Electronic Supporting Information

Dye encapsulated zinc-based metal-organic framework as a dual-emission sensor for highly sensitive detection of antibiotics

Kang Wang, Yuhan Duan, Jiajing Chen, Haiying Wang* and Huiyan Liu*

School of Chemistry & Materials Science, Jiangsu Key Laboratory of Green Synthetic Chemistry for Functional Materials, Jiangsu Normal University, Xuzhou 221116, P. R. China

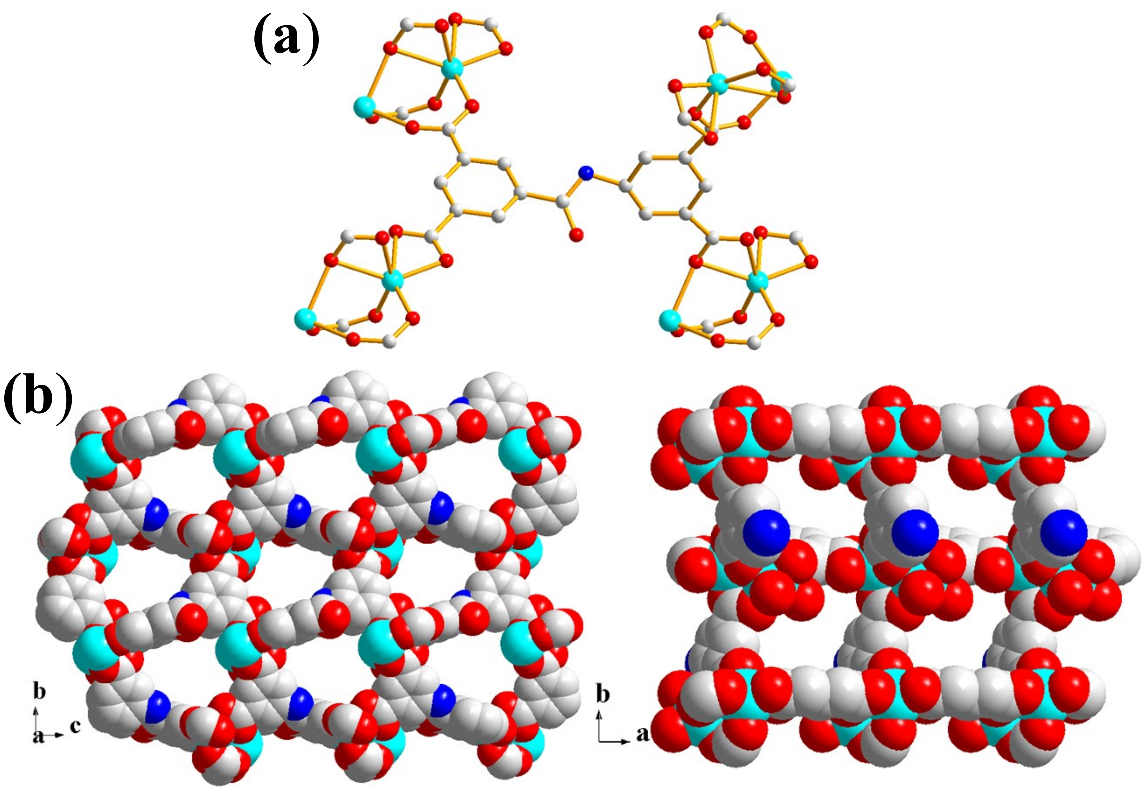


Fig. S1 (a) The coordination modes of H_4L in **1**. (b) Space-filling representation of 3D framework of **1** showing channels of approximate dimension 7.3× 6.1 Å^2 and 6.6 × 6.3 Å^2 (point-to-point and excluding van der Waals radii) along the *a* axis and *c* axis, respectively.

