Electronic Supplementary Material (ESI) for RSC Advances.

A series of europium-based metal organic frameworks with tuned intrinsic luminescence properties and detection capacities

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1. Crystal data and structure refinement

Table S1 Crystal data and structure refinement for Eu-BDC-NH_2

Eu-BDC-NH_2 (*CCDC: 1494828*)	
Empirical formula	$C_{104}H_{132}Eu_{12}N_{16}O_{76}$
Formula weight	4644.703
Measurement temperature	282(1) K
Crystal system	Cubic
Space group	*Fm*-3*m*
a (Å)	21.713(3)
b (Å)	21.713(3)
c (Å)	21.713(3)
α (°)	90
β (°)	90
γ (°)	90
Volume(Å^3)	10237(2)
Z	2
Calculated density(g/cm^3)	1.610
Absorption coefficient (mm^{-1})	26.572
Independent reflections ($I > 2\sigma(I)$)	515 [R(int) = 0.0345]
F(000)	4744
Reflections collected	3527
Completeness to theta = 66.98 ^{o}	100.0 %
θ range for data collection	3.53-66.98
Data/restraints/parameters	515/14/32
Limiting indices	$-25 \le h \le 12$
	$-21 \le k \le 25$
	$-18 \le l \le 17$
Goodness-of-fit on F^2	1.147
R_1[a],wR2b [$I > 2\sigma(I)$]	$R_1 = 0.0900$, $wR_2 = 0.2544$
R_1[a], wR_2[b] (all data)	$R_1 = 0.0930$, $wR_2 = 0.2600$
Largest diff. peak and hole (e/Å^3)	1.697 and –3.912

[a] $R_1 = \Sigma(||F_0|-|F_C||)/\Sigma|F_0|$.

[b] $wR_2 = [\Sigma w(|F_0|^2-|F_C|^2)^2/\Sigma w(F_0^2)]^{1/2}$.

