

Supporting information

A Point-of-care Diagnostics Logic Detector Based on Glucose Oxidase Immobilized Lanthanide Functionalized Metal-organic Frameworks

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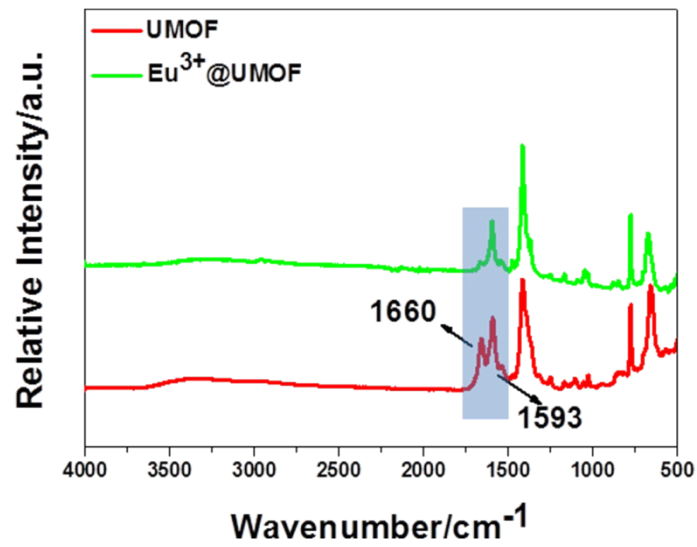


Figure S1 FT-IR spectra of UMOF and Eu^{3+} @UMOF.

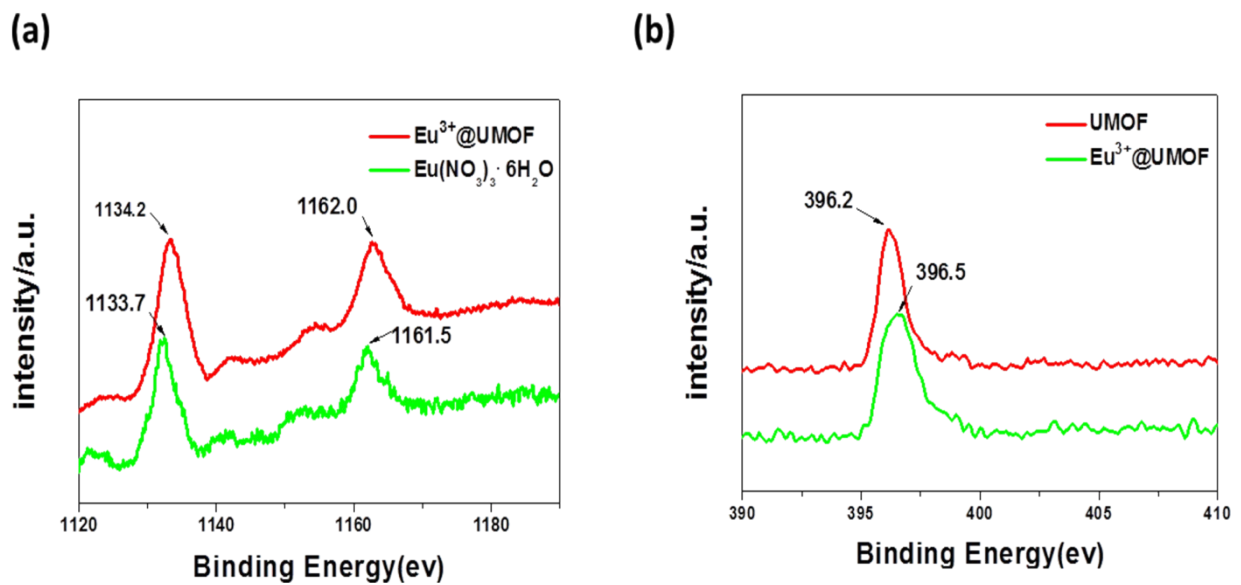


Figure S2 Eu 3d XPS spectra of Eu^{3+} @UMOF and $\text{Eu}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$; N 1s XPS spectra of UMOF and Eu^{3+} @UMOF.

