Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

A multifunctional fluorescent platform based on polyoxometalate functionalized HOFs for 5-hydroxymethylfurfural, 2-furaldehyde and ascorbic acid sensing, logic computing and anti-counterfeiting

Zishuo Zhang, Xin Xu, Bing Yan*

School of Chemical Science and Engineering, Tongji University, Siping Road 1239, Shanghai 200092, China.

* Corresponding author: Email address: byan@tongji.edu.cn (Bing Yan)

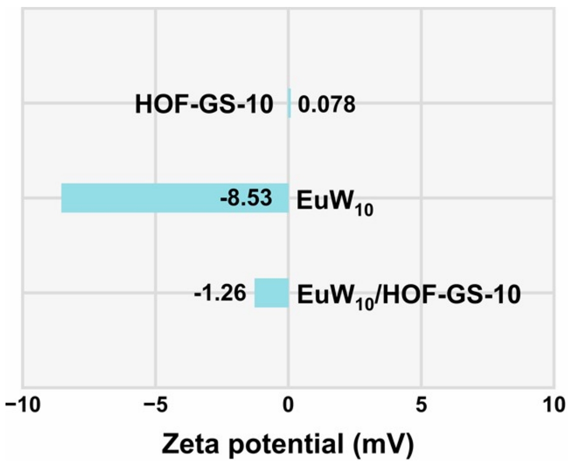

Figure S1 ξ-Potential analysis of EuW_{10}, HOF-GS-10 and EuW_{10}/HOF-GS-10 (**1**) suspensions.

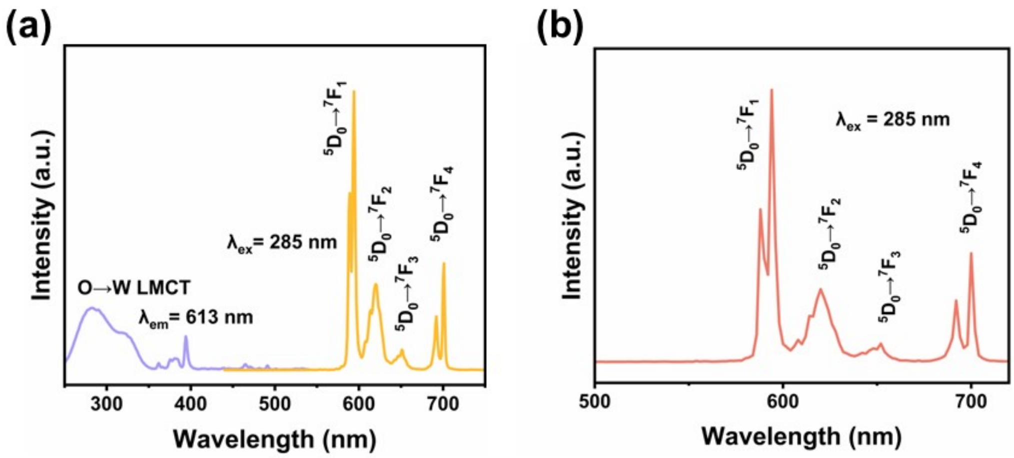

Figure S2 (a) The solid-state excitation and emission spectra of EuW_{10}. (b) The emission spectrum of EuW_{10} in solution at the 285 nm excitation.

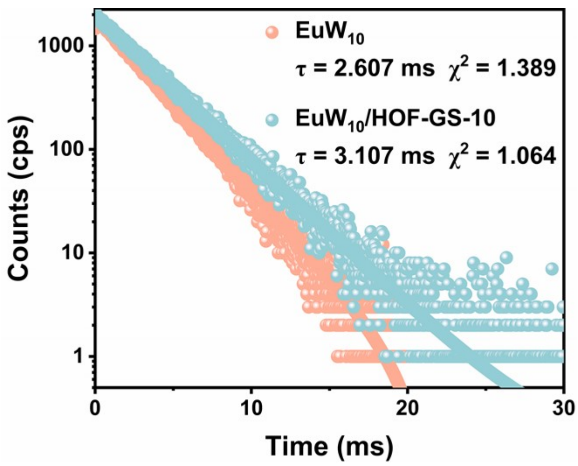

Figure S3 Decay lifetimes curve of the emission peak at 613 nm for EuW_{10} (λ_{ex} = 285 nm) and that of **1** at 595 nm (λ_{ex} = 310 nm).

