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

Supporting Information

Luminescence tuning of the Dy-Zn metal-organic framework and its application in detection of Fe (III) ion

Yu-Fei Li, Dan Wang, Zhuang Liao, Yang Kang, Wei-Hua Ding, Xiang-Jun Zheng*and Lin-Pei Jin

Beijing Key Laboratory of Energy Conversion and Storage Materials, College of Chemistry, Beijing Normal University, Beijing, 100875, People's Republic of China.

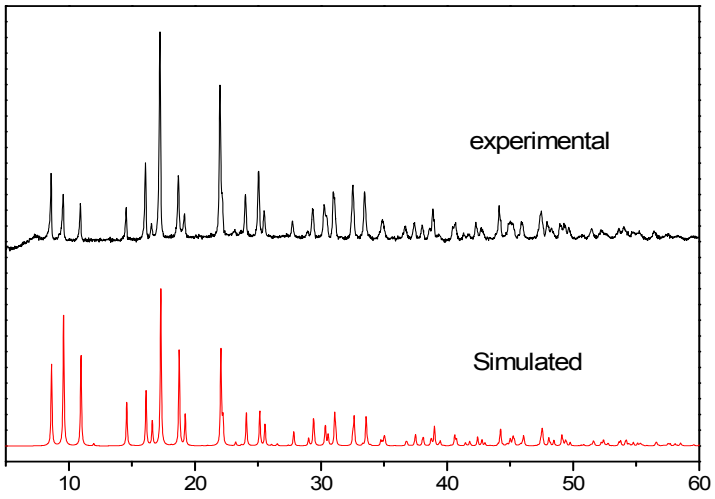
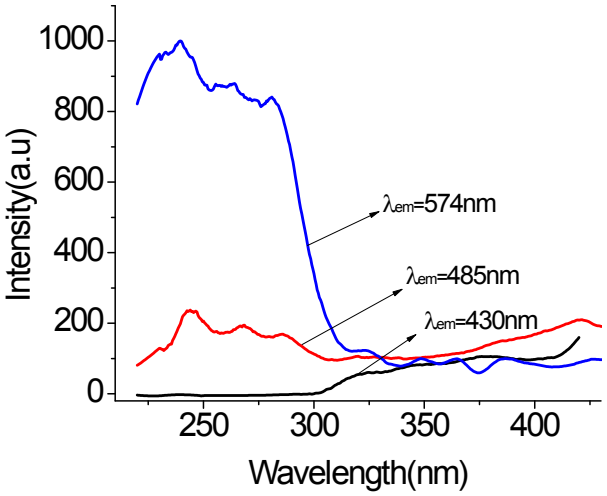
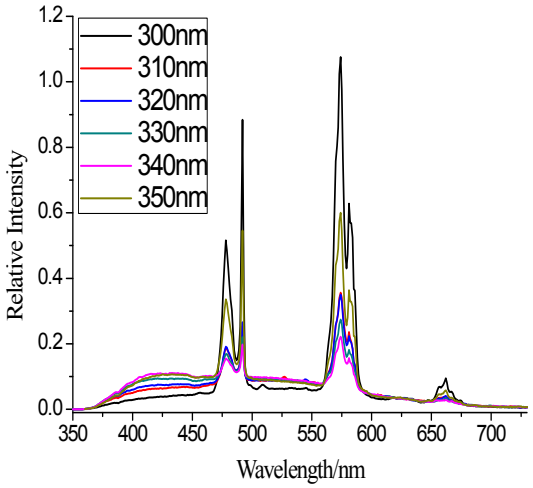


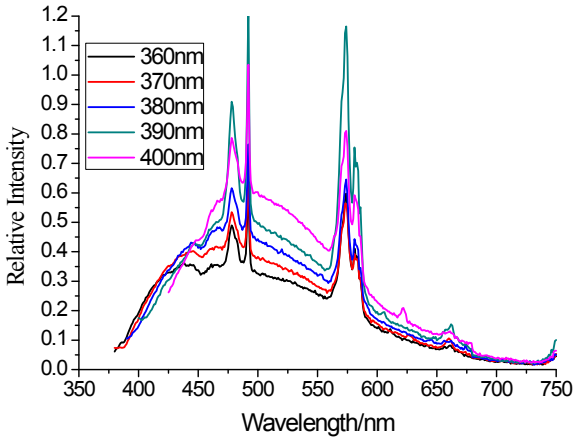
Fig. S1 The PXRD patterns of Dy-Zn MOFs



(a)



(b)



(c)

Fig. S2 a) Excitation spectra of Dy-Zn MOFs with 574, 486 and 431 nm as the analysis wavelength, respectively. b) and c) Emission spectra of Dy-MOFs at different excitation wavelength.