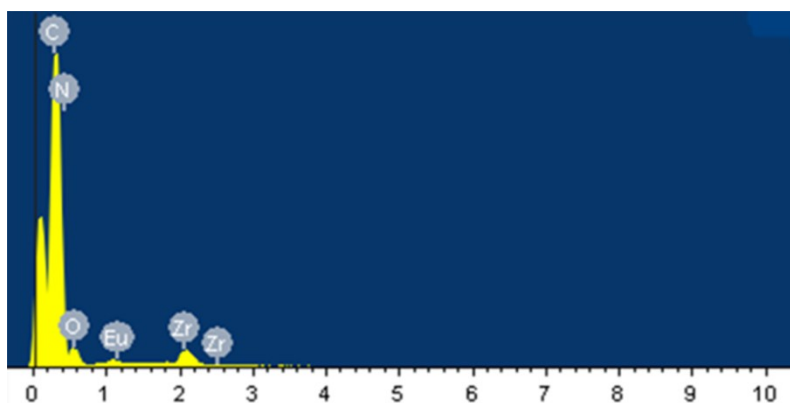
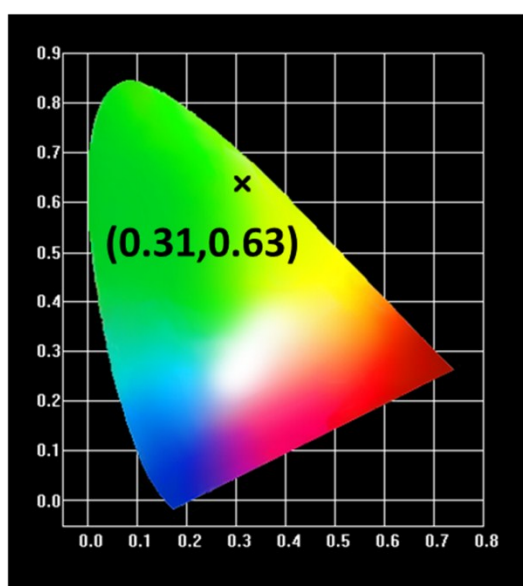


Figure S3 The energy dispersive X-ray spectroscopy (EDX) of $\text{Eu}^{3+}@$ UMOF.

(a)



(b)

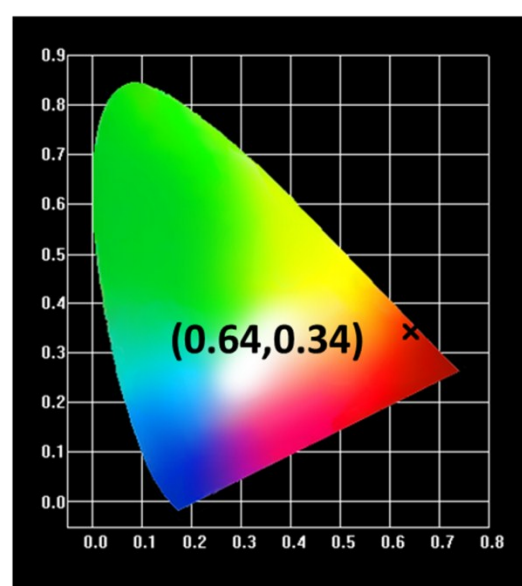


Figure S4 The corresponding CIE chromaticity diagram of (a) UMOF and (b) $\text{Eu}^{3+}@$ UMOF.