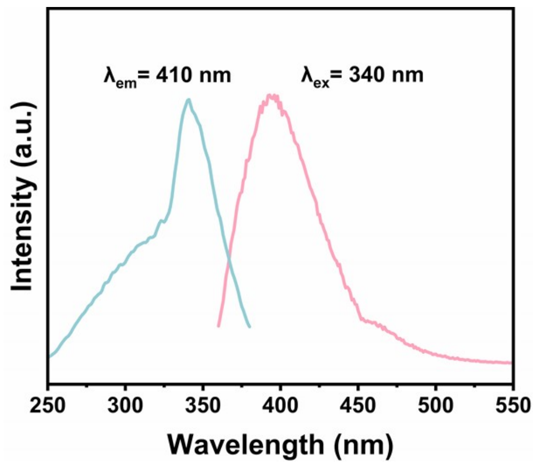

Figure S4 The solid-state fluorescence excitation and emission spectra of HOF-GS-10.

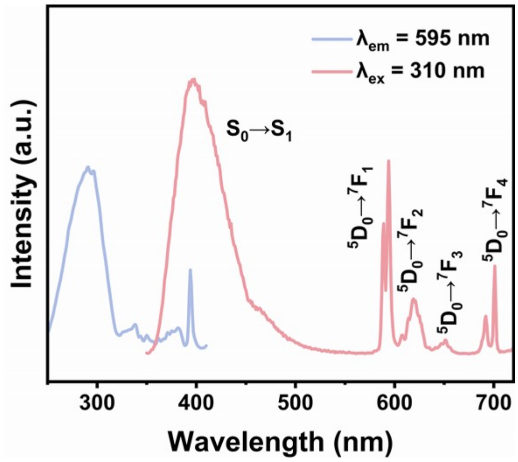

Figure S5 The solid-state fluorescence excitation and emission spectra of **1**.

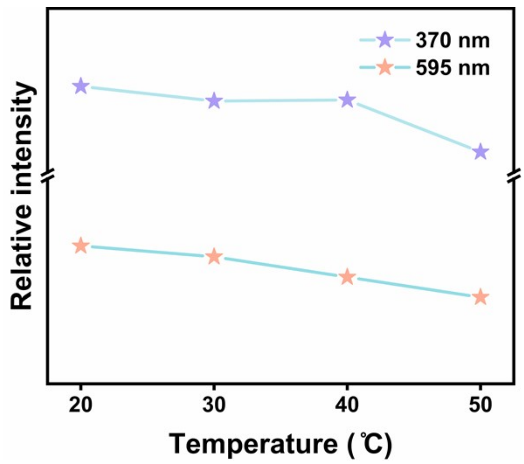

Figure S6 The emission intensity of **1** at 370 and 595 nm at different temperatures upon 310 nm excitation.

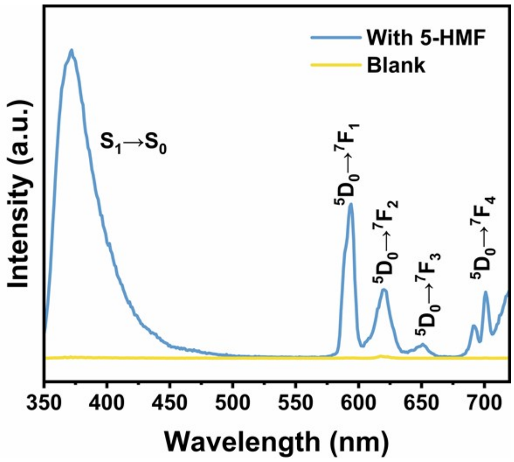

Figure S7 The fluorescence emission spectrum of **1** before and after adding 5-HMF (10^{-2} M) (λ_{ex} = 310 nm).

