Supporting Information

Multidimensional luminescent cobalt(II)-coordination polymers as sensors with extremely high sensitivity and selectivity for detecting of acetylacetone, benzaldehyde and $Cr_2O_7^{2-}$

Ai-Ling Li[a], Yun-Hua Qu[a], Lianshe Fu[b], Chao Han[a], Guang-Hua Cui[a]*

[a]*College of Chemical Engineering, Hebei Key Laboratory for Environment Photocatalytic and Electrocatalytic Materials, North China University of Science and Technology, No. 21 Bohai Road, Caofeidian new-city, Tangshan, Hebei, 063210, P. R. China*

[b]*Department of Physics and CICECO-Aveiro Institute of Materials, University of Aveiro, 3810-193 Aveiro, Portugal*

* Corresponding author. Fax: +86–315–8805462, Tel: +86–315–8805460.

*E-mail: tscghua@126.com

Supporting Information

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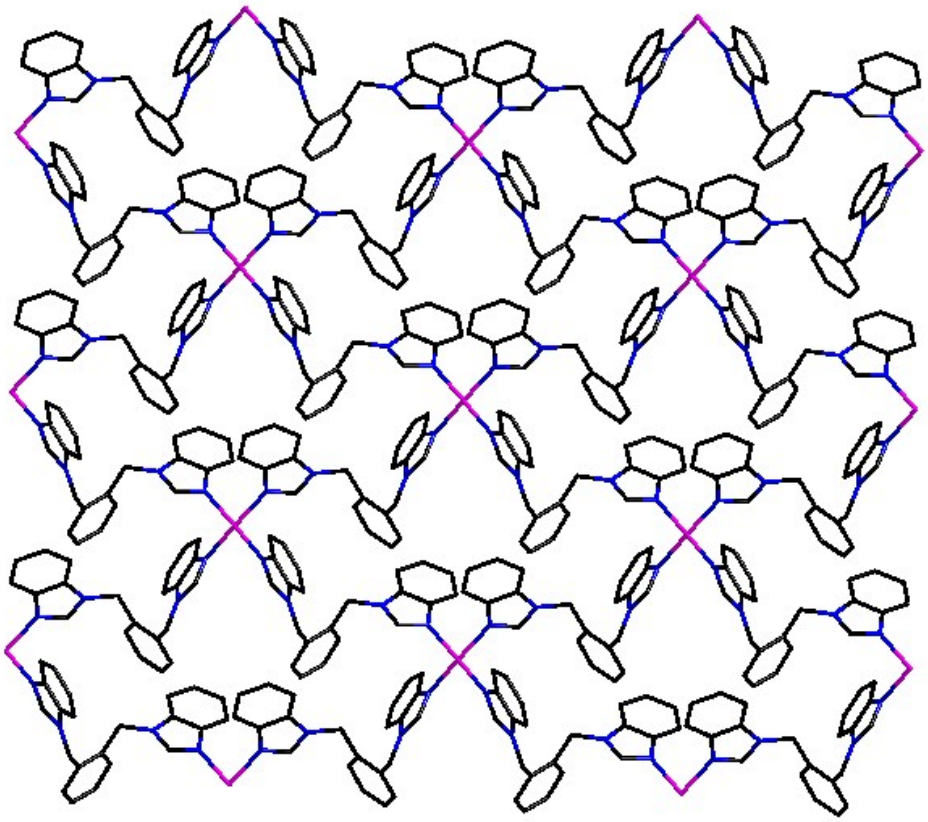


Fig. S1. Each L ligand to link adjacent Co^{II} centers into a 2D (4,4) layer of **1**.

Fig. S2. 1D wave-like [Co–TBTA–Co]$_n$ chain of **2**.