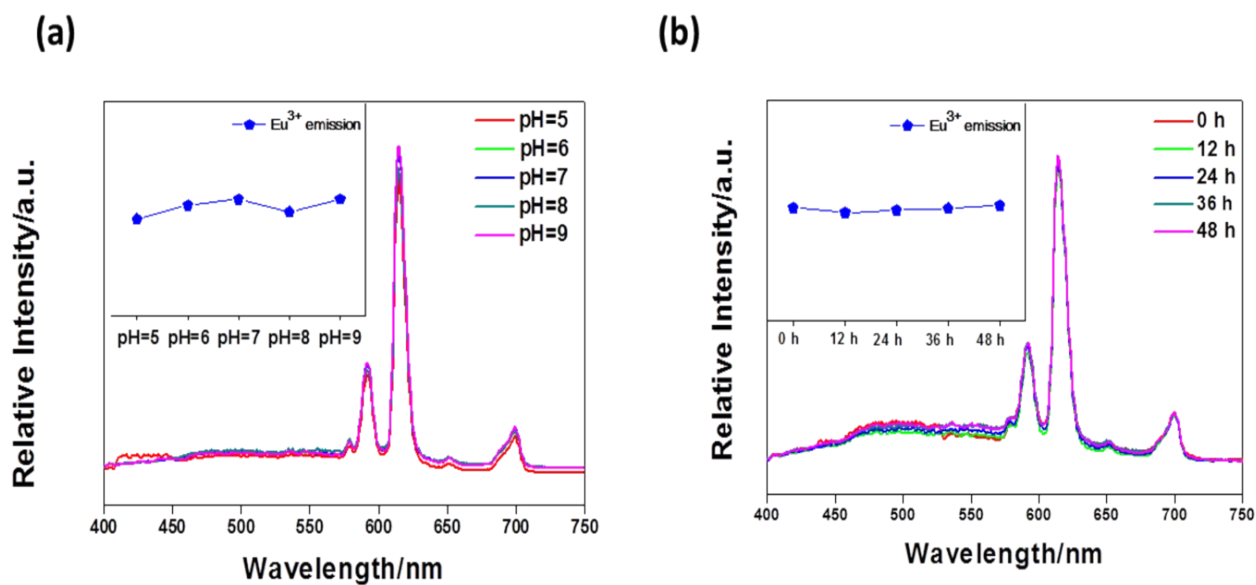


Figure S5 (a) The fluorescence stability of $\text{Eu}^{3+}@$ UMOF in different PH (5-9) solutions; (b) hour to hour fluorescence stability of $\text{Eu}^{3+}@$ UMOF.

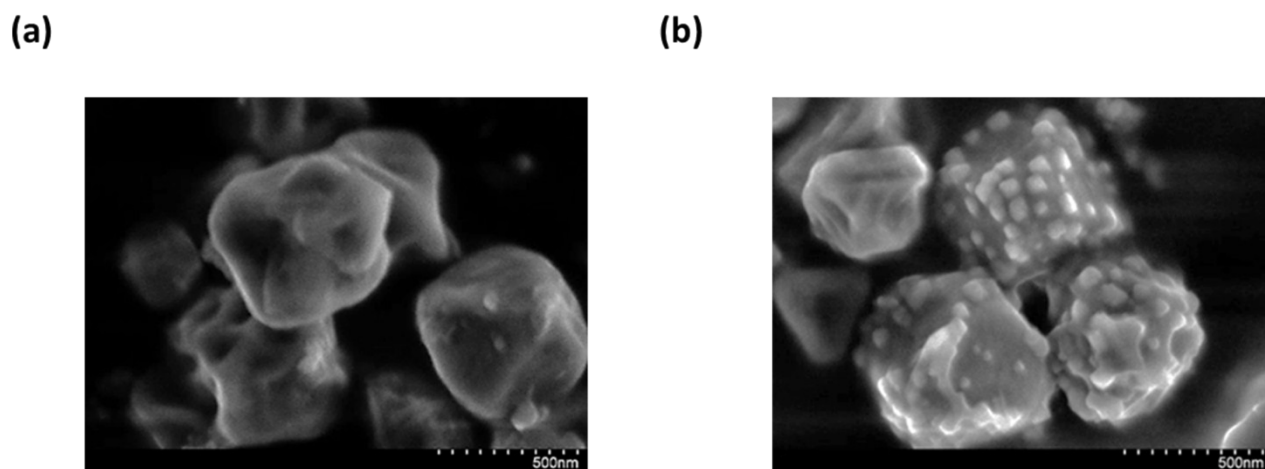


Figure S6 The SEM images of (a) $\text{Eu}^{3+}@$ UMOF and (b) $\text{GOx-Eu}^{3+}@$ UMOF.

