Supporting information for

A hydrolytically stable europium–organic framework for the selective detection of radioactive Th^{4+} in aqueous solution

Liping Song, [§a,b] Wei Liu, [§b] Yanlong Wang, [b] Lanhua Chen,[b] Xiao-Feng Wang[*a] and Shuao Wang[*b]

[a]School of Chemistry and Chemical Engineering, and Hunan Province Engineering Research Center of Radioactive Control Technology in Uranium Mining and Metallurgy, University of South China, Hengyang, 421001, China.
[b]School for Radiological and Interdisciplinary Sciences (RAD-X) and Collaborative Innovation Center of Radiation Medicine of Jiangsu Higher Education Institutions, Soochow University, 199 Ren'ai Road, Suzhou 215123, China.

Contents

S1. Crystallographic data of Compound 1

Table S1. Crystallographic data and structural refinement for **compound 1**

Sample	**Compound 1**
Formula	$C_{26}H_{26}O_{18}N_2Eu_2$
Mr [g·mol^{-1}]	958.43
Crystal system	triclinic
Space group	*P -1*
a (Å)	9.1075(8)
b (Å)	11.8822(11)
c (Å)	15.5502(14)
α	80.532(3)
β	74.179(3)
γ	74.763(3)
V (Å^3)	1554.3(2)
Z	2
D_c (g cm^{-3})	2.048
μ (mm^{-1})	4.084
F (000)	932.0
T(K)	296
GOF on F^2	1.054
R_1,[a] wR$_2$[b] (I>2σ(I))	0.0282, 0.0712
R_1,[a] wR$_2$[b] (all data)	0.0311, 0.0729

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

Table S2. Selected bond lengths (Å)

Selected Bond Lengths (Å)	
Eu1-O4	2.381(3)
Eu1-O6	2.301(3)
Eu1-O7	2.309(3)
Eu1-O8	2.449(3)
Eu1-O11	2.390(2)
Eu1-O13	2.337(2)
Eu1-O15	2.375(2)
Eu2-O5	2.346(3)
Eu2-O9	2.365(2)
Eu2-O10A	2.806(3)
Eu2-O12	2.303(2)
Eu2-O14	2.454(3)
Eu2-O16	2.349(2)
Eu2-O17	2.386(2)

S2. Stability test

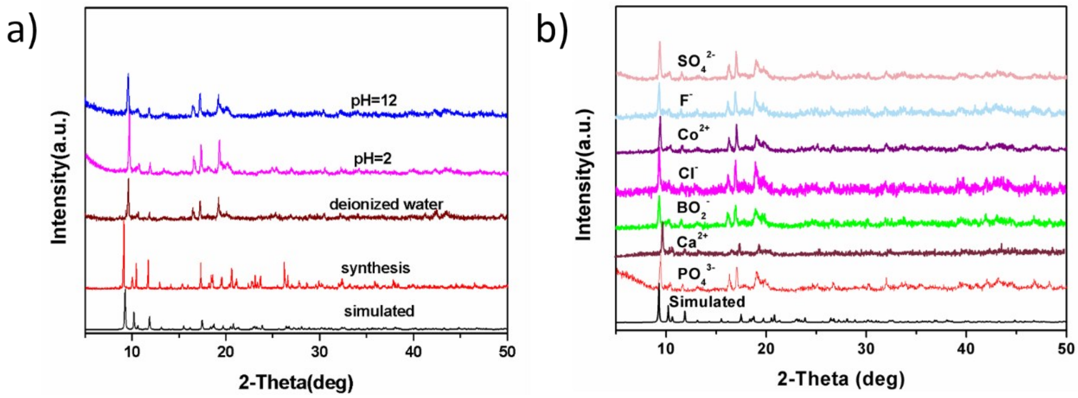

Figure S1. a) The stability of **Compound 1** in deionized water, pH =2, and 12 aqueous solutions. b) The stability of **Compound 1** in cation and anion solutions.