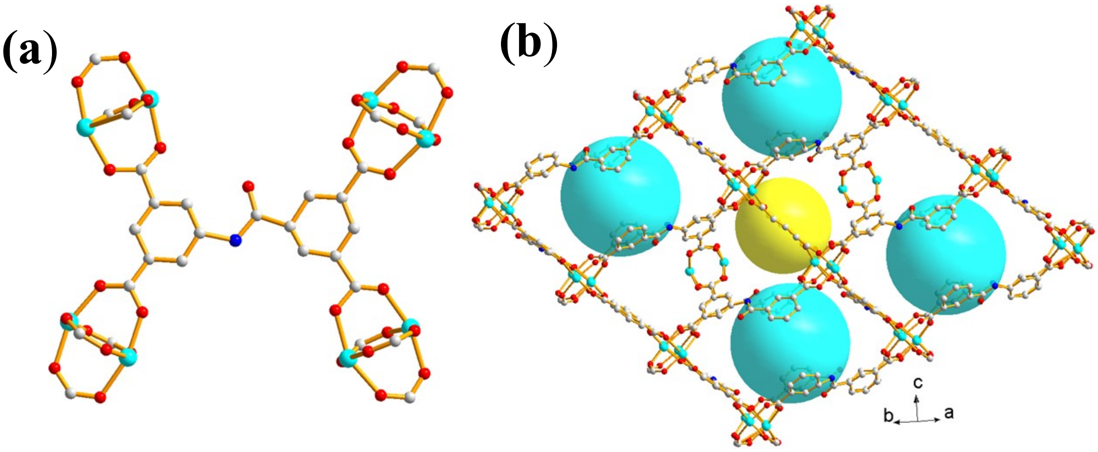


Fig. S2 (a) The coordination modes of H_4L in **2**. (b) Ball-and-stick representation of 3D framework of **2**.

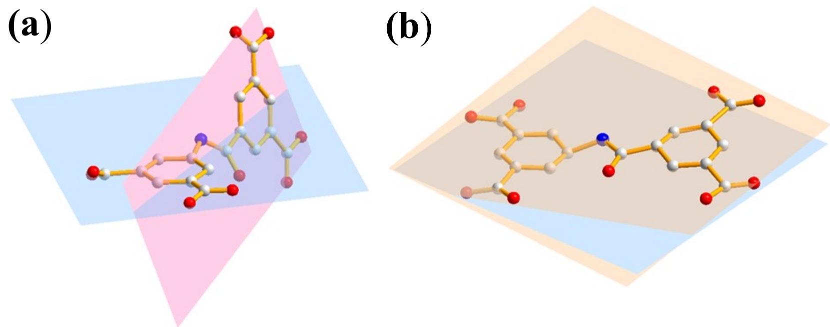


Fig. S3 (a) Conformation of L^{4-} linker in **1** in which the two terminal isophthalic moieties are not coplanar with a dihedral angle of about 77.1°. (b) Conformation of L^{4-} linker in **2** with four carboxyl groups are almost in the same plane.