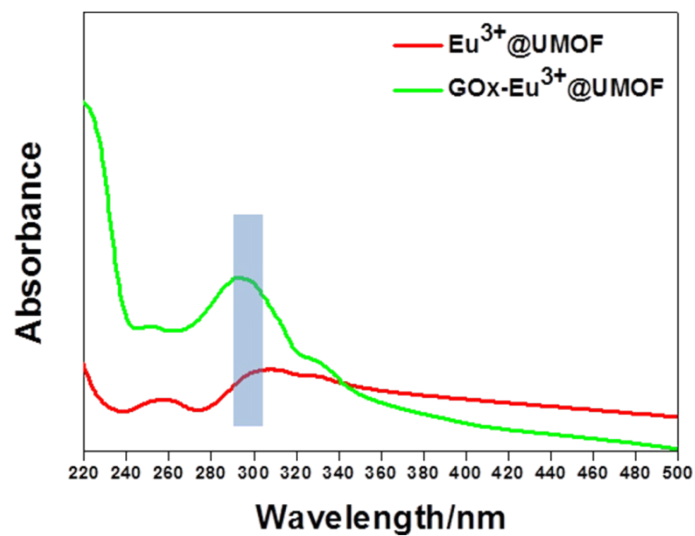


Figure S7 The UV-vis spectra of $\text{Eu}^{3+}@UMOF$ and $\text{GOx-Eu}^{3+}@UMOF$.

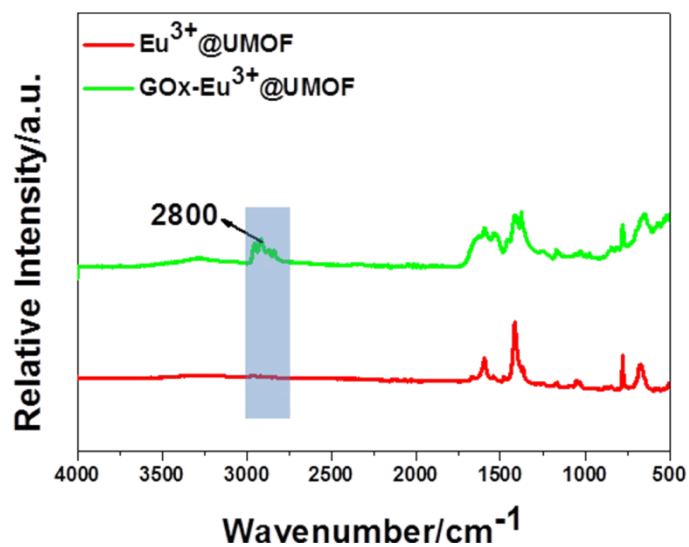
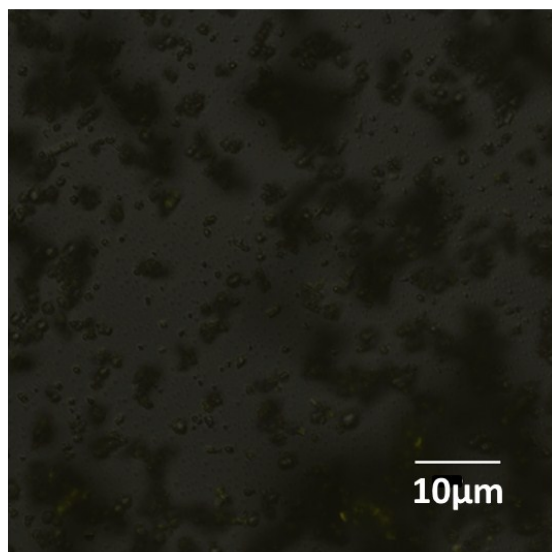


Figure S8 FT-IR spectra of $\text{Eu}^{3+}@UMOF$ and $\text{GOx-Eu}^{3+}@UMOF$.