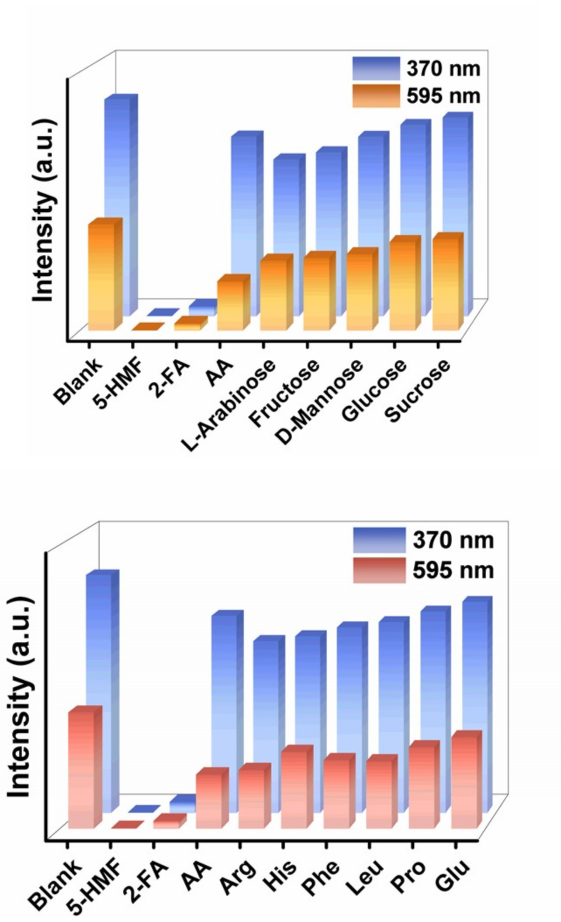

Figure S8 The histogram of emission intensity at 370 and 595 nm with addition of saccharides and amino acids.

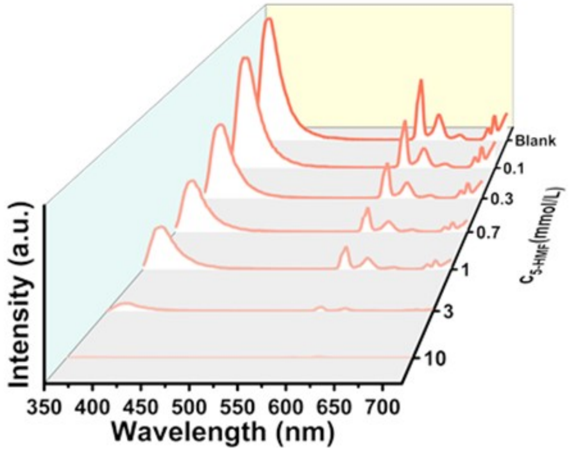

Figure S9 Fluorescence response spectra of **1** toward different concentrations of 5-HMF (λ_{ex} = 310 nm).

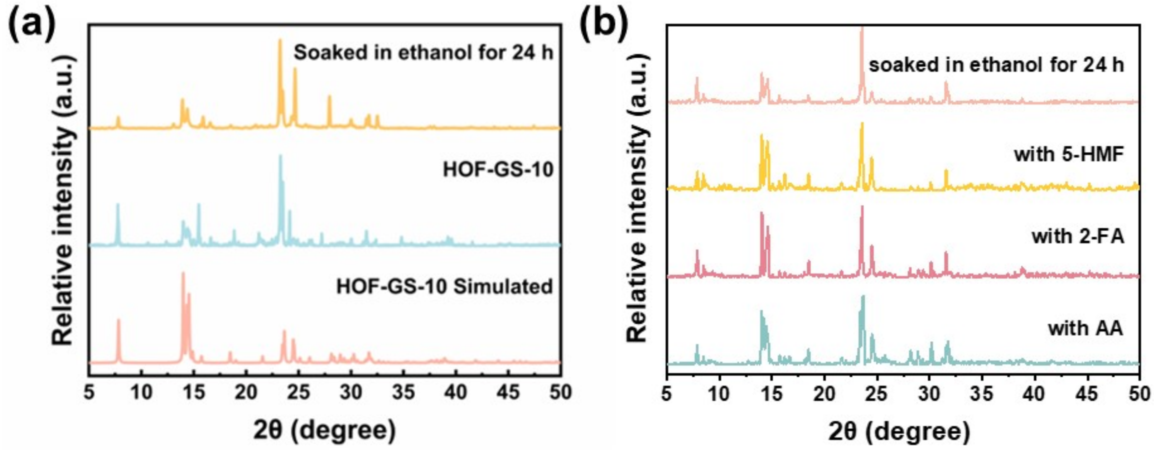

Figure S10 (a)PXRD patterns of HOF-GS-10 after treated by soaking in ethanol for 24h. (b) PXRD patterns of **1** after treated by soaking in ethanol for 24h and by containing 5-HMF, 2-FA and AA solutions.