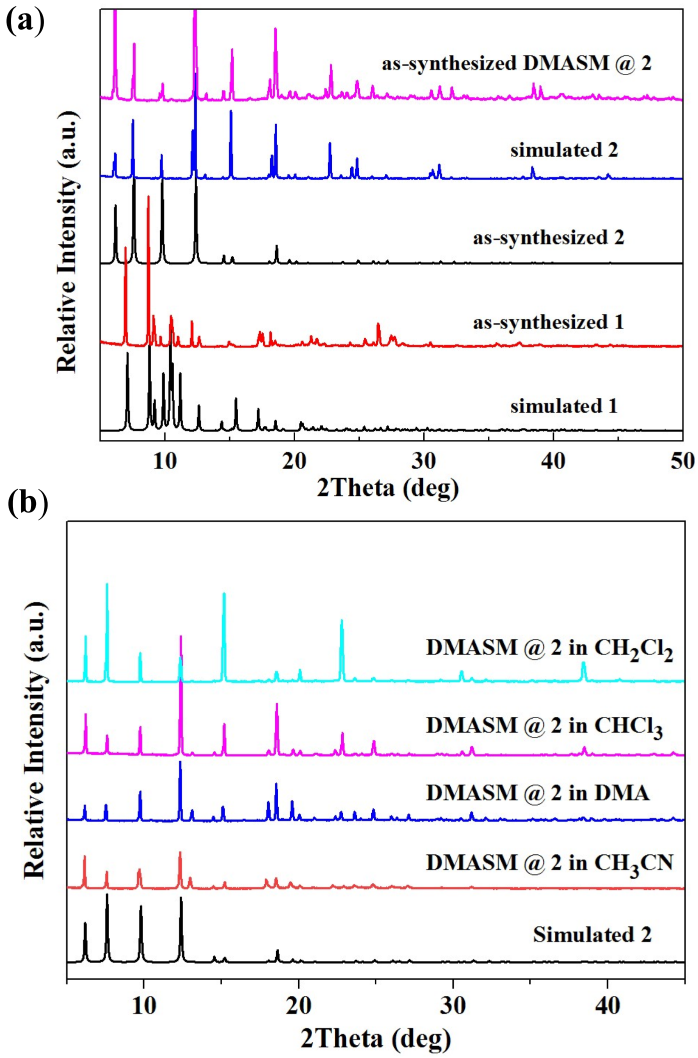


Fig. S4 PXRD patterns of **1**, **2** and **DMASM@2** (a) and **DMASM@2** in common solvents (b).

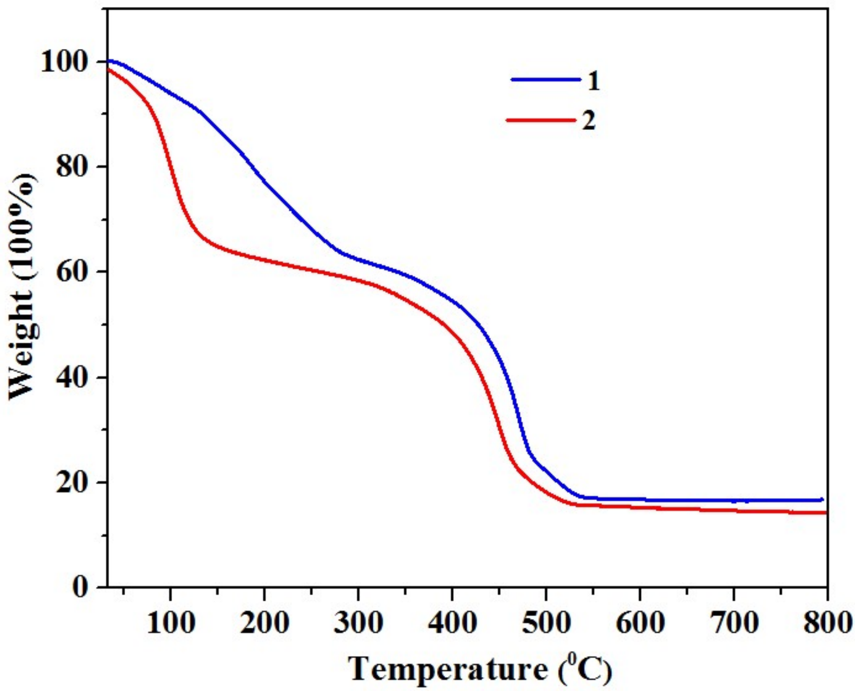


Fig. S5 TG curves of as-synthesized **1** and **2**.