2. SEM images FT-IR spectra and TGA curves

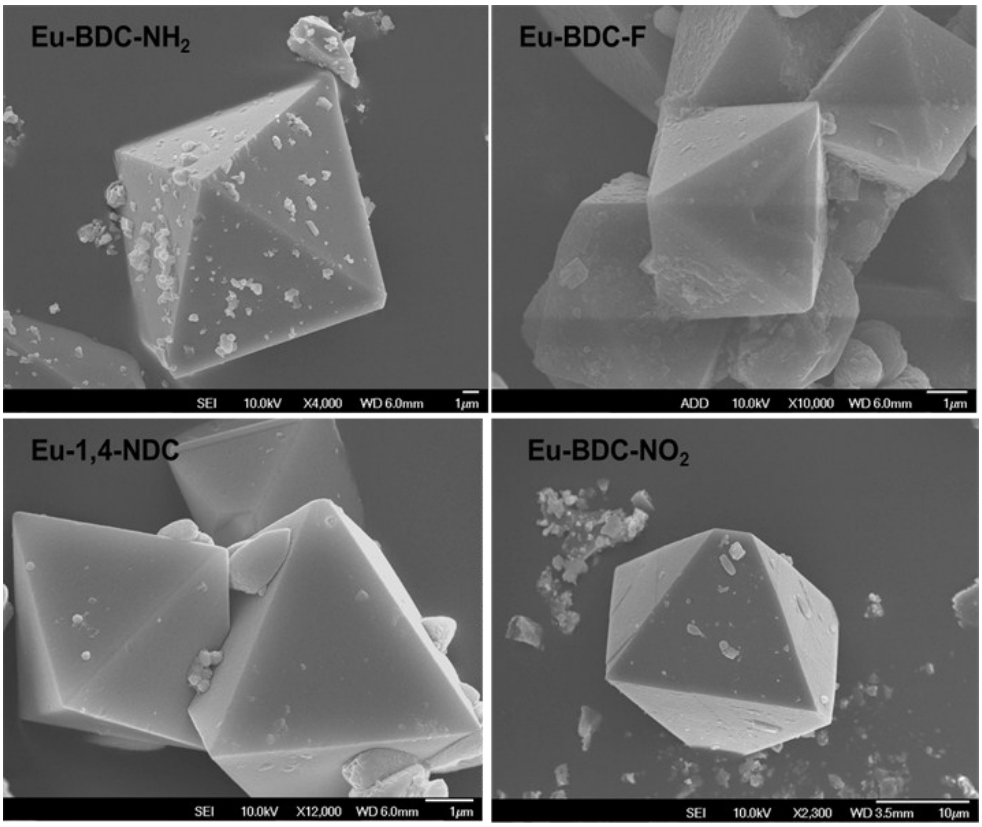

Fig. S1 SEM images for Eu-MOFs

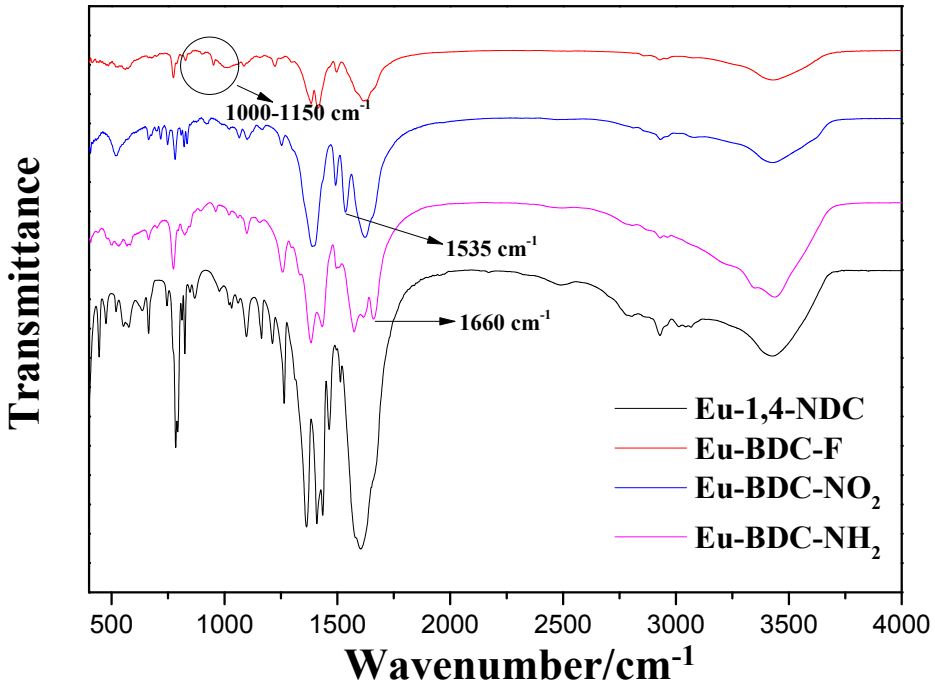

Fig. S2 FT-IR spectra for Eu-MOFs

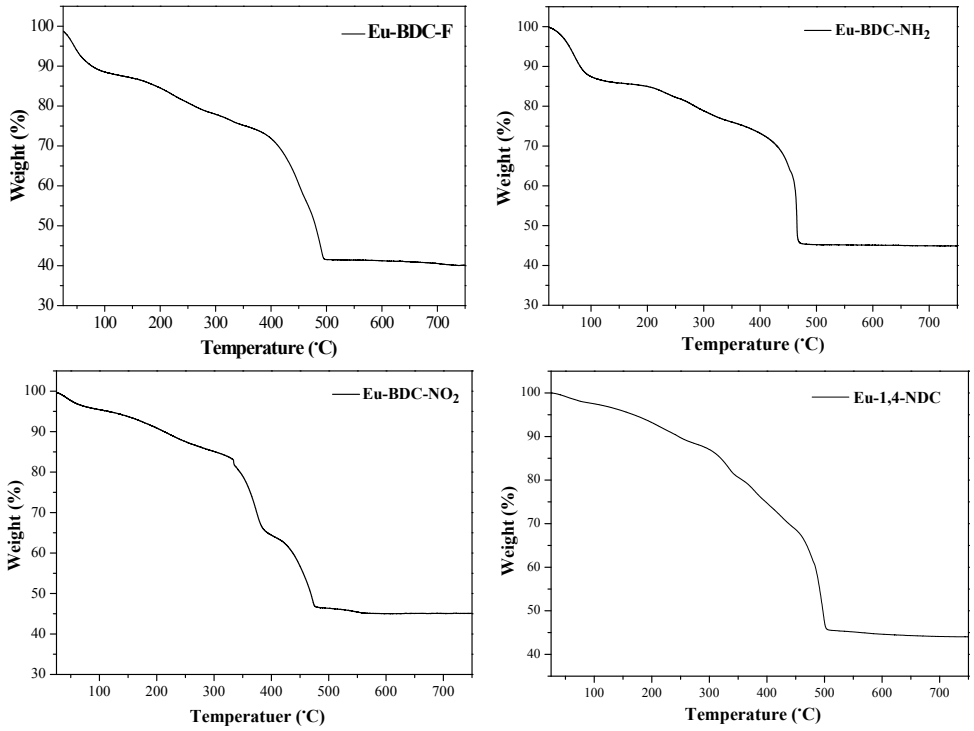

Fig. S3 TGA curves for Eu-MOFs

3. Luminescence lifetime and fluorescence quantum yield

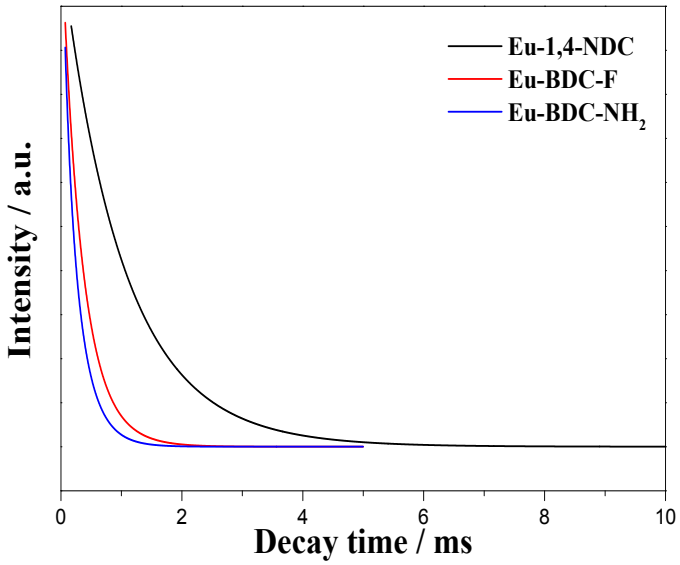

Fig. S4 Luminescence lifetime for Eu-MOFs

Table S2 The quenching efficiencies of the Eu-MOFs in various analytes

Ligands	BDC-NH_2	BDC-F	1,4-NDC
Fluorescence quantum yield	1.24%	3.40%	35.77%
Lifetime (ns)	4.88	2.17	21.1
MOFs	Eu-BDC-NH_2	Eu-BDC-F	Eu-1,4-NDC
Fluorescence quantum yield	3.21%	30.83%	57.01%
Lifetime (ms)	0.54	0.72	1.06