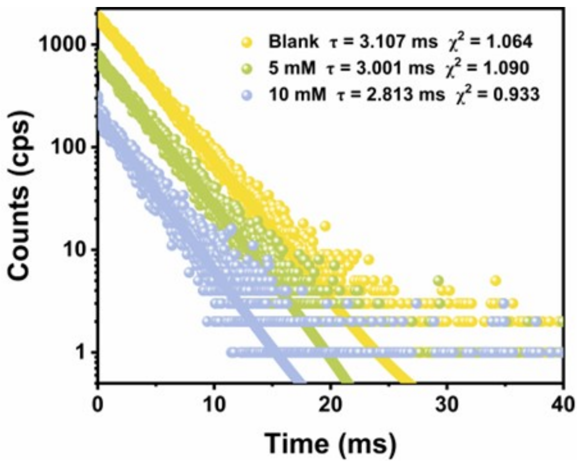

Figure S11 The time-resolved fluorescence decay spectra of **1** before and after adding different concentration of 5-HMF.

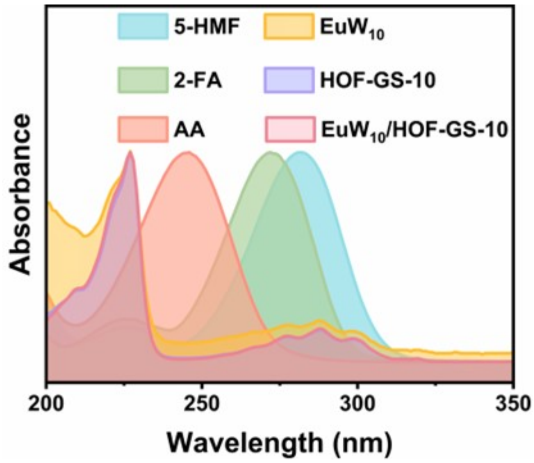

Figure S12 The UV-vis absorption of EuW_{10}, HOF-GS-10 and **1**.

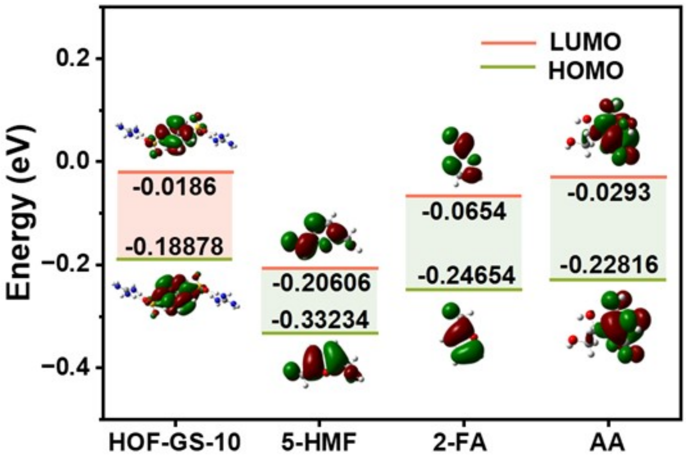

Figure S13 LUMO and HOMO levels of HOF-GS-10 and 5-HMF, 2-FA and AA.

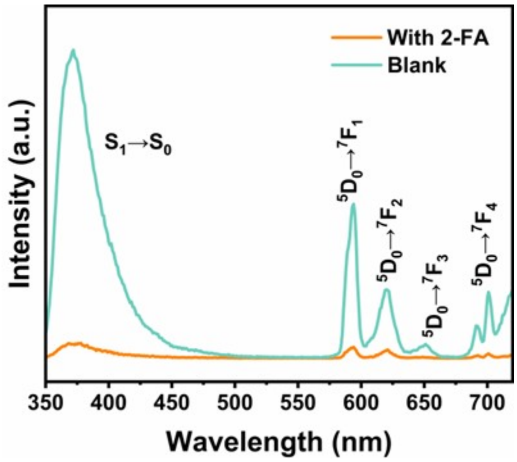

Figure S14 LUMO and HOMO levels of HOF-GS-10 and 5-HMF, 2-FA and AA.

