Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting Information

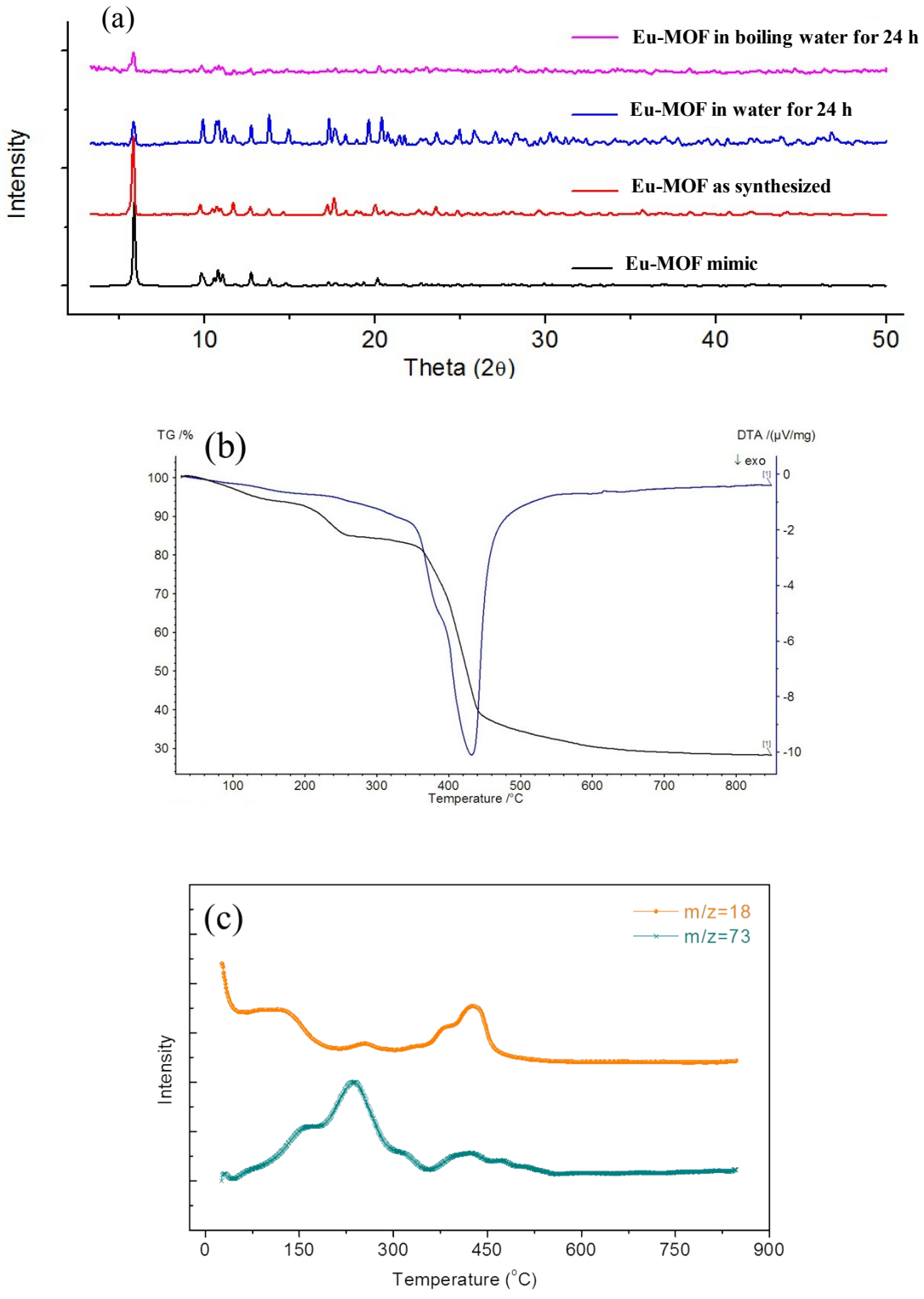

Fig. S1 (a) PXRD patterns of simulated, as synthesized Eu-MOF and after immersing in water and bloiling water for 24 hours. (b) TG and DTA curves and (c) ion flow intensity in TG-MS measurement for Eu-MOF.