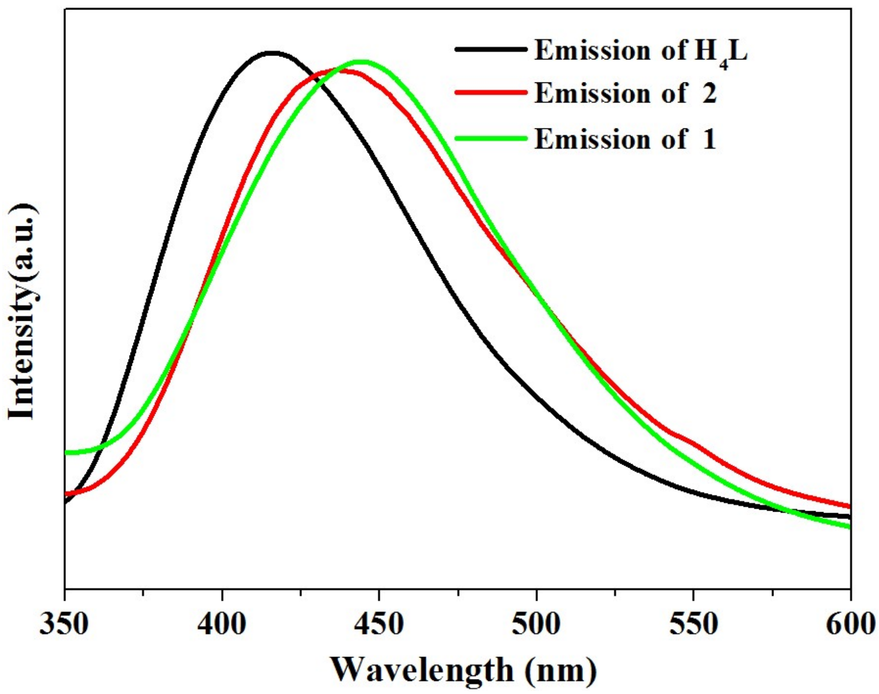


Fig. S6 Solid-state luminescence spectra of H_4L, **1** and **2** at room temperature.

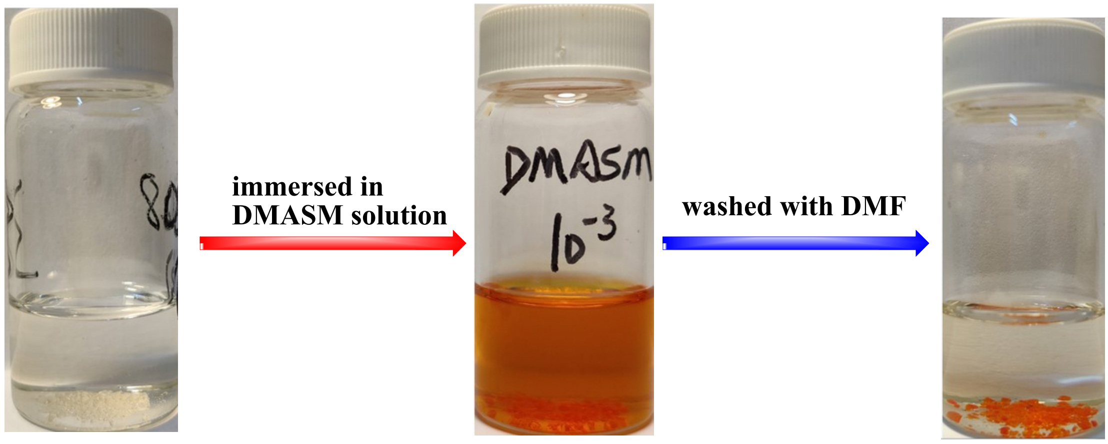


Fig. S7 The pristine **2** before and after immersed in DMF solution of DMASM (1 mM) at 60 °C for 5 days.

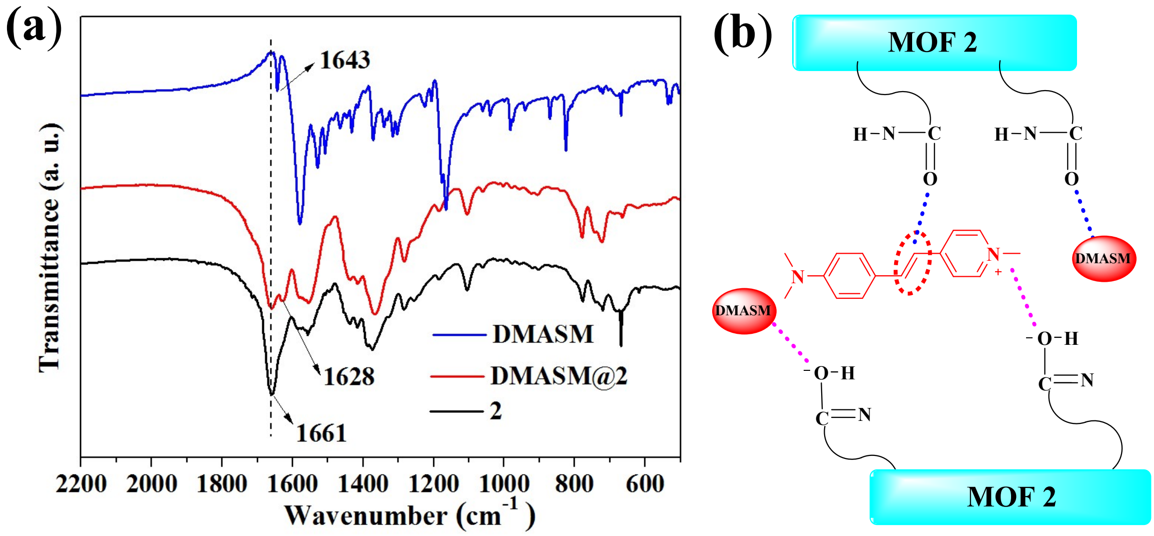


Fig. S8 (a) Portions of FTIR spectra recorded for **2**, **DMASM@2** and DMASM. (b) Possible interaction mechanism between DMASM and **2**.