S3. The TGA curve for Compound 1

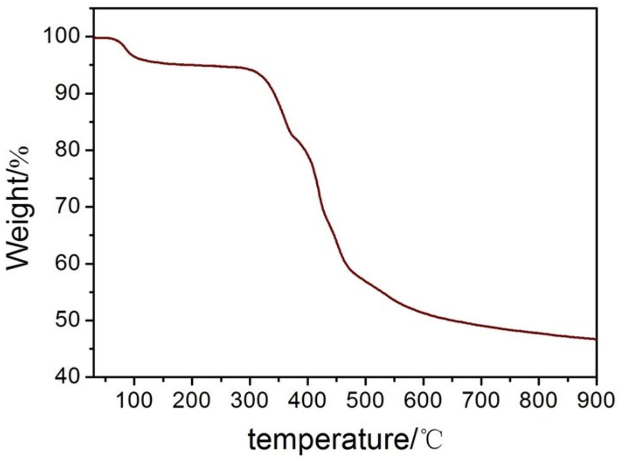

Figure S2. The TGA curve of **Compound 1** measured from 30 °C to 900 °C.

S4. The excitation spectrum of Compound 1

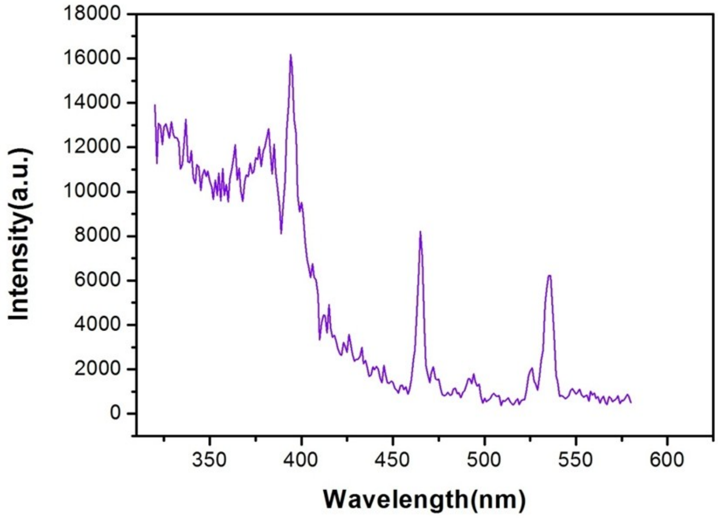

Figure S3. The excitation spectrum of **Compound 1.**

S5. Influence of competing ions

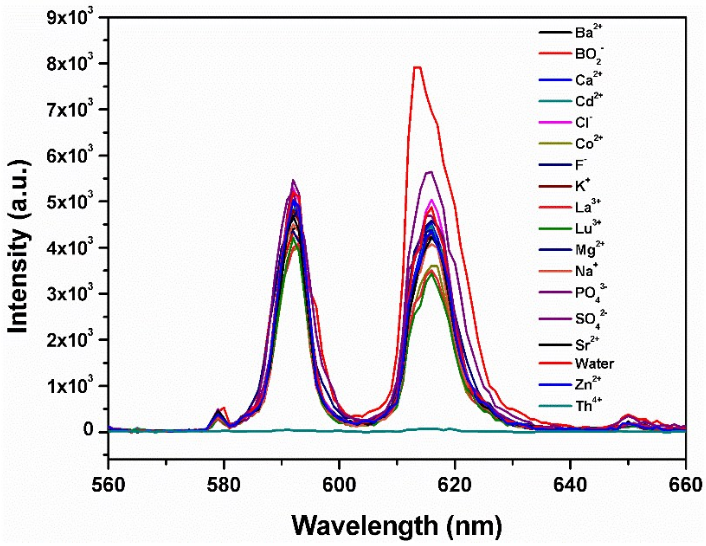

Figure S4. Emission spectra of **compound 1** immersed in different cation and anion solutions.