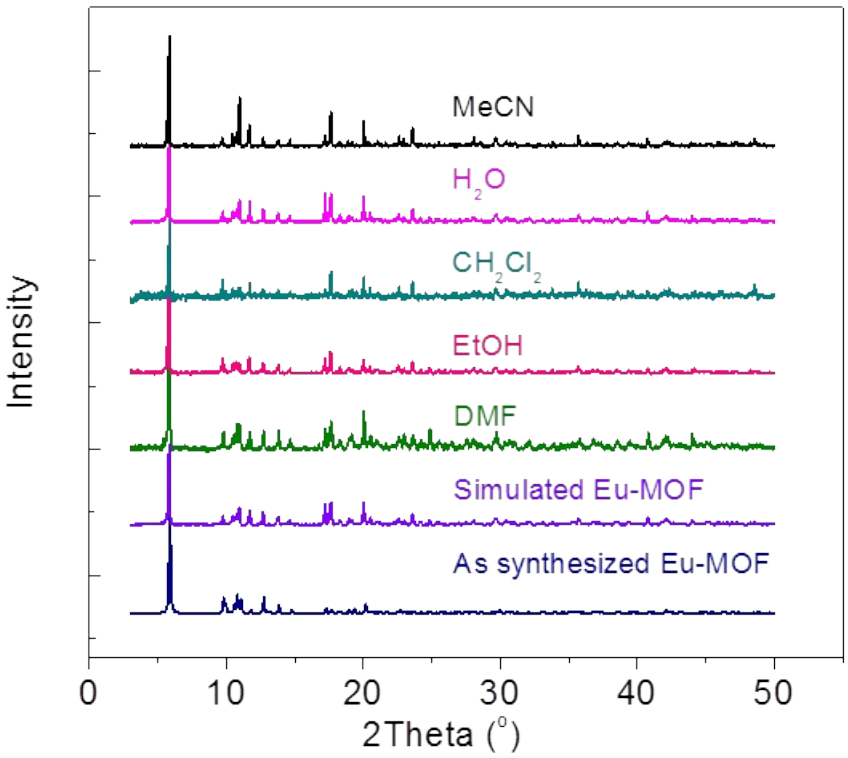

Fig. S2 PXRD patterns of Eu-MOF after immersing in different solvents for 24 h.

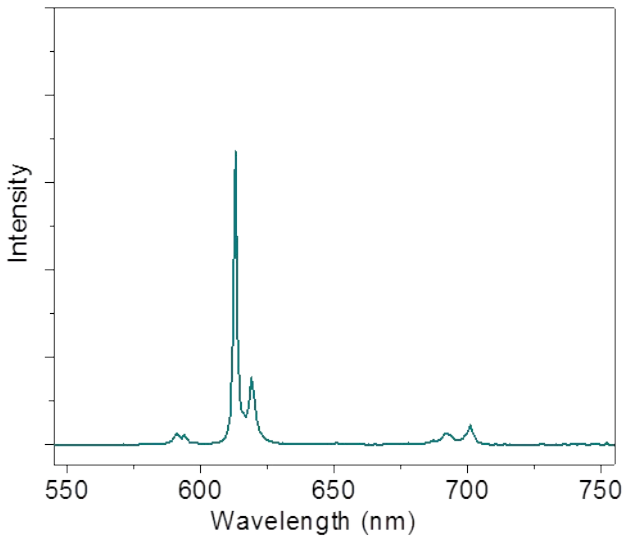

Fig. S3 The emission spectra of Eu-MOF excited by 320 nm (solid state, r. t.).