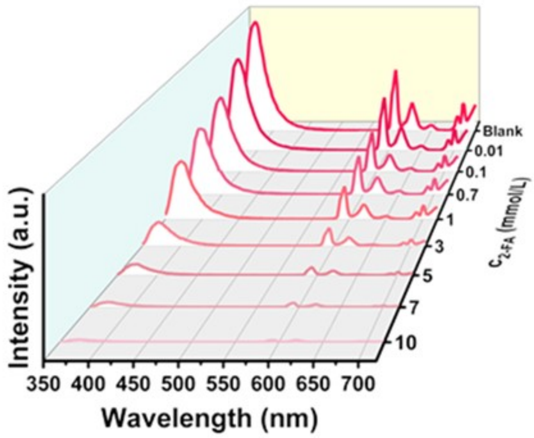

Figure S15 Fluorescence response spectra of **1** toward different concentrations of 2-FA (λex = 310 nm).

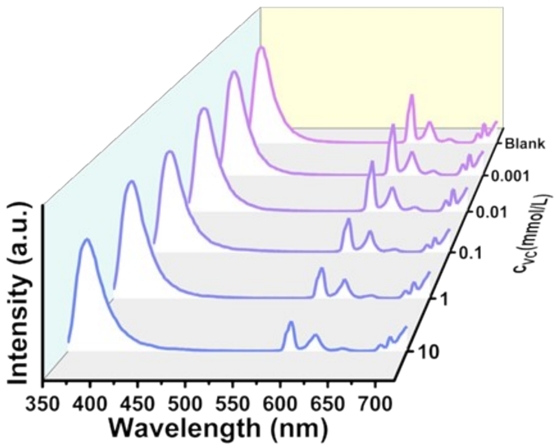

Figure S16 Fluorescence response spectra of **1** toward different concentrations of AA (λ_{ex} = 310 nm).

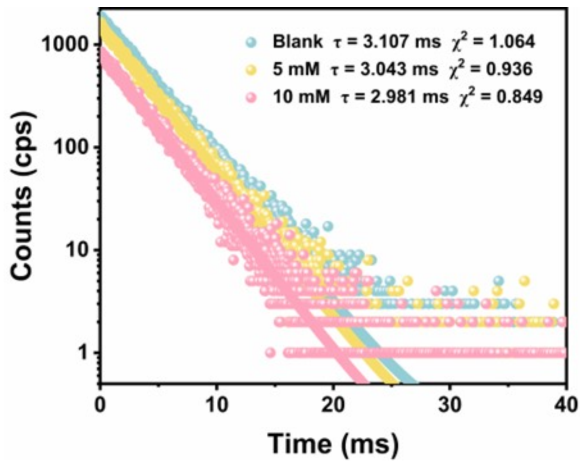

Figure S17 The time-resolved fluorescence decay spectra of **1** before and after adding different concentration of 2-FA.

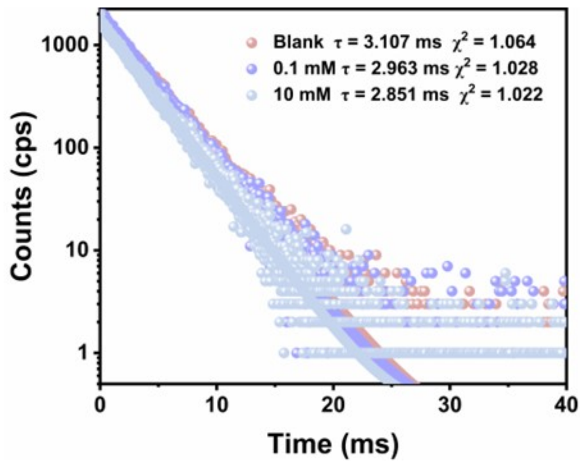

Figure S18 The time-resolved fluorescence decay spectra of **1** before and after adding different concentration of AA.

