Supporting Information

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Fig. S1 PXRD patterns of Cd-MOF and Cd-MOF immersing in different solvents.
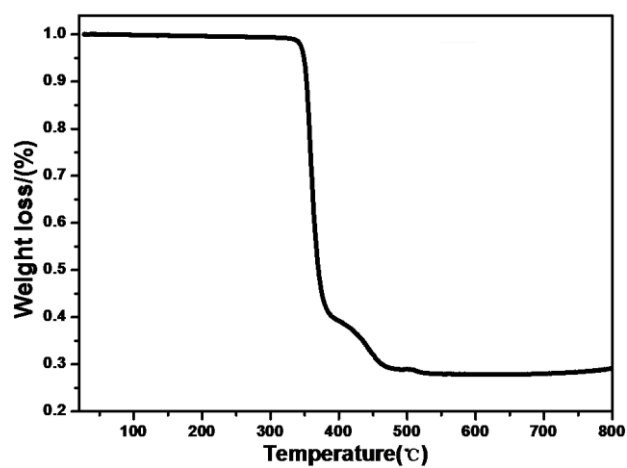
Fig. S2 The TGA curve of Cd-MOF.
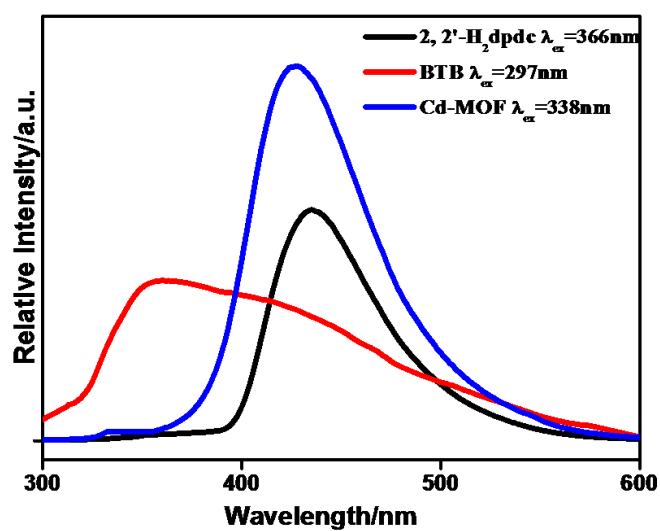
Fig. S3 The solid state emission spectra of Cd-MOF and the free ligands.
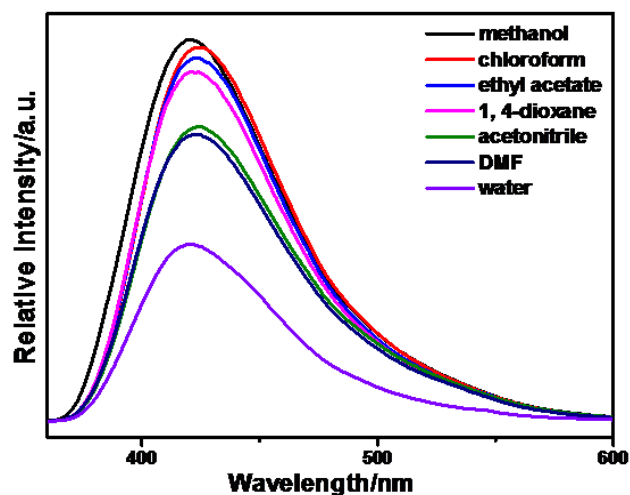
Fig. S4 Emission spectra of Cd-MOF in different solvents (λ_{ex} = 318 nm).
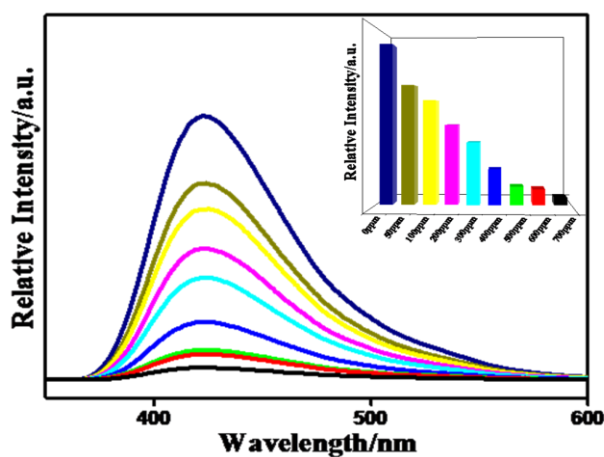
Fig. S5 Emission spectra of Cd-MOF dispersed in DMF with different concentrations of NB (λ_{ex} = 318 nm).
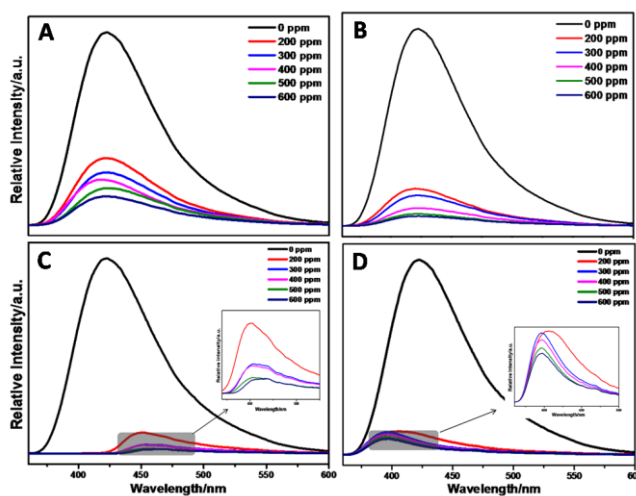