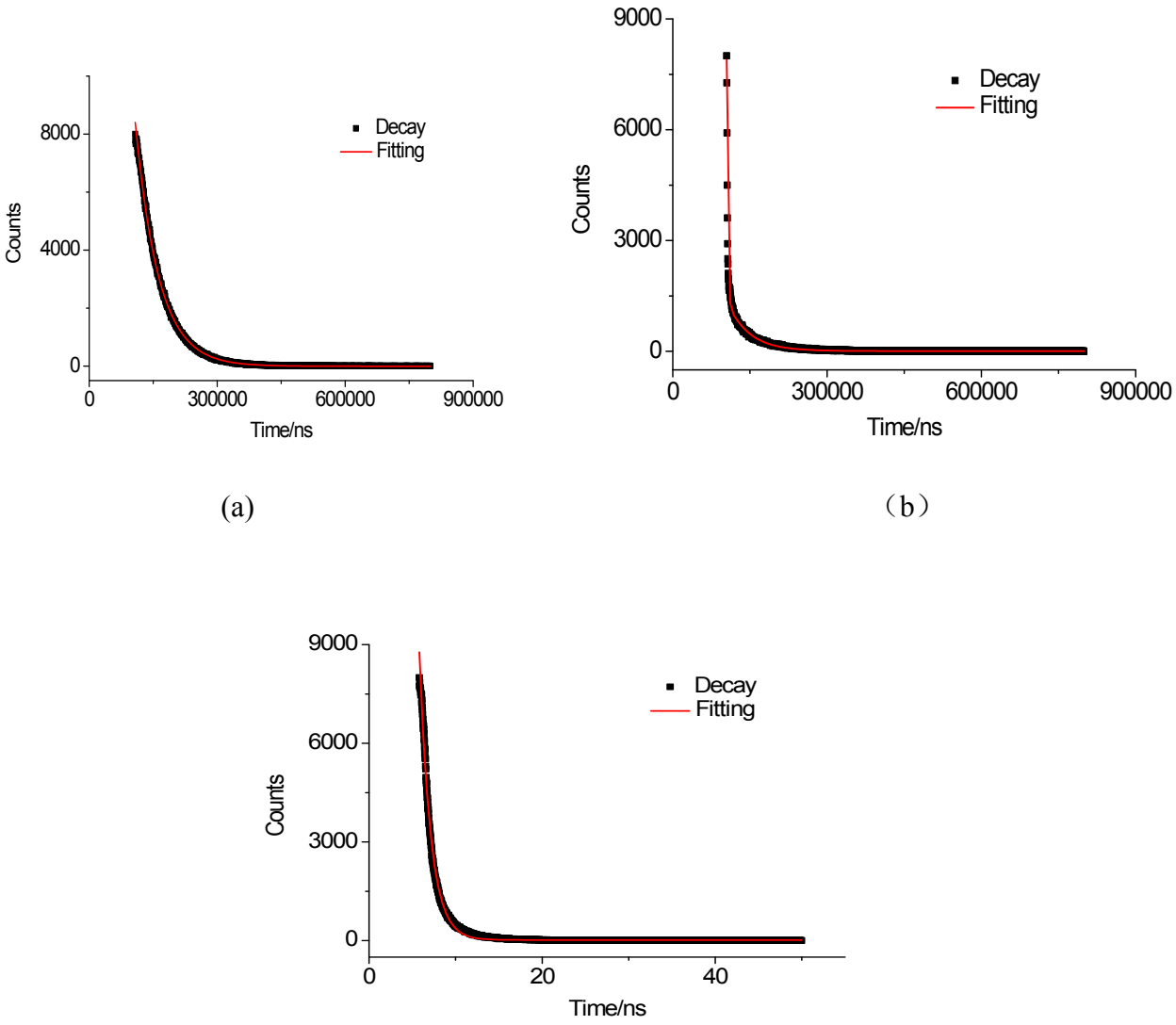


Fig. S3 Decay and fitting profiles of the Dy-Zn MOFs when monitored at 574 nm and excited at 290 nm (a) and 340 nm (b), when monitored at 431nm and excited at 340 nm (c).