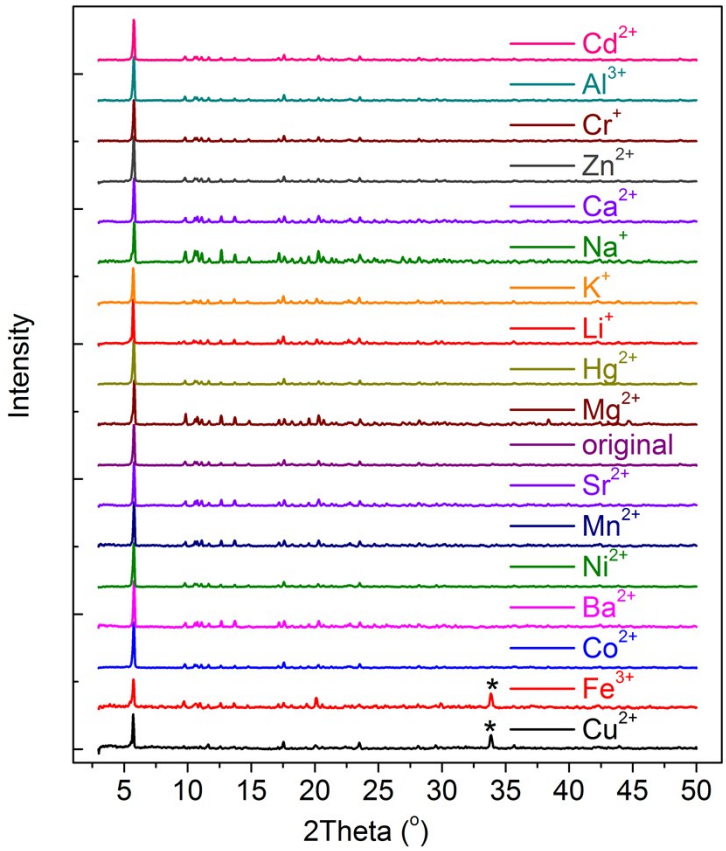

Fig. S4 The PXRD patterns of Eu-MOF after immersed in different metal solutions (1 mM). (* represents the new peak)