Fig. S6 Emission spectra of Cd-MOF dispersed in DMF containing 4-nitrotoluene (A), 4-chloronitrobenzene (B), 4-nitroaniline (C) and 4-nitrophenol (D) (λ_{ex} = 318 nm).
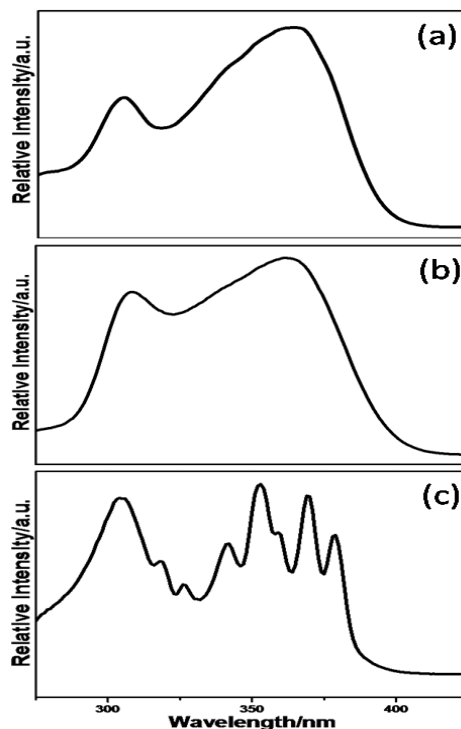
Fig. S7 The excitation spectra of Tb(III)@Cd-MOF/methanol (a), Tb(III)@Cd-MOF/ aqueous (b), $10^{-2}/3 \times 10^{-2}$ mol/L Tb(III)/Eu(III)@Cd-MOF/methanol (c) (λ_{em}=545 nm).
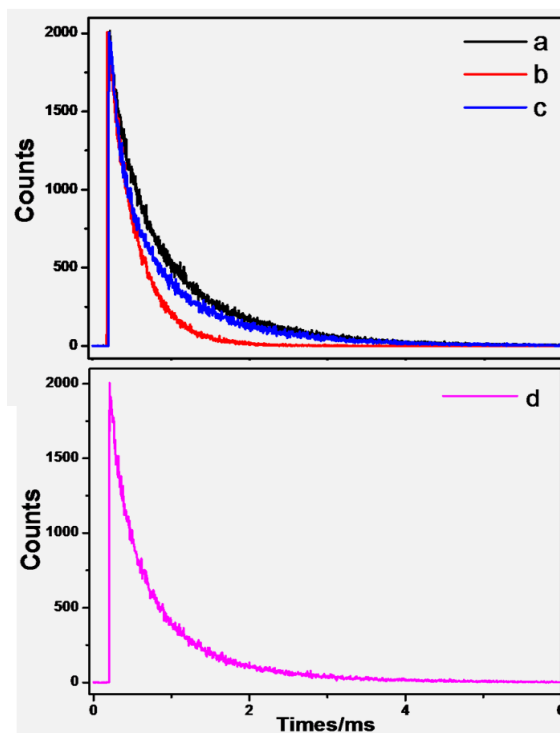
Fig. S8 Emission decay profiles of $^5D_4$ Tb(III) in Tb(III)@Cd-MOF/methanol (a), Tb(III)@Cd-MOF/ aqueous (b), $10^{-2}/10^{-2}$ mol/L Tb(III)/Eu(III)@Cd-MOF/methanol (c), and $^5D_0$ Eu(III) in $10^{-2}/10^{-2}$ mol/L Tb(III)/Eu(III)@Cd-MOF/methanol (d).