(a)



(b)

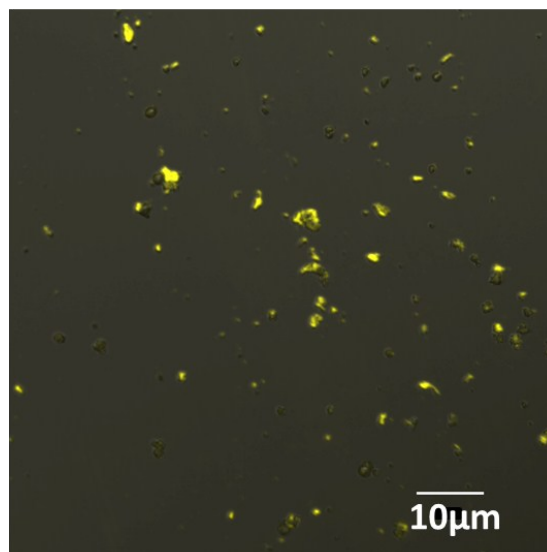
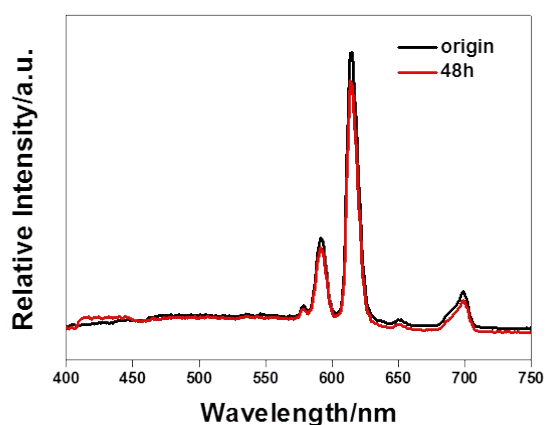


Figure S9 Confocal microscopy images of (a) GOx-Eu³⁺@UMOF; (b) RhB-GOx-Eu³⁺@UMOF

(a)



(b)

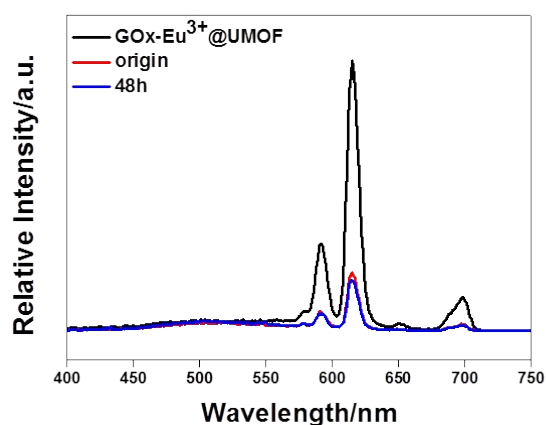


Figure S10 a) Luminescence spectra of GOx-Eu³⁺@UMOF and GOx-Eu³⁺@UMOF when stored for 48 hours at room temperature; b) Luminescence spectra of the original GOx-Eu³⁺@UMOF, GOx-Eu³⁺@UMOF immersing into Glu and GOx-Eu³⁺@UMOF immersing into Glu after stored for 48 hours at room temperature.