4. Sensing of anions

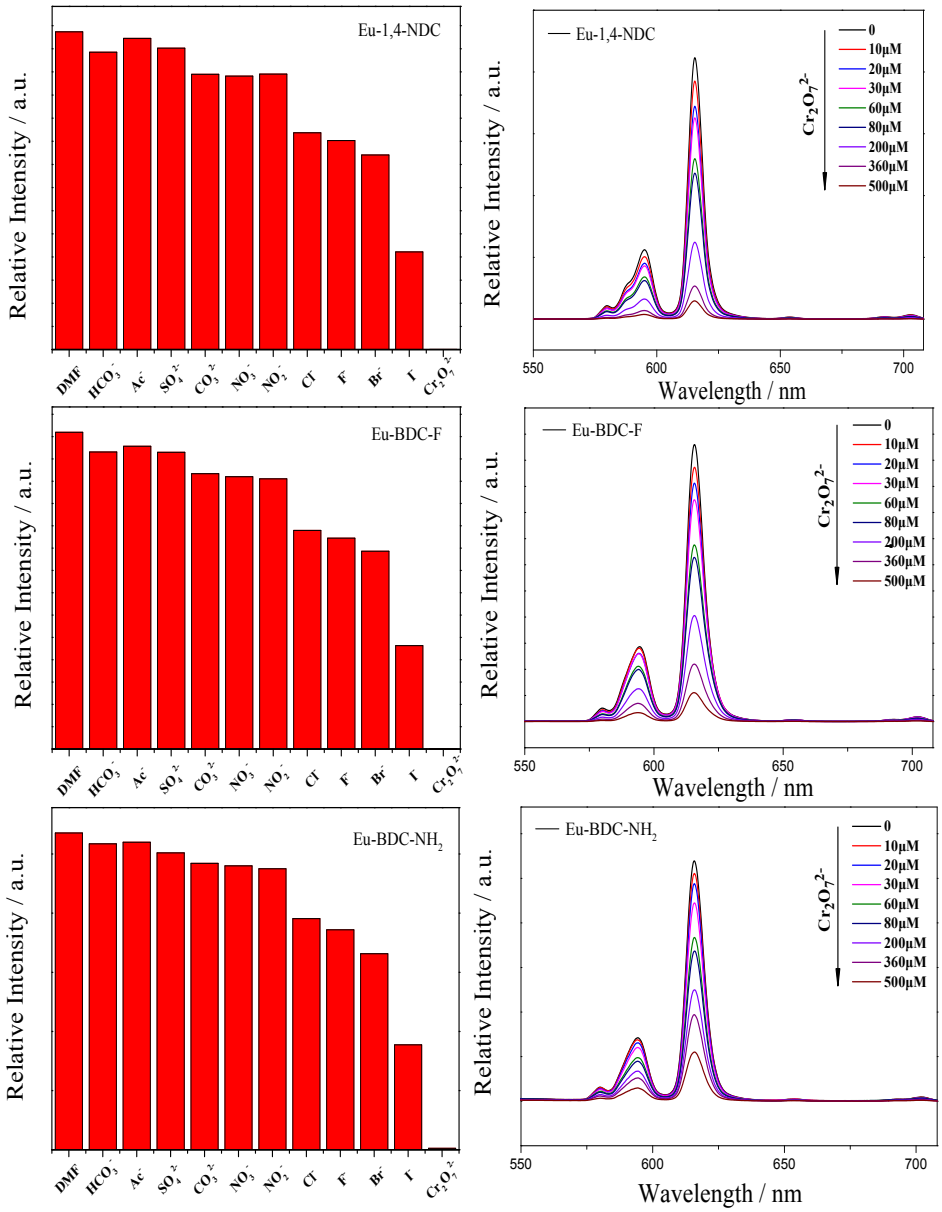

Fig. S5 The PL intensities of Eu-MOFs toward with various anions and in various concentrations of $Cr_2O_7^{2-}$ solution.

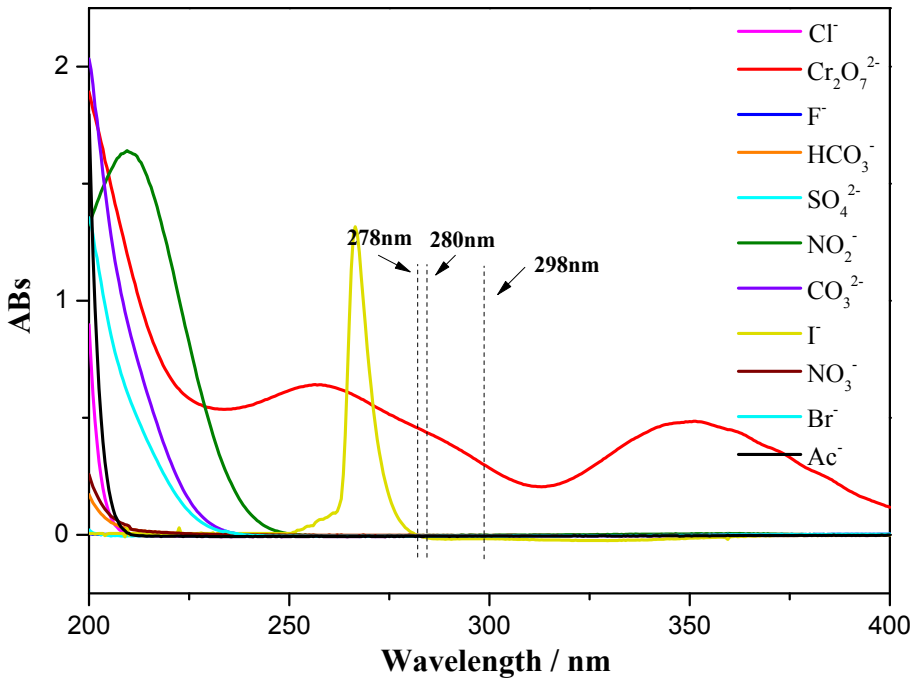

Fig. S6 Liqiud UV−vis absorption spectra of different anions.