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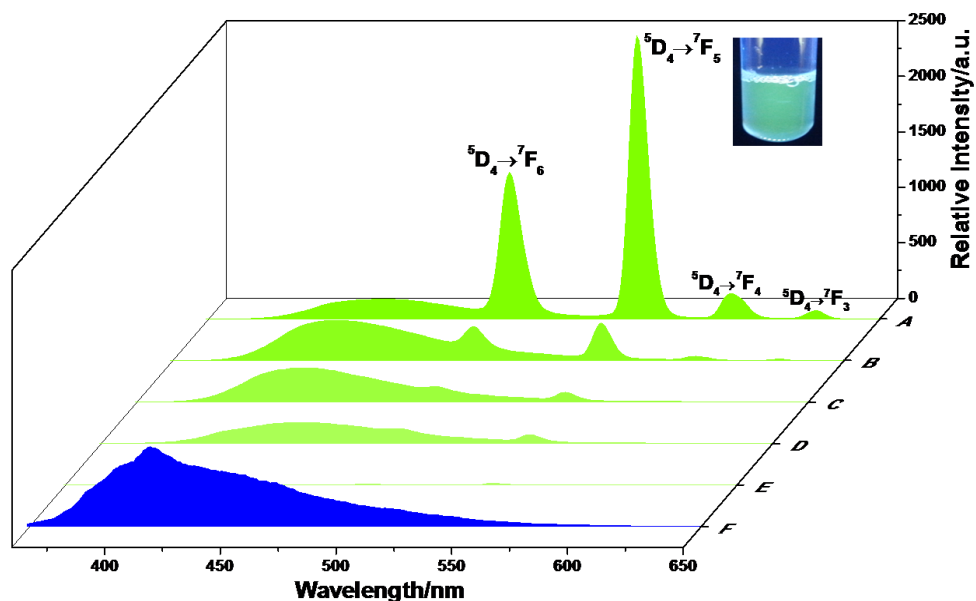
Fig. S9 Emission spectra of Tb(III)@Cd-MOF/aqueous with different concentrations of Tb(III) 1×10^{-2} (A), 1×10^{-3} (B), 1×10^{-4} (C), and 1×10^{-5} (D) mol/l, 1×10^{-2} Tb(III)/aqueous (E) and Cd-MOF/aqueous (F) (λ_{ex} =366 nm). Inset, image under 365 nm UV-radiation for Tb(III)@Cd-MOF/aqueous.
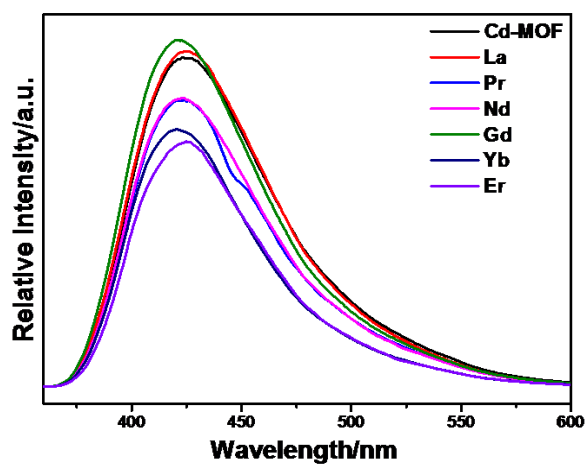
Fig. S10 Emission spectra of Cd-MOF immersed in methanol solution containing rare earth metal ions (La(III), Pr(III), Nd(III), Er(III) and Yb(III), 10^{-2} mol/L) (λ_{ex} = 318 nm).