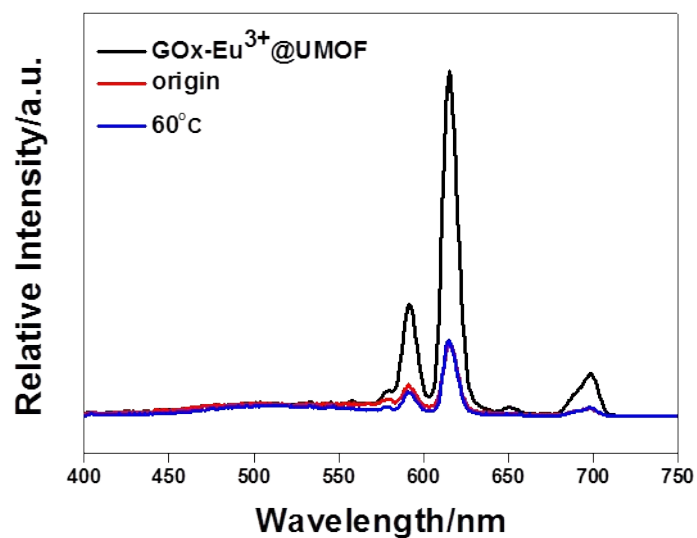


Figure S11 Luminescence spectra of the original GOx-Eu³⁺@UMOF, GOx-Eu³⁺@UMOF immersing into Glu and GOx-Eu³⁺@UMOF immersing into Glu after stored in in an oven at 60 °C.

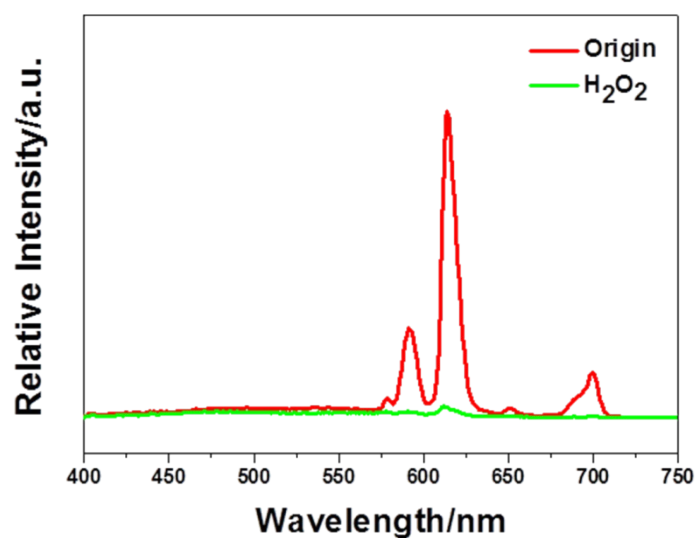


Figure S12 Luminescence spectra of GOx-Eu³⁺@UMOF when immersing in H₂O (red) and H₂O₂ (green).

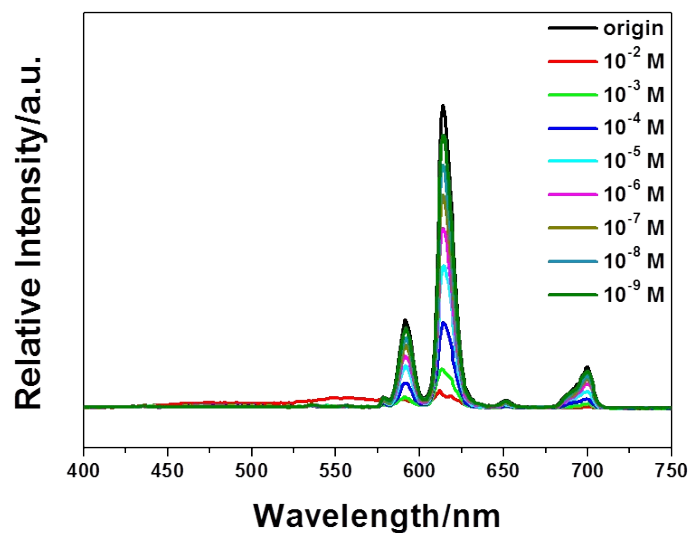


Figure S13 The luminescent intensity of $\text{Eu}^{3+}@UMOF$ toward different concentrations of H_2O_2 .