5. Sensing of organic solvent molecules

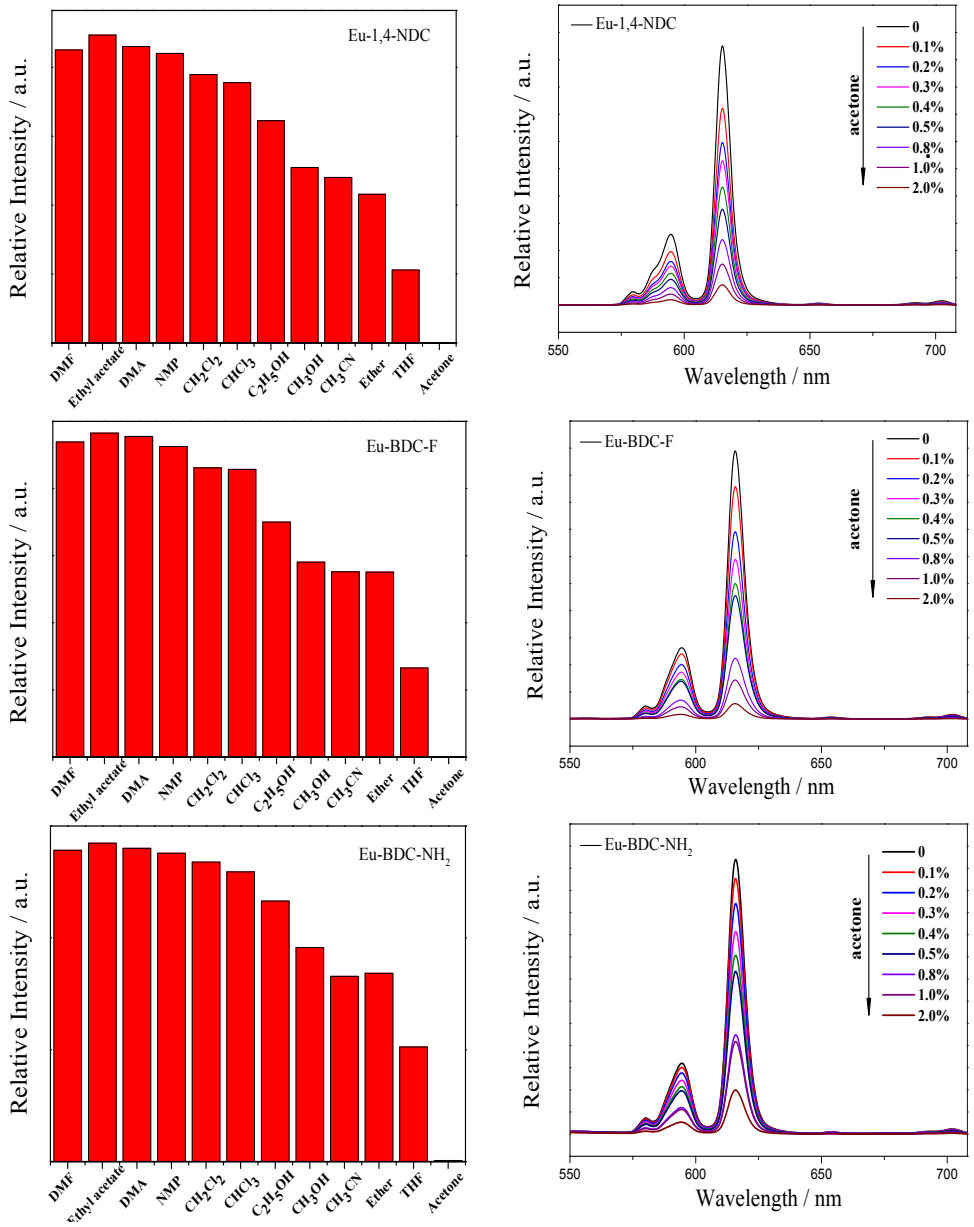

Fig. S7 The PL intensities of Eu-MOFs with various pure organic solvents and in various concentrations of acetone solution.