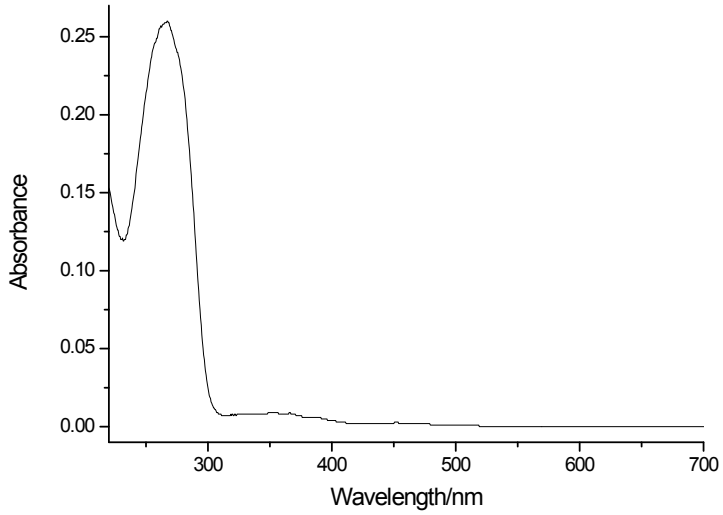


Fig. S4 UV-Vis absorption of Dy-Zn MOF at solid state.

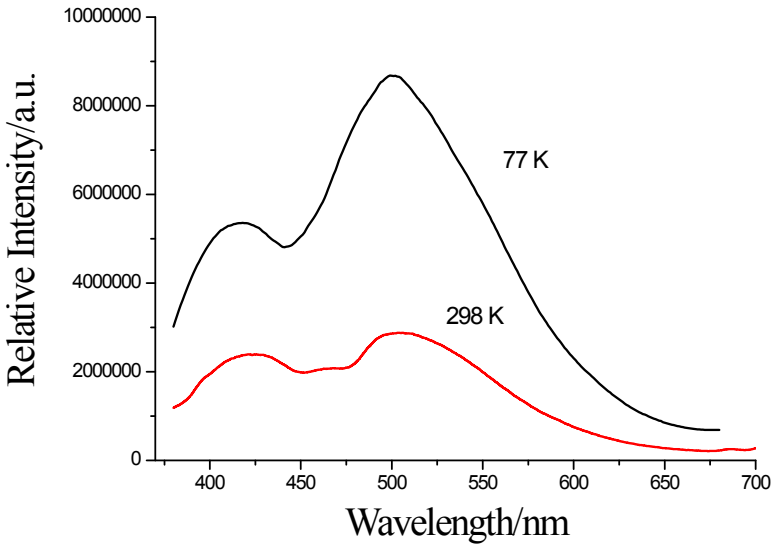


Fig. S5 The phosphorescence spectra of the Gd complex at 77K and 298K.

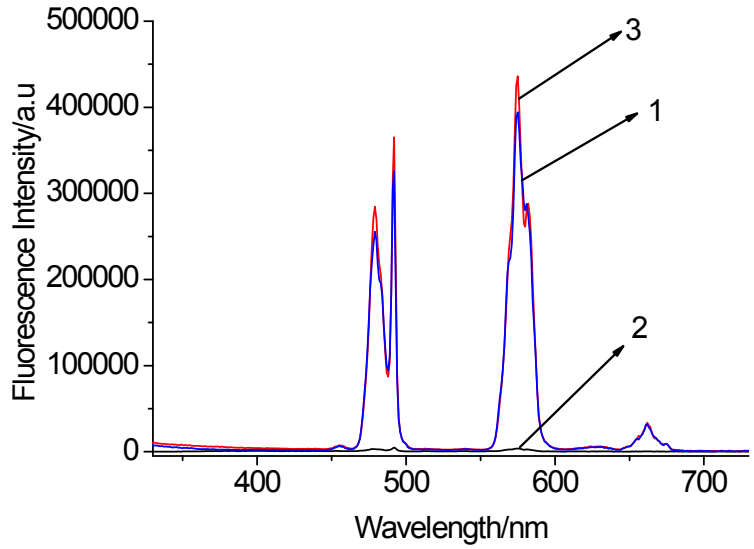


Fig. S6 Fluorescence changes of Dy-Zn MOF. (1) 0.5 mM Dy-Zn MOF in DMSO solution; (2) the addition of 2.5 mM Cu^{2+} to 0.5 mM Dy-Zn MOF in DMSO solution; (3) the sample of (2) was washed with H_2O and then dispersed in DMSO solution.