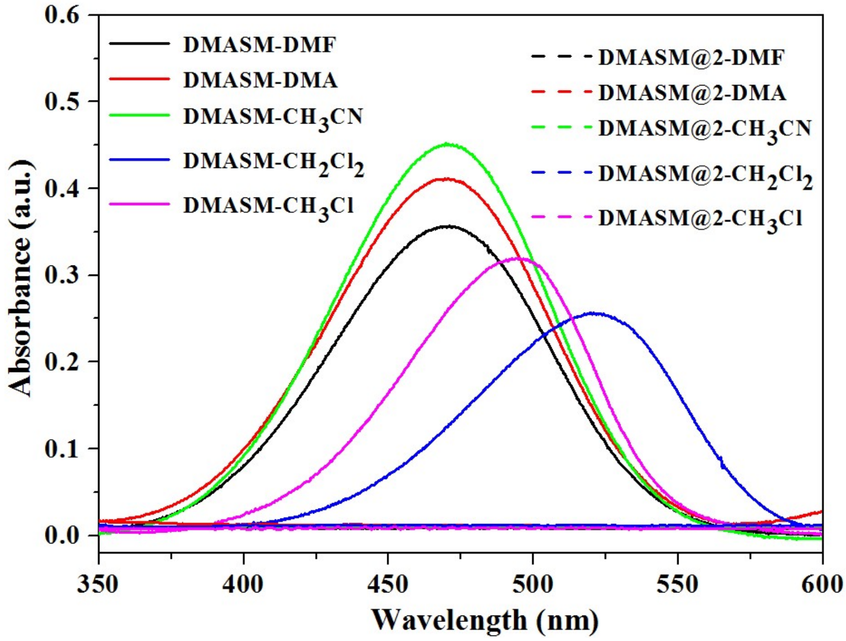


Fig. S9 UV-Vis spectra of **DMASM** in several solvents (DMF, DMA, CH_3CN, CH_2Cl_2 and CH_3Cl) and the spectra of **DMASM@2** after immersed in these solvents for 48 h and separated.

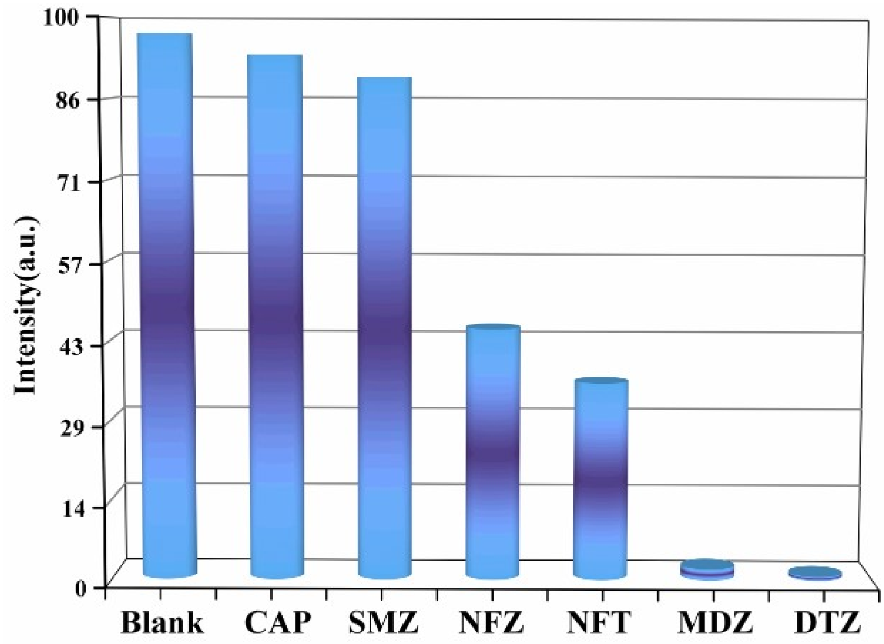


Fig. S10 Comparison of the fluorescence intensity of **DMASM@2** with different antibiotics.