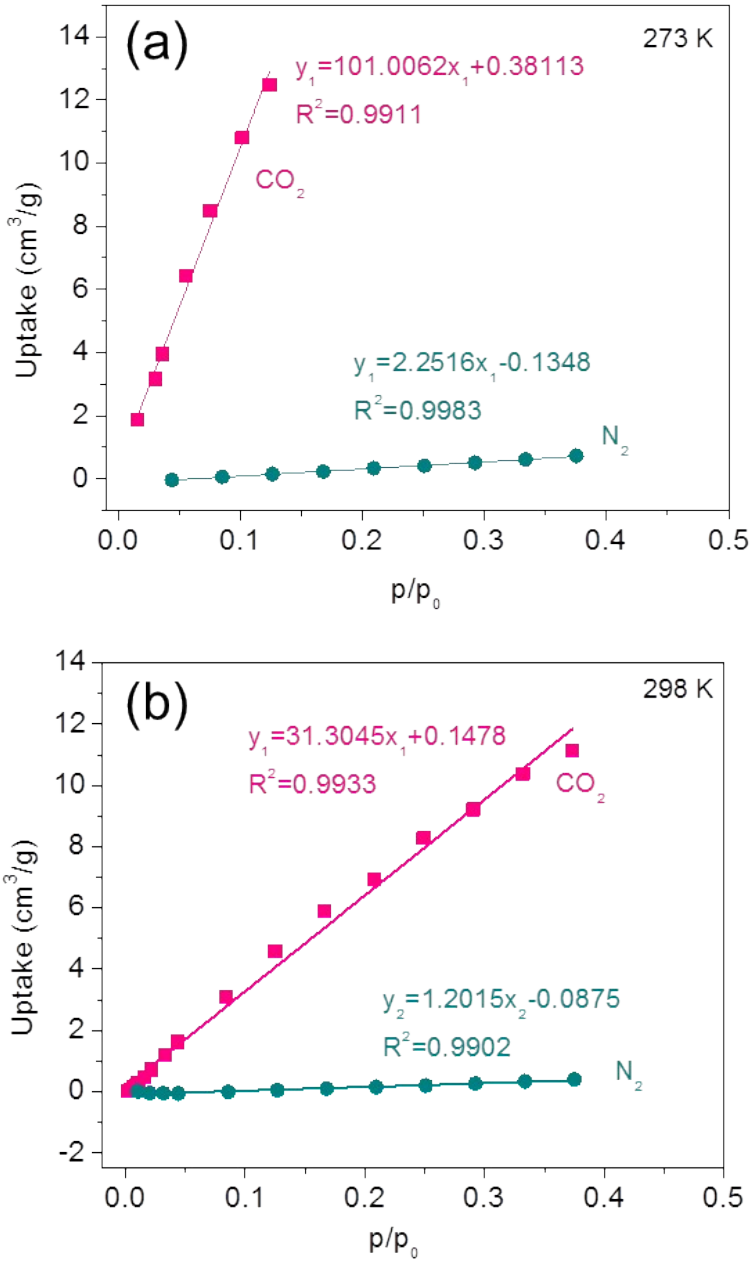

Fig. S5 The initial slopes fitting of adsorption isotherms of CO_2 and N_2 for Eu-MOF at 273 K (a) and 298 K (b), respectively.

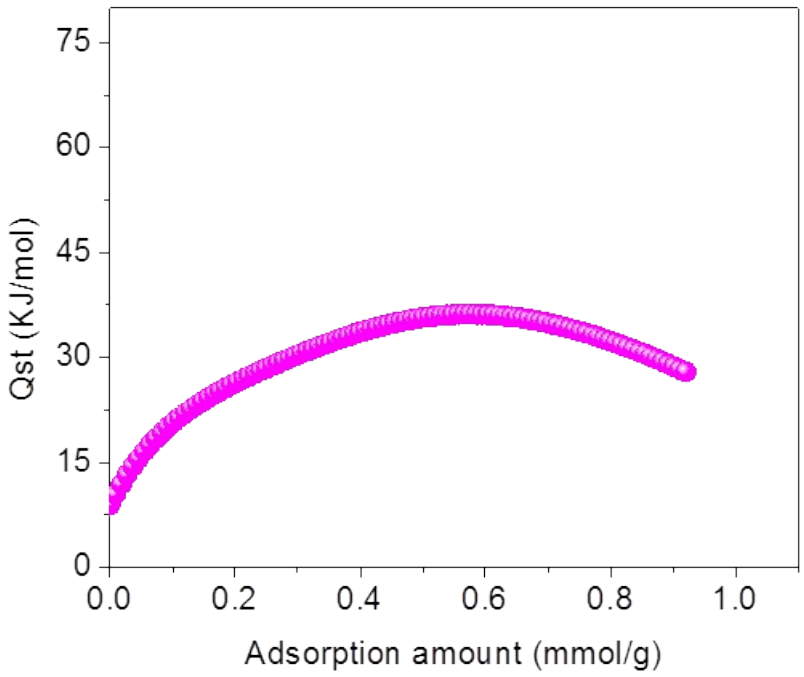

Fig. S6 The enthalpy of adsorption (Q_{st}) curve of CO_2 for Eu-MOF.

Table S1 Crystal data and structure refinement for Eu-MOF.