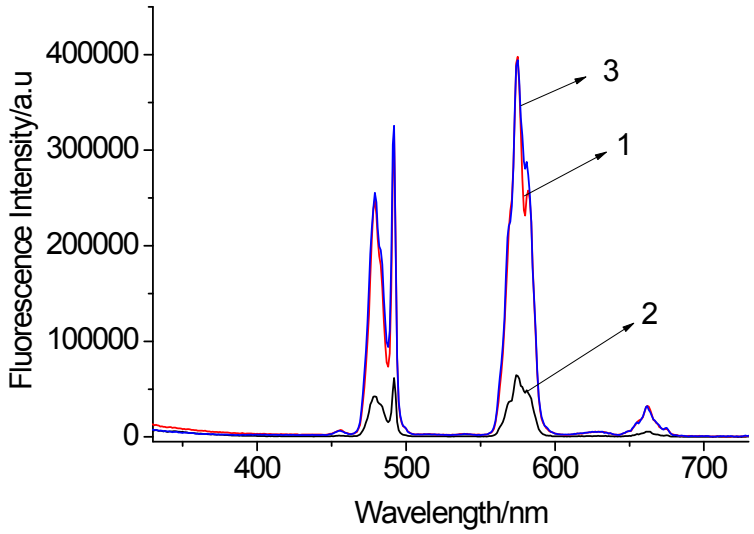


Fig. S7 Fluorescence changes of Dy-Zn MOF. (1) 0.5 mM Dy-Zn MOF in DMSO solution; (2) the addition of 2.5 mM Hg^{2+} to 0.5 mM Dy-Zn MOF in DMSO solution; (3) the sample of (2) was washed with H_2O and then dispersed in DMSO solution.

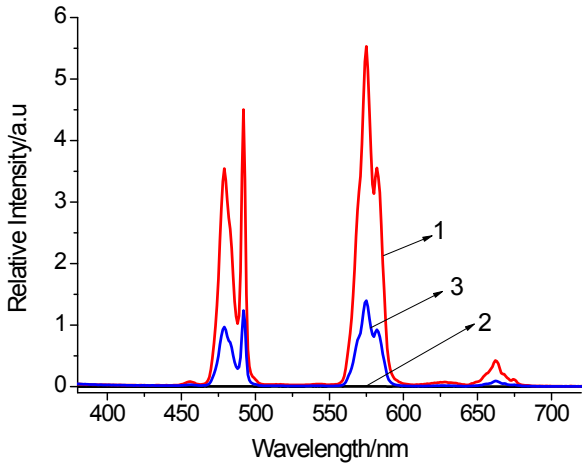


Fig.S8 Emission spectra of Dy-Zn MOF dispersed in DMSO (1), upon addition of Fe^{3+}(2), and the sample dispersed in DMSO after centrifugation and washing with water for three times (3).

Table S1 Crystal data and refinement for Dy-Zn MOF.

	Dy-Zn MOF
Empirical formula	$C_{32}H_{37}Zn_4N_{16}O_{24}Dy$
F_w	716.29
T / K	293(2)
Wavelength/Å	0.71073
Crystal system	Orthorhombic
Space group	*I222*
a / Å	10.659(2)
b / Å	12.327(2)
c / Å	18.406(4)
α / °	90
β / °	90
γ / °	90
V / Å^3	2418.4(8)
Z	4
D_c / g·cm^{-3}	1.967
μ / mm^{-1}	3.582
Reflections collected, unique, R_{int}	8319, 2789 0.0362
R indices (all data)	R_1 = 0.0478 wR_2 = 0.1457
CCDC no.	1444495

Table S2 Selected bond lengths[Å] and angles[deg]for the Dy-Zn MOF.