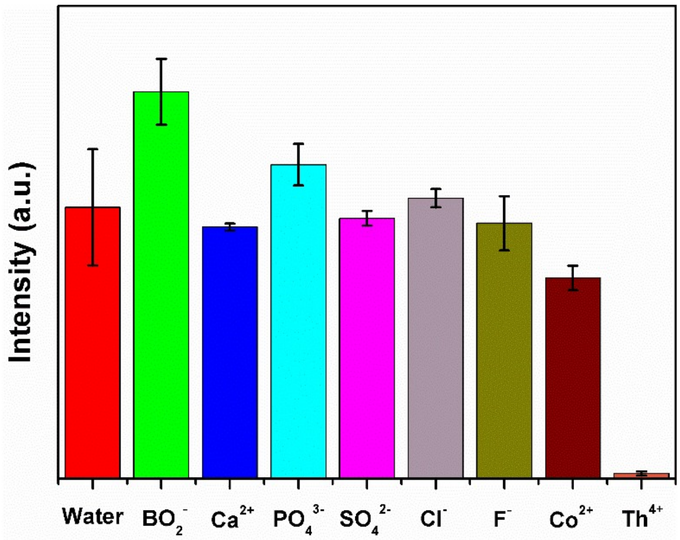

Figure S5. Luminescence intensity of **compound 1** immersed in 1 × 10^{-3} mol/L various ion solutions. (monitored at 616 nm, and excited at 290 nm)

S6. The influence of the pH value on the luminescence intensity of compound 1

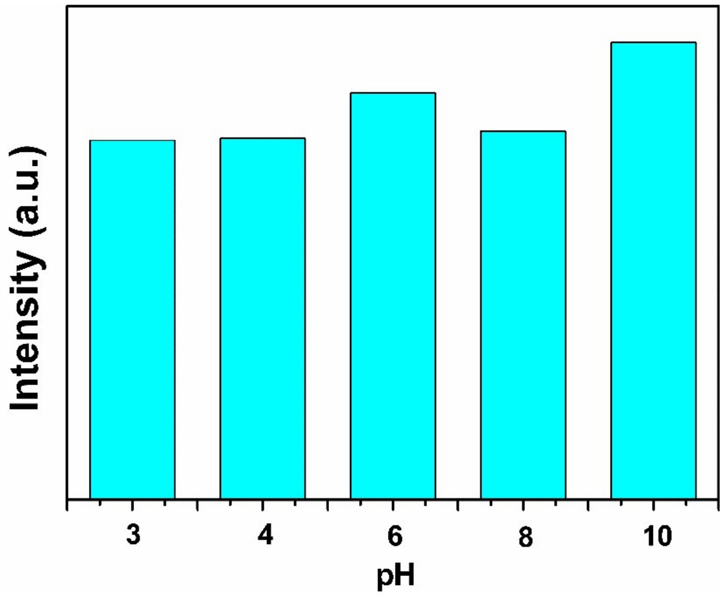

Figure S6. The influence of the pH value on the luminescence intensity of compound 1 (monitored at 616 nm).

S7. Emission spectra of deionized water

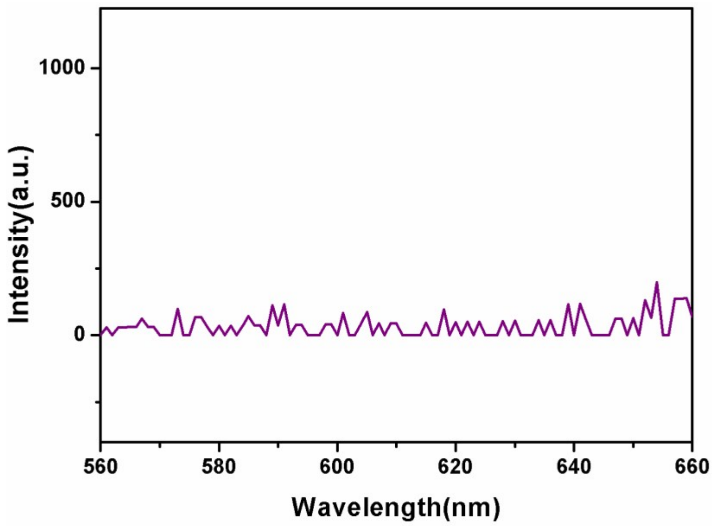

Figure S7. Emission spectra of deionized water (excited at 290 nm).