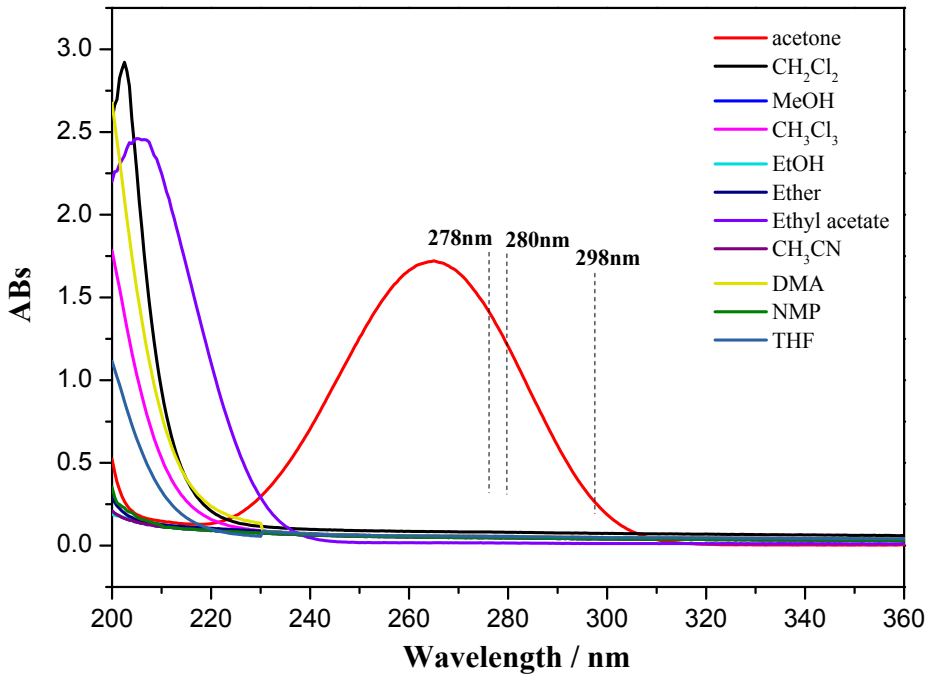

Fig. S8 Liqiud UV−vis absorption spectra of different solvents.