Dy(1)-O(3)#1	2.306(5)	Dy(1)-O(3)	2.306(5)	Dy(1)-O(3) #2	2.306(5)	Dy(1)-O(3)#3	2.306(5)
Dy(1)-O(2)#1	2.373(6)	Dy(1)-O(2)#2	2.373(6)	Dy(1)-O(2)#3	2.373(6)	Dy(1)-O(2)	2.373(6)
Zn(1)-N(1)	2.004(9)	Zn(1)-N(2)#5	2.001(9)	Zn(1)-N(3)	1.956(15)	Zn(1)-O(1)	2.166(7)
Zn(1)-O(4)#5	2.150(6)						
O(3) -Dy(1)-O(3)#1	86.4(3)	O(3) -Dy(1)-O(3)#2	146.2(3)	O(3)#1-Dy(1)-O(3)#2	103.4(3)	O(3)-Dy(1)-O(3)#3	103.4(3)
O(3)#1-Dy(1)-O(3)#3	146.2(3)	O(3)#2-Dy(1)-O(3)#3	86.4(3)	O(3) -Dy(1)-O(2)#1	70.8(2)	O(3)#1-Dy(1)-O(2)#1	78.1(2)
O(3)#2-Dy(1)-O(2)#1	142.6(2)	O(3)#3-Dy(1)-O(2)#1	75.0(2)	O(3) -Dy(1)-O(2)#2	75.0(2)	O(3)#1-Dy(1)-O(2)#2	142.6(2)
O(3)#2-Dy(1)-O(2)#2	78.1(2)	O(3)#3-Dy(1)-O(2)#2	70.8(2)	O(2)#1-Dy(1)-O(2)#2	123.4(3)	O(3) -Dy(1)-O(2) #3	142.6(2)
O(3)#1-Dy(1)-O(2)#3	75.0(2)	O(3)#2-Dy(1)-O(2)#3	70.8(2)	O(3)#3-Dy(1)-O(2)#3	78.1(2)	O(2)#1-Dy(1)-O(2)#3	73.7(3)
O(2)#2-Dy(1)-O(2)#3	136.9(3)	O(3) -Dy(1)-O(2)	78.1(2)	O(3)#1-Dy(1)-O(2)	70.8 (2)	O(3)#2-Dy(1)-O(2)	75.0(2)
O(3)#3-Dy(1)-O(2)	142.6(2)	O(2)#1-Dy(1)-O(2)	136.9(3)	O(2)#2-Dy(1)-O(2)	73.7(3)	O(2)#3-Dy(1)-O(2)	123.4(3)
N(3')-Zn(1)-N(3)	11.4(9)	N(3')-Zn(1)-N(2)#5	124.1(8)	N(3)-Zn(1)-N(2)#5	114.3(7)	N(3'))-Zn(1)-N(1)	114.7(8)
N(3)-Zn(1)-N(1)	124.4(7)	N(2)#5-Zn(1)-N(1)	121.1(4)	N(3')-Zn(1)-O(4)#5	94.9(7)	N(3)-Zn(1)-O(4)#5	99.0(6)
N(2)#5-Zn(2)-O(4)#5	79.0(3)	N(1) -Zn(1)-O(4)#5	95.3(3)	N(3') -Zn(1)-O(1)	92.5(7)	N(3)-Zn(1)-O(1)	88.9(7)
N(2)#5-Zn(1)-O(1)	99.7(3)	N(1)-Zn(1)-O(1)	78.4(3)	O(4)#5-Zn(1)-O(1)	171.9(4)		

#1 -x,-y+1, z #2 -x,y,-z+1 #3 x,-y+1,-z+1 #4 x-1/2,-y+1/2,-z+1/2 #5 x+1/2,-y+1/2,-z+1/2

Table S3 The CIE chromaticity coordinates and correlated color temperature for Dy-Zn MOF at different excitation wavelength.

Excitation wavelength/nm	CIE chromaticity coordinates	CCT
250	(0.39, 0.43)	4094
260	(0.39, 0.43)	4094
270	(0.39, 0.44)	4141
280	(0.39, 0.44)	4141
290	(0.39, 0.44)	4141
300	(0.36, 0.42)	4746
310	(0.32, 0.38)	5952
320	(0.31, 0.37)	6384
330	(0.29, 0.35)	7497
340	(0.28, 0.33)	8436
350	(0.31, 0.36)	6437
360	(0.27, 0.31)	9782
370	(0.26, 0.31)	10616
380	(0.26, 0.31)	10616
390	(0.24, 0.31)	12395
400	(0.22, 0.29)	16506