S8. The linear relationship the relative decrease of luminescence intensity and thorium concentration of compound 1 in low concentration

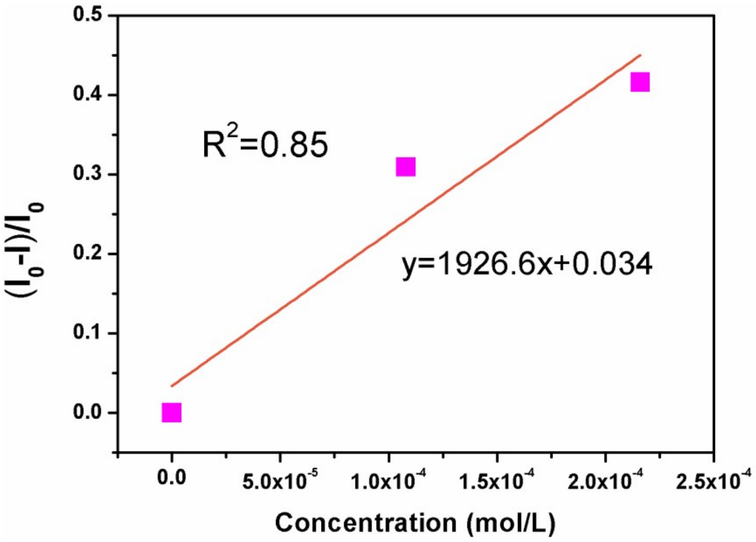

Figure S8. A plot showing the relative decrease of luminescence intensity (measured at 616 nm) of **compound 1**, the data points in low concentration (0 - 2.16 × 10^{-4} mol /L) are fitted in linear relationship (R^2 = 0.85).

S9. Adsorption ratio of Th^{4+} in 2.15 × 10^{-5} mol/L competing metal ions.

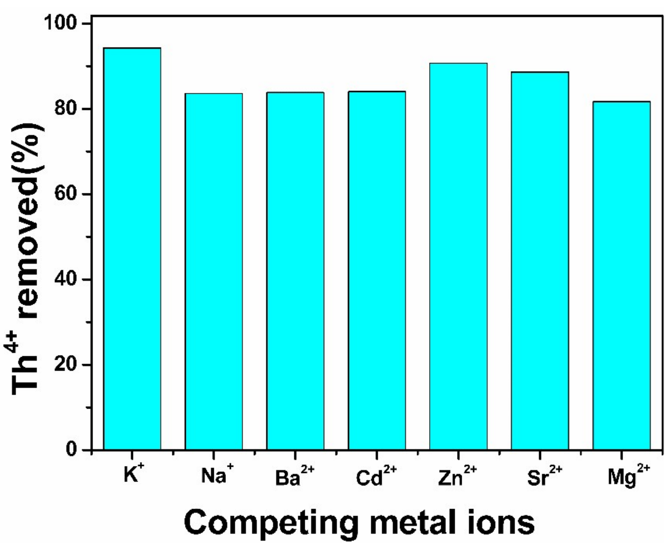

Figure S9. Adsorption ratio of Th^{4+} in 2.15 × 10^{-5} mol/L competing metal ions.

Table S3. Quenching constants (K_{SV}) of various 1 × 10^{-3} mol/L $M(NO_3)_x \cdot n(H_2O)$ (M = K^+, Na^+, Ba^{2+}, Sr^{2+}, Cd^{2+}, Ca^{2+}, Co^{2+}, Zn^{2+}, Mg^{2+}, La^{3+}, Lu^{3+}, Th^{4+}; x = 1, 2, 3, 4) solution, and $Na_m(X) \cdot y(H_2O)$.(X = BO_2^-, PO_4^{3-}, SO_4^{2-}, Cl^-, F^-; m = 1, 2, 3).

Sample	Blank	K^+	Na^+	Ba^{2+}	Sr^{2+}	Cd^{2+}
K_{SV}	0	124.90	197.81	150.36	156.91	88.75
Sample	Zn^{2+}	Mg^{2+}	La^{3+}	Lu^{3+}	Th^{4+}	BO_2^-
K_{SV}	119.59	110.85	391.01	418.74	6.68×10^4	-298.67
Sample	Ca^{2+}	PO_4^{3-}	SO_4^{2-}	Cl^-	F^-	Co^{2+}
K_{SV}	0.08	-0.13	41.73	-32.63	61.94	351.38