Fig. S11 Emission spectrum of $10^{-2}/3$ $\times$ 10^{-2} mol/L Tb(III)/Eu(III)@Cd-MOF/methanol (λ_{ex} =366 nm).

Fig. S12 The luminescence intensity of four recyclable experiments of sensing nitrobenzene (A) and Tb(III) ion (B) in methanol.

Table S1 Crystal data and structure refinement for Cd-MOF

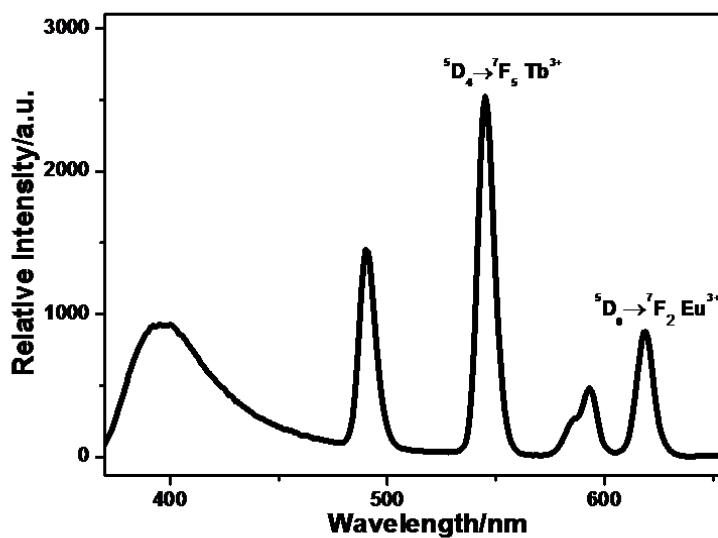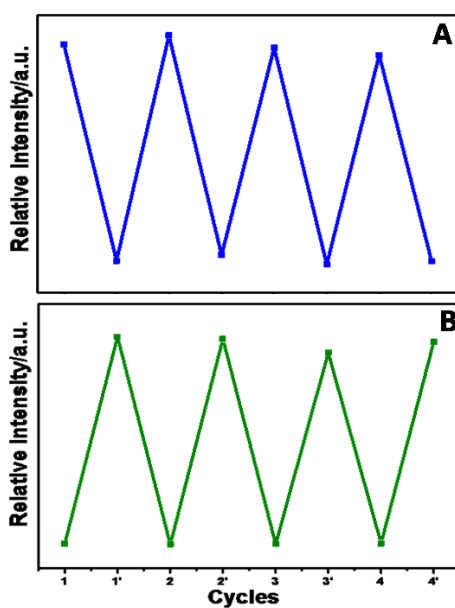| Complex	Cd-MOF
Empirical formula	$C_{36}H_{28}Cd_2N_6O_8$
Formula weight	897.44
Crystal system	hexagonal
Space group	$P6_1$
a / Å	11.823(2)
b / Å	11.823(2)
c / Å	41.384(8)
γ / (°)	120
Volume / Å^3	5009.5(16)
Z	6
Calculated density / mg· m^{-3}	1.785
Absorption coefficient / mm^{-1}	1.338
F(000)	2676
Crystal size / mm	0.40 × 0.20 × 0.20
θ Range for data collection / (°)	1.99-27.52
Limiting indices	-15<=h<=6
	-14<=k<=15
	-46<=l<=51
Reflections collected / unique	19935/7269
	[R(int)=0.0514]
Data / restraints / parameters	7269/175/524
Goodness-of-fit on F^2	0.984
R$_1$ [I > 2sigma(I)]	0.0386
wR$_2$ [I > 2sigma(I)]	0.0531
R$_1$ [all data]	0.057
wR$_2$ [all data]	0.0578
Largest diff. peak and hole / e·Å^{-3}	0.462 and -0.393