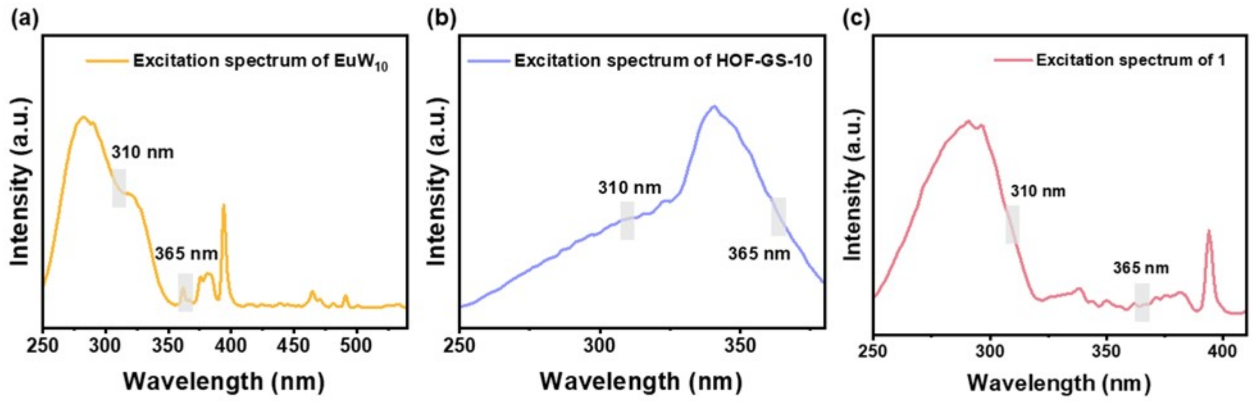

Figure S19 The fluorescence excitation spectra of (a) EuW_{10}, (b) HOF-GS-10 and (c) **1**.

Table. S1. ICP-OES analysis of **1**.

Samples	Eu (wt%)	W (wt%)
EuW_{10}/HOF-GS-10	0.517	7.841

Table. S2. Summary of detection method and detection limit (LOD) of 5-HMF, 2-FA and AA.

	Analytical method	LOD (μM)	Reference
5-HMF	Fluorescent detection	43	[1]
	SERS	75	[2]
	HPLC/diode-array detector	1.98	[3]
	SPE-LC–MS	1.54	[4]
	Fluorescent detection	1.116	This work
2-FA	SERS	11	[5]
	HPLC/diode-array detector	1.04	[3]

	Fluorescent detection	1.448	This work
AA	Fluorescent detection	74	[6]
	Fluorescent detection	6	[7]
	Fluorescent detection	1.3	[8]
	Fluorescent detection	8.837	This work

Calculation method for LOD:

The limit of detection is calculated according to the previous work. The calculation formula is listed as follows:

$$\frac{3.3\sigma}{LOD} = \frac{Signal\ Intensity\ (A)}{Concentration\ (A)}$$

where σ is the standard deviation of fluorescent intensity of blank solutions for 20 repeated measurements and A is the corresponding value at the analyte's minimum concentration in the linear relationship.[9]

References

1 K. Luo, H. Chen, Q. Zhou, Z. Yan, Z. Su and K. Li, *Anal. Chim. Acta*, 2020, **1124**, 113-120.

2 J. Zhang, Y. Li, M. Lv, Y. Bai, Z. Liu, X. Weng and C. You, *Spectrochim. Acta, Part A*, 2022, **279**, 121393.

3 P. Chambel, M. B. Oliveira, P. B. Andrade, R. M. Seabra and M. A. Ferreira, *J. Liq. Chromatogr. Relat. Technol.*, 2006, **20**, 2949-2957.

4 S. Imperiale, K. Morozova, G. Ferrentino, M. R. Alam and M. Scampicchio, *Food Anal. Methods*, 2021, **15**, 1-9.

5 H. Shi, W. Chen, F. Wan, L. Du, S. Zhang, W. Zhou, J. Zhang, Y. Huang and C. Zhu, *Nanomaterials*, 2018, **9**, 17.

6 N. Selivanova and Y. Galyametdinov, *Chemosensors*, 2021, **9**, 134.

7 J. Song, X. Guo, H. Chen, Y. Tang and L. Han, *Molecules*, 2023, **28**, 2162.

8 J. Zhu, Z.-J. Zhao, J.-J. Li and J.-W. Zhao, *J. Lumin.*, 2017, **192**, 47-55.

9 D. Kong, J. Zhao, S. Tang, W. Shen and H. K. Lee, *Anal. Chem.*, 2021, **93**, 12156-12161.