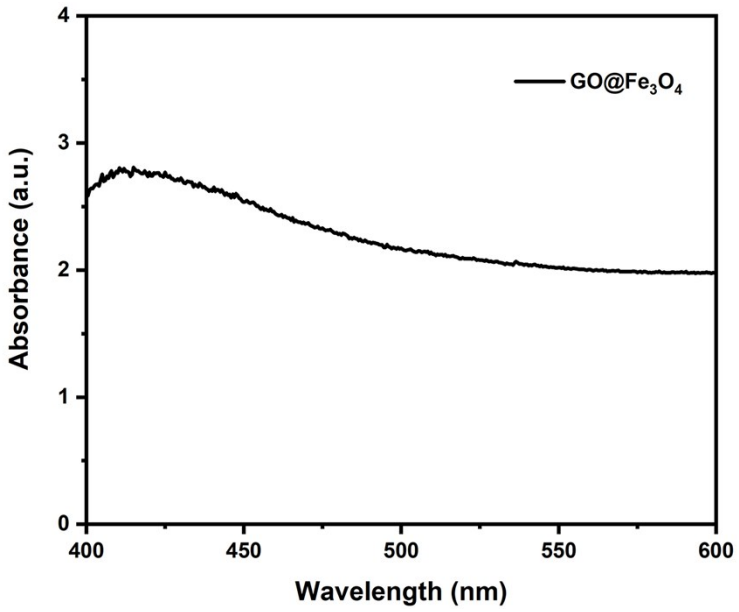

Fig. S1. Ultraviolet spectrum of GO@Fe_3O_4 (0.6 mg/mL)

3. The binding ability of GO@Fe_3O_4 for ssDNA

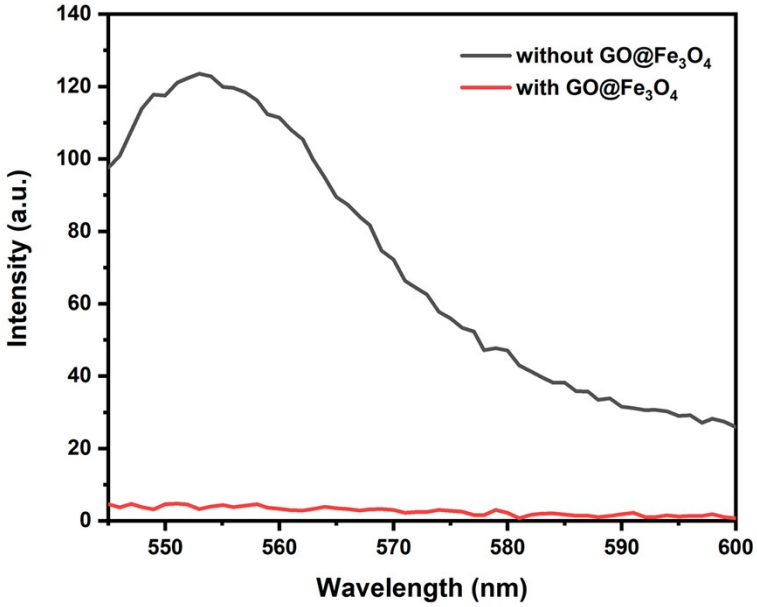

Fig. S2. Intensity of the HEX-labelled *E. coli* aptamer before and after incubation with 0.6 mg/mL GO@Fe_3O_4.

4. Performance comparison for *E. coli* detection

Table S1. Performance comparison for *E. coli* detection.

Detection method	Linear range (CFU/mL)	LOD (CFU/mL)	Detection time	Reference
Electrochemical	10^3--10^8	100	3 h	(Zhang et.al 2018)[1]
Fluorescence	500--10^6	487	40 min	(Hu et.al 2021)[2]
Flow Cytometry	3×10^4—3×10^8	100	1 h	(He et.al 2020)[3]
Impedance	10^3--10^7	500	1 h	(Elgiddawy et.al 2020)[4]
Immunosensor	10^2--10^7	267	1.5 h	(Li et.al 2020)[5]
Fluoescence	10^3--10^7	467	30 min	This work

5. Oligonucleotide sequences for *E.coli* recognition

Table S2. Oligonucleotide sequences used in this experiment.

Oligonucleotide	Sequence (5′ to 3′)
Aptamer(*E. coli*)	NH_2- CCGGACGCTTATGCCTTGCCATCTACAGAGCAGGTGTGACGG[6]
Aptamer(HEX)	HEX- CCGGACGCTTATGCCTTGCCATCTACAGAGCAGGTGTGACGG

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