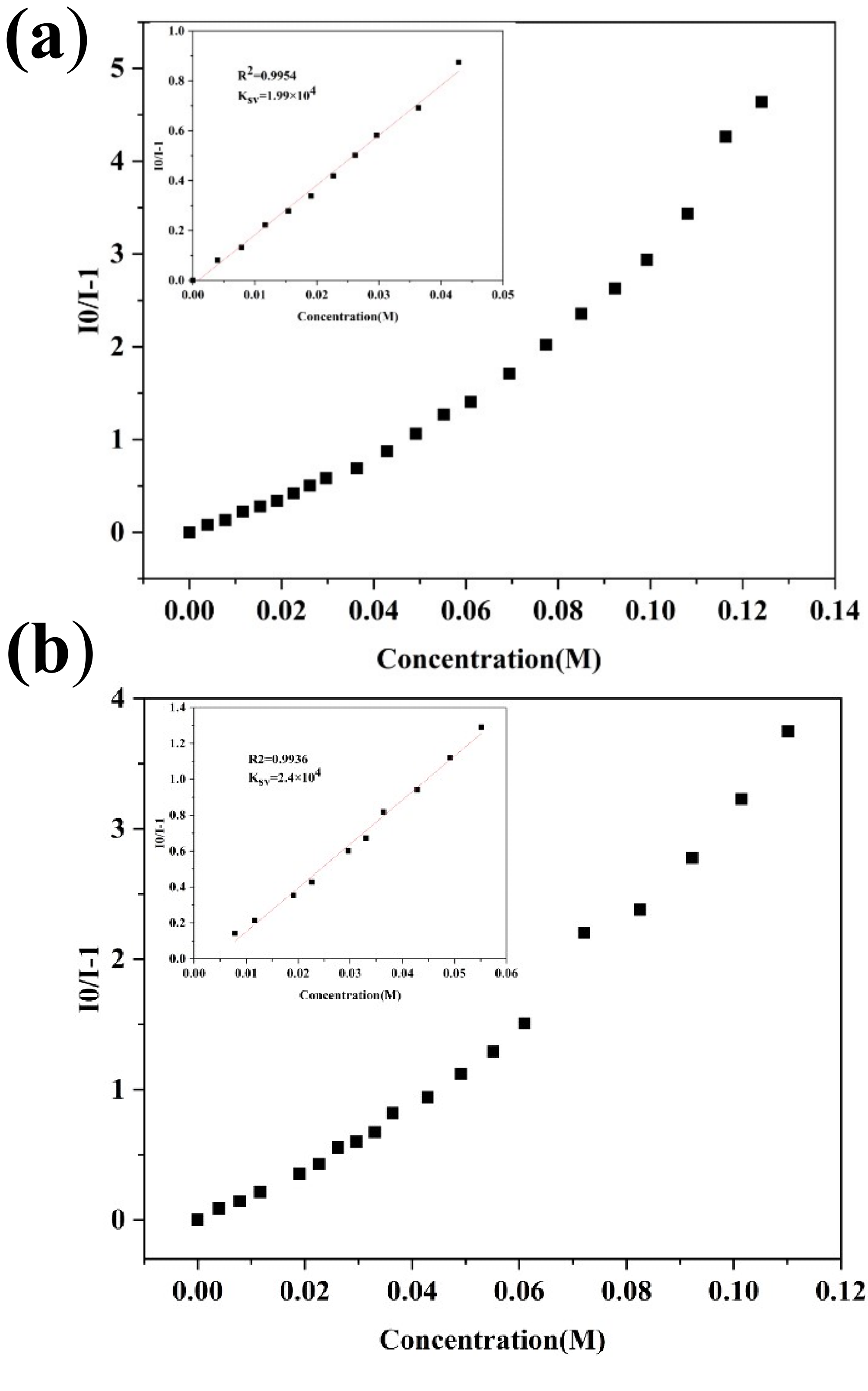


Fig. S11 The Stern-Volmer plots for **2** with MDZ (a) and DTZ (b).