Table S2 Selected bond lengths [Å] and angles [°] for Cd-MOF

Cd-MOF			
Cd(1)-O(1)	2.297(3)	Cd(1)-O(5)	2.328(3)
Cd(1)-O(3)	2.294(3)	Cd(1)-O(7)	2.371(3)
Cd(1)-N(6)#1	2.264(4)	Cd(1)-N(1)	2.258(4)
Cd(2)-O(3)#2	2.239(3)	Cd(2)-O(7)	2.413(4)
Cd(2)-O(6)#2	2.328(4)	Cd(2)-O(8)	2.390(4)
Cd(2)-O(1)	2.276(3)	Cd(2)-O(5)#2	2.527(3)
O(3)-Cd(1)-O(1)	116.52(10)	O(3)-Cd(1)-O(5)	76.91(11)

O(1)-Cd(1)-O(5)	166.04(11)	O(3)-Cd(1)-O(7)	164.61(12)
O(1)-Cd(1)-O(7)	75.09(11)	O(5)-Cd(1)-O(7)	92.45(10)
N(1)-Cd(1)-O(3)	100.54(12)	N(6)#1-Cd(1)-O(3)	84.07(13)
N(1)-Cd(1)-O(1)	87.93(13)	N(6)#1-Cd(1)-O(1)	92.92(13)
N(1)-Cd(1)-O(5)	85.66(13)	N(6)#1-Cd(1)-O(5)	92.28(14)
N(1)-Cd(1)-O(7)	89.54(13)	N(6)#1-Cd(1)-O(7)	85.30(14)
N(1)-Cd(1)-N(6)#1	174.36(15)	O(8)-Cd(2)-O(7)	54.52(12)
O(3)#2-Cd(2)-O(5)#2	73.91(11)	O(1)-Cd(2)-O(5)#2	154.12(11)
O(6)#2-Cd(2)-O(5)#2	53.74(10)	O(8)-Cd(2)-O(5)#2	82.68(11)
O(7)-Cd(2)-O(5)#2	94.22(10)	O(6)#2-Cd(2)-O(7)	89.28(13)
O(3)#2-Cd(2)-O(1)	128.68(10)	O(3)#2-Cd(2)-O(6)#2	109.81(12)
O(1)-Cd(2)-O(6)#2	102.04(12)	O(3)#2-Cd(2)-O(8)	88.11(11)
O(1)-Cd(2)-O(8)	107.82(12)	O(6)#2-Cd(2)-O(8)	122.13(12)
O(3)#2-Cd(2)-O(7)	142.28(12)	O(1)-Cd(2)-O(7)	74.64(11)

Symmetry transformations used to generate equivalent atoms: #1 y-1,-x+y,z-1/6; #2 y,-x+y,z-1/6.