6. Sensing of metal ions

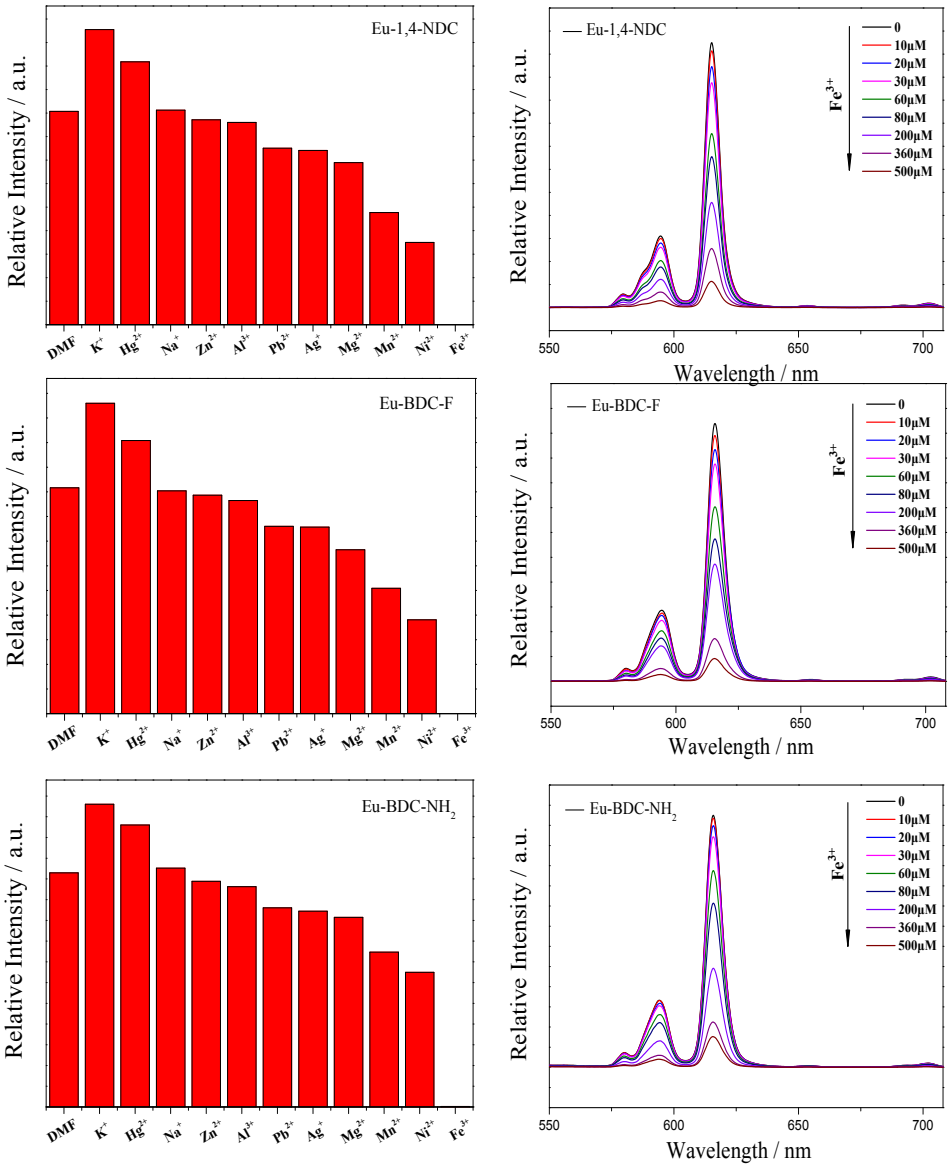

Fig. S9 The PL intensities of Eu-MOFs toward various ions and in various concentrations of Fe^{3+} solution.

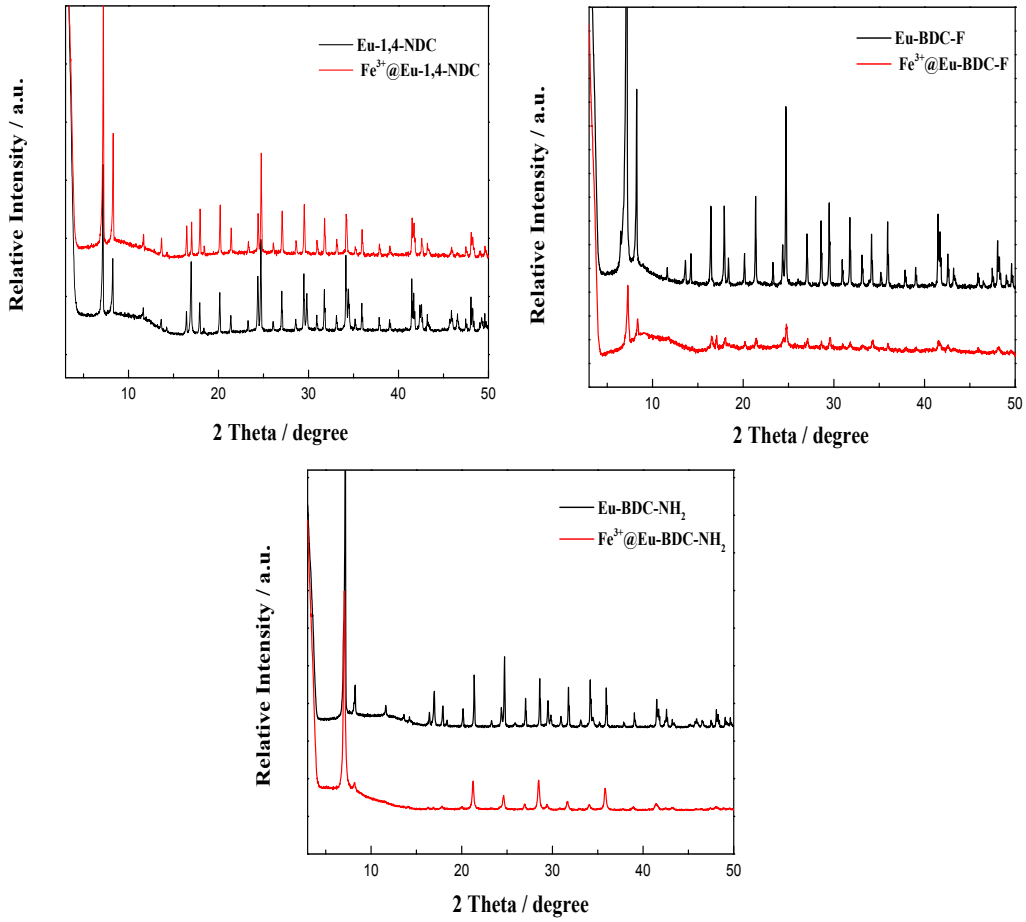

Fig. S10 PXRD patterns of the original and ions exchanged compounds.