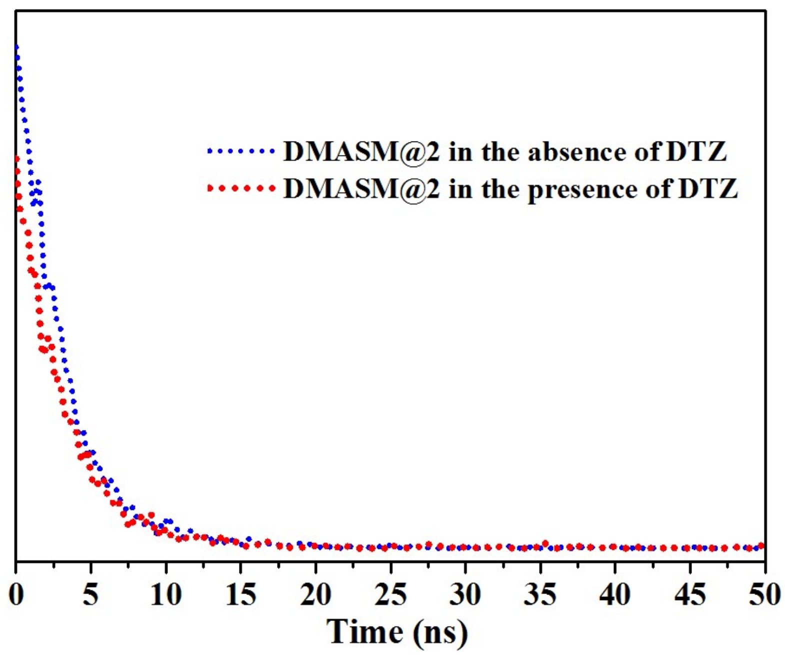
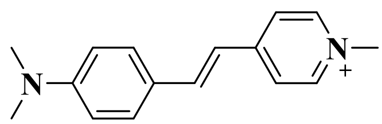
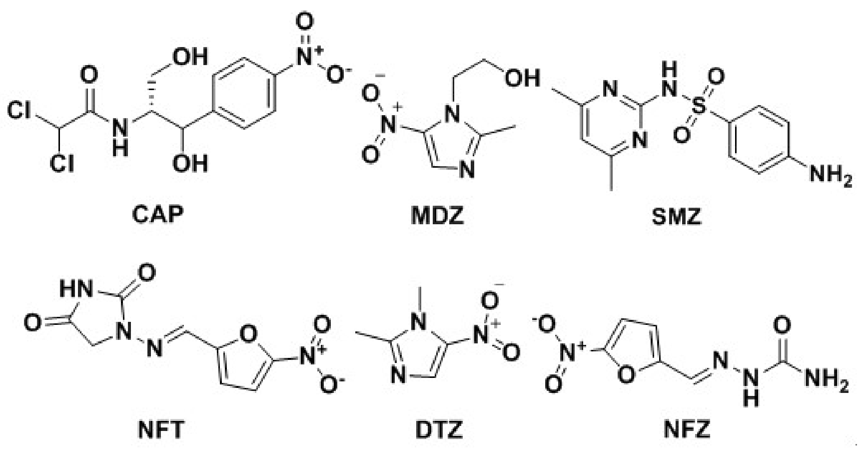


Fig. S12 Luminescence decay curves for DMF dispersion of **DMASM@2** in the absence and presence of DTZ (0.5 mM).



Scheme S1 Schematic structural illustration of fluorescent dye 4-[*p*-(dimethylamino)styryl]-1-methylpyridinium (DMASM).



Scheme S2 Schematic structural illustration of six antibiotics used.