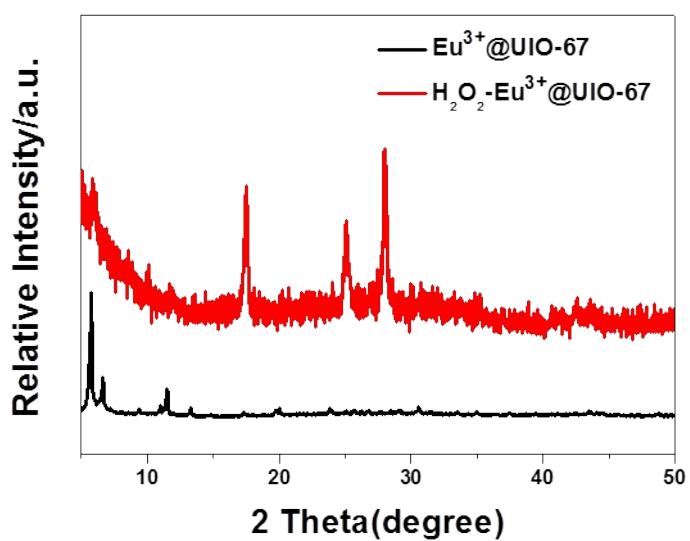


Figure S14 The PXRD patterns of $\text{Eu}^{3+}@UMOF$ and $\text{Eu}^{3+}@UMOF$ immersed into H_2O_2 .

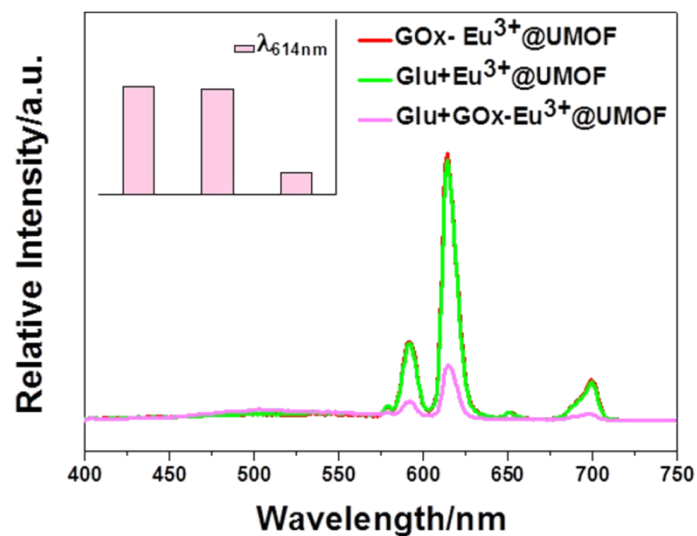


Figure S15 Luminescence spectra of (a) GOx-Eu³⁺@UMOF; (b) Eu³⁺@UMOF after immersing into Glu solutions; (c) GOx-Eu³⁺@UMOF after immersing into Glu solutions. The insert is the histogram of λ_{614nm}.

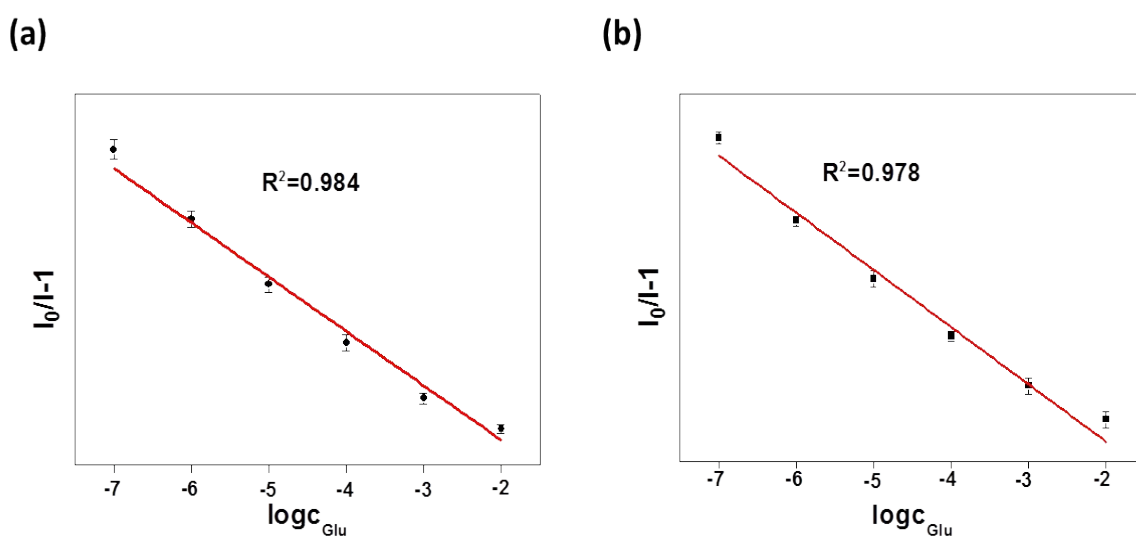


Figure S16 Linear curve of the luminescent intensity of GOx-Eu³⁺@UMOF toward different concentrations of Glu in (a) urine and (b) serum.