Table S3 The detailed ICP studies of Eu-MOFs and target metal ions

Sample	Eu^{3+}（ppm）	Fe^{3+}（ppm）
Eu-BDC-NH_2	19.10	1.496
Eu-BDC-F	12.44	2.478
Eu-1,4-NDC	20.04	2.083

7. Photographs in various analytes under UV-light irradiation

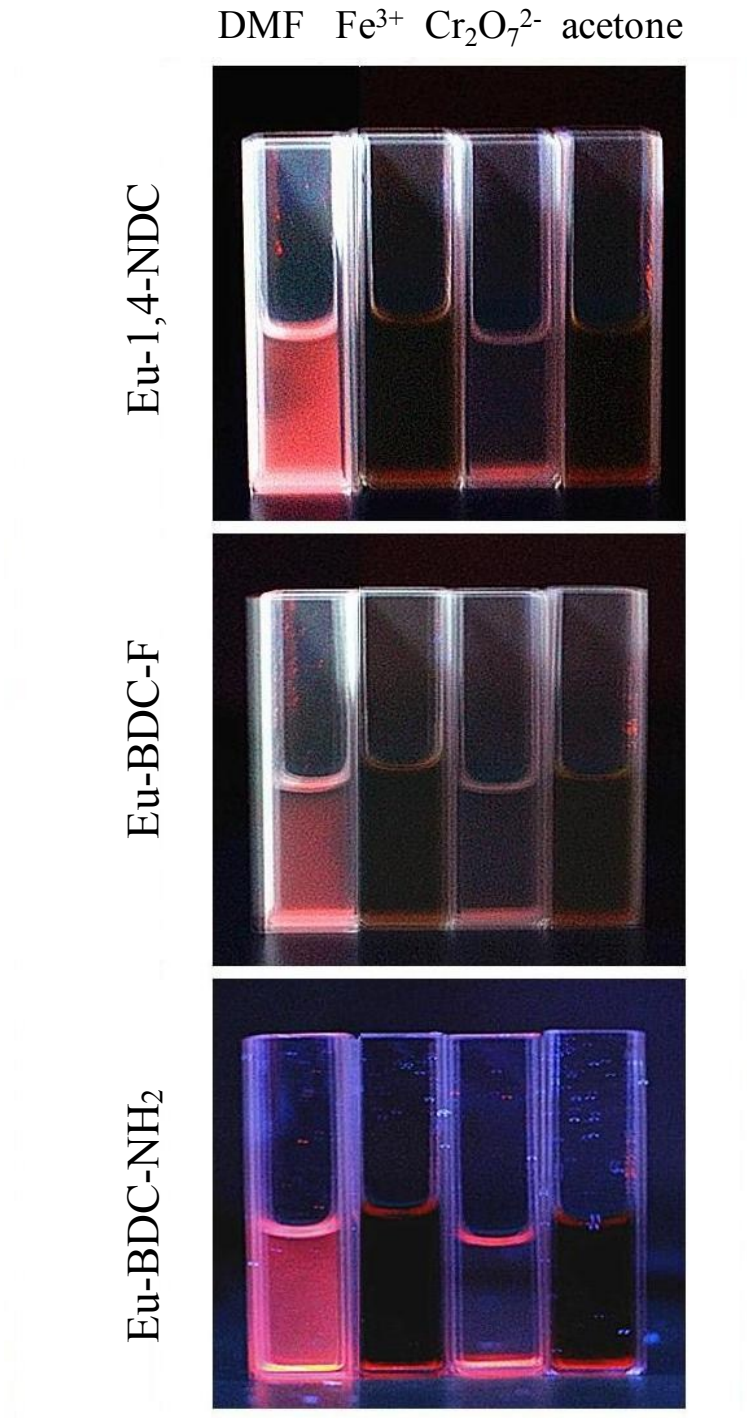

Fig. S11 The photographs of Eu-MOFs in the analytes solutions (10^{-2}M) under UV-light