Table S1 Summary of some MOF-based luminescent materials for sensing antibiotics

MOFs or dye@MOF	K_{SV} **(M^{-1})**	**antibiotic**	**reference**
$[NaCd_2(L)(BDC)_{2.5}]\cdot 9H_2O$	5.06×10^4	NZF	1
	3.57×10^4	NFT	1
	1.83×10^4	FZD	1
$[Cd_2(L)(2,6\text{-}NDC)_2]\cdot DMF\cdot 5H_2O$	1.04×10^5	NZF	1
	7.19×10^4	NFT	1
	6.38×10^4	FZD	1
MOG (Eu)	2.9×10^4	RDZ	2
	2.1×10^4	ODZ	2
	2.3×10^4	MDZ	2
	1.4×10^4	DTZ	2
$[Cd_3(DBPT)_2(H_2O)_4]\cdot 5H_2O$	2.4×10^4	ONZ	3
	2.0×10^4	MNZ	3
	1.7×10^4	DMZ	3
	1.1×10^4	2-M-5-MZ	3
Zn-PDC/Tb^{3+}	1.1×10^5	CFX	4
$[Me_2NH_2][In(L)]\cdot 2.5NMF\cdot$	3.35×10^4	NZF	5
$[Eu_2(BCA)_3(H_2O)(DMF)_3]\cdot 0.5DMF\cdot H_2O$	2.2×10^4	NFZ	6
	1.6×10^4	NFT	6
$[Eu_2(2,3'\text{-}oba)_3(phen)_2]_n$	2.39×10^4	MDZ	7
$\{[Cd_3(TDCPB)\cdot 2DMAc]\cdot DMAc\cdot 4H_2O\}$	7.46×10^4	NFT	8
RhB@Tb-dcpcpt	3.78×10^4	NZF	9
	3.99×10^4	NFT	9
RhB-CDs@$[Cu_2L(OH)]_n$	1.98×10^4	NZF	10
	2.09×10^4	NFT	10
	4.0×10^3	TCS	10
	1.38×10^4	NFX	10
	2.5×10^4	CPFX	10
1⊃DSM	1.13×10^5	NZF	11
	5.85×10^4	FZD	11
	9.5×10^3	DTZ	11
	1.08×10^4	ODZ	11
	7.41×10^3	RDZ	11
1⊃HPTS	1.72×10^4	NZF	12
	1.01×10^4	NFT	12
	1.72×10^4	FZD	12
DMASM@2	3.1×10^4	MDZ	this work
	3.2×10^4	DTZ	this work

References

1. D. Zhao, X. H. Liu, Y. Zhao, P. Wang, Y. Liu, M. Azam, S. I. Al-Resayes, Y.

Lu and W. Y. Sun, *J. Mater. Chem. A*, 2017, **5**, 15797-15807.
2. Z. S. Qin, W. W. Dong, J. Zhao, Y. P. Wu, Z. F. Tian, Q. C. Zhang and D. S. Li, *Eur. J. Inorg. Chem.*, 2018, **2018**, 186-193.
3. B. X. Dong, Y. M. Pan, W. L Liu and Y. L. Teng, *Cryst. Growth Des.* 2018**, 18**, 431-440.
4. H. Pan, S. Wang, X. Dao and Y. Ni, *Inorg. Chem.*, 2018, **57**, 1417-1425.
5. B. Zhang, P. Y. Guo, L. N. Ma, B. Liu, L. Hou and Y. Y. Wang, *Inorg. Chem.*, 2020, **59**, 5231-5239.
6. F. Zhang, H. Yao, T. Chu, G. Zhang, Y. Wang and Y. Yang, *Chem. Eur. J.*, 2017, **23**, 10293-10300.
7. J. M. Li, R. Li and X. Li, *CrystEngComm*, 2018, **20**, 4962-4972.
8. Q. Q. Zhu, Q. S. Zhou, H. W. Zhang, W. W. Zhang, D. Q. Lu, M. T. Guo, Y. Yuan, F. X. Sun and H. M. He, *Inorg. Chem.*, 2020, **59**, 1323-1331.
9. M. Yu, Y. Xie, X. Wang, Y. Li and G. Li, *ACS Appl. Mater. Inter.*, 2019, **11**, 21201-21210.
10. K. Zhu, R. Fan, X. Zheng, P. Wang, W. Chen, T. Sun, S. Gai, X. Zhou and Y. Yang, *J. Mater. Chem. C*, 2019, **7**, 15057-15065..
11. H. R. Fu, Y. Zhao, T. Xie, M. L. Han, L. F. Ma and S. Q. Zang, *J. Mater. Chem. C*, 2018, **6**, 6440-6448
12. H. R. Fu, L. B. Yan, N. T. Wu, L. F. Ma and S. Q. Zang, *J. Mater. Chem. A*, 2018, **6**, 9183-9191