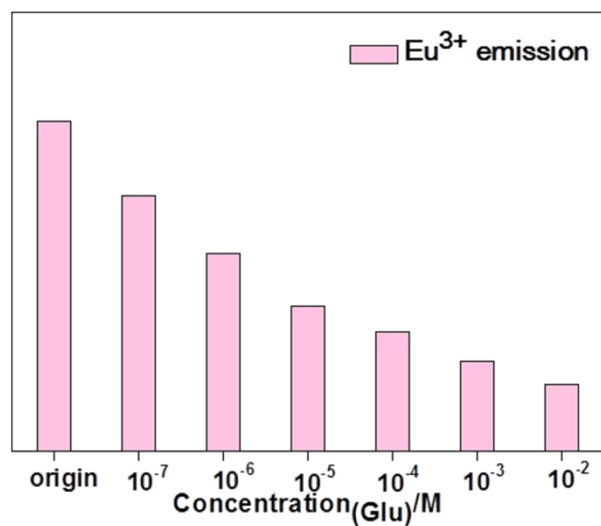


Figure S17 The column diagram of the fluorescence intensity of GOx-Eu³⁺@UMOF after immersing into different concentrations of Glu in urine.

Table S1 The weight percentage and atomic percentage of all elements in Eu³⁺@UMOF and GOx-Eu³⁺@UMOF determined by energy dispersive X-ray spectroscopy (EDX).

(a)

Materials	Element	Weight%	Atomic%
Eu ³⁺ @UMOF	C	49.19	56.03
	N	36.65	35.79
	O	8.70	7.44
	Zr	4.04	0.61
	Eu	1.42	0.13

(b)

Materials	Element	Weight%	Atomic%
GoX-Eu ³⁺ @UMOF	C	54.60	60.14
	N	32.82	31.00
	O	10.36	8.57
	Zr	1.82	0.26
	Eu	0.39	0.03

Table S2 The GOx loading in repeated experiments.

Times	1	2	3	4	5	6	7	8
GOx loading(%)	54.95	55.65	53.25	54.05	53.69	55.68	54.80	54.58

Table S3 The zeta potential of UMOF, Eu³⁺@ and GOx-Eu³⁺@UMOF.

Materials	Zeta potential (mv)
UMOF	-3.87mv
Eu ³⁺ @UMOF	-3.95mv
Gox-Eu ³⁺ @UMOF	-5.76mv

Table S4 The kinetic parameters of GOx-Eu³⁺@UMOF.

	K _m /mM	V _{max} / μ M S ⁻¹
Gox-Eu ³⁺ @UMOF	1.75	0.23

Table S5 The truth table of Gate 1, Gate 2 and Gate 3

Gate 1			(b) Gate 2				(c) Gate 3			
Input 1		Output 1	Input 2		Output 2		Input 3		Output 3	
C _{Glu} >0.1 μ M	λ_{ex}	Light 1	C _{Glu} >10 μ M	λ_{ex}	Output 1	Light 2	C _{Glu} >10mM	λ_{ex}	Output 2	Light 3
1	0	0	1	0	0	0	1	0	0	0
1	1	0	1	1	0	0	1	1	0	0
0	0	0	0	0	0	0	0	0	0	0
0	1	1	0	1	0	1	0	1	0	1
			1	0	1	0	1	0	1	0
			1	1	1	0	1	1	1	0
			0	0	1	0	0	0	1	0
			0	1	1	0	0	1	1	0