Complex	Eu-MOF
Temperature	293 K
Chemical Formula	$C_{24}H_{21}EuN_2O_9$+[S]
Formula Weight	633.40
crystal system	Triclinic
space group	*P -1*
a (Å)	10.0077(6)
b (Å)	10.3815(5)
c (Å)	15.9271(7)
α (deg)	71.109(4)
β (deg)	85.541(4)
γ (deg)	64.379(5)
V (Å^3)	1407.91(12)
Z	2
D_{Calcd} (g cm^{-3})	1.494
μ (mm^{-1})	16.372
Ref. collected	8447
Independent ref.	4680
R_{int}	0.0560
GOF	1.031
$R1^a$ [$I > 2\sigma(I)$]	0.0567
wR_2^b [$I > 2\sigma(I)$]	0.1493

[a] $R_1=\sum(||F_0|- |F_c||)/\sum|F_0|$; [b] $wR_2=[\sum w(F_0^2- F_c^2)^2/\sum w(F_0^2)^2]^{1/2}$

Table S2 Lifetimes of Eu-MOF in different acidic solution.

	pH=3	pH=4	pH=5	pH=6	pH=7
τ/μs	358	352	357	348	308

Table S3 CO_2 adsorption performance and adsorption enthalpy for some similar lanthanide-carboxylate MOFs.

MOF	Selectivity[a]	Selectivity[b]	S_{BET}[c](m^2/g^{-1})	CO_2 [d](wt%)	$Q_{st}(CO_2)$ KJ/mol	References
La-TTCA	-/-	940/188	-	13.9/10.5	32.8 to 35.4	S1
Eu-MOF	*44.9/26.1*	*109.4/28.7*	*209.7*	*5.7/4.1*	*9.2 to 35.6*	*This work*
La-BTN	-/-	93 to 38/-	-	17.2/-	26	S2
Eu-BDC	-/57.4	-/72.5	124	-/3.6	-	S3
Tb-FDA	-/-	-/36	1005.6	-/12	-	S4
Y-TPO	-/-	22.0/28.2	692.0	13.1/8.5	-	S5
Eu-TPO	-/-	20.9/25.6	495.5	10.5/6.2	-	S5
Pr-LOF	18.6/-	-/-	484	7.1/-	-	S6
Eu-*p*-CDC	-/-	-/8	108	-/1.3	-	S7

For simplicity, the MOF in the table uses a proxy for instead. [a]Selectivity of CO_2/N_2 calculated from the initial slope at 1 atm and 273/298 K, respectively. [b]Selectivity of CO_2/N_2 calculated from IAST method at 1 atm and 273/298 K, respectively. [c] Brunauer–Emmett–Teller (BET) surface area. [d] CO_2 uptake at 273/298 K and 1 atm.

References

S1 Y. N. Gong, P. Xiong, C. T. He, J. H. Deng and D. C. Zhong, *Inorg. Chem.*, 2018, 57, 5013.

S2 J. Duan, M. Higuchi, R. Krishna, T. Kiyonaga, Y. Tsutsumi, Y. Sato, Y. Kubota, M. Takata and S. Kitagawa, *Chem. Sci.*, 2014, 5, 660.

S3 W. M. Liao, H. T. Shi, X. H. Shi and Y. G. Yin, *Dalton Trans.*, 2014, 43, 15305.

S4 T. Kambe, R. Sakamoto, K. Hoshiko, K. Takada, M. Miyachi, J.-H. Ryu, S. Sasaki, J. Kim, K. Nakazato, M. Takata and H. Nishihara, *J. Am. Chem. Soc.*, 2013, 135, 2462.

S5 Z. J. Lin, Z. Yang, T. F. Liu, Y. B. Huang and R. Cao, *Inorg. Chem.*, 2012, 51, 1813.

S6 Z. Lin, R. Zou, W. Xia, L. Chen, X. Wang, F. Liao, Y. Wang, J. Lin and A. K. Burrell, *J. Mater. Chem.*, 2012, 22, 21076.

S7 S.-L. Huang, Y.-J. Lin, W.-B. Yu and G.-X. Jin, *ChemPlusChem*, 2012, 77, 141.