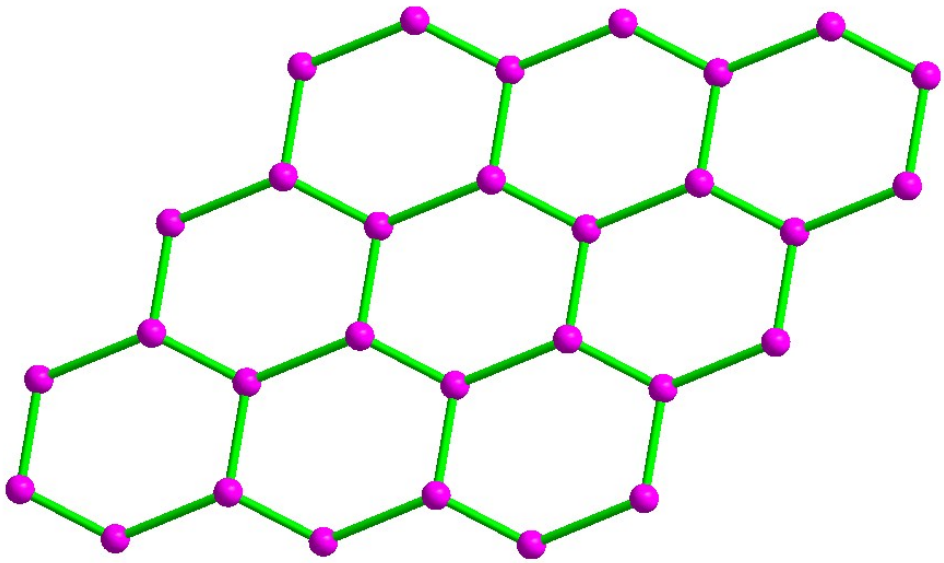


Fig. S3. Uninodal **hcb** topology of **2**.

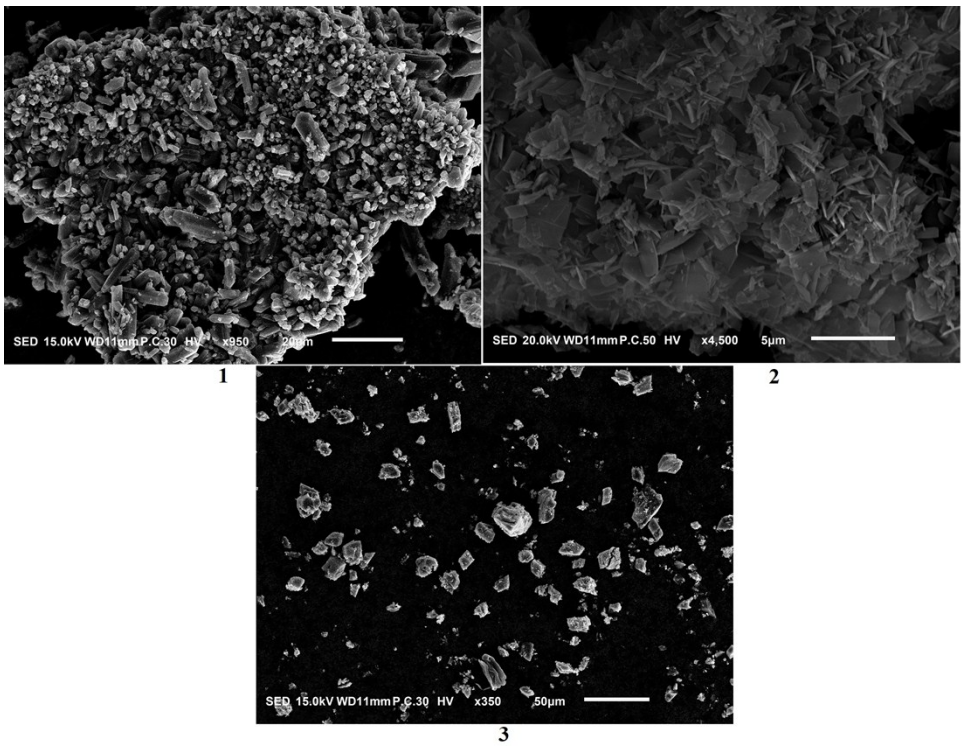


Fig. S4. SEM images of the powdered **1**, **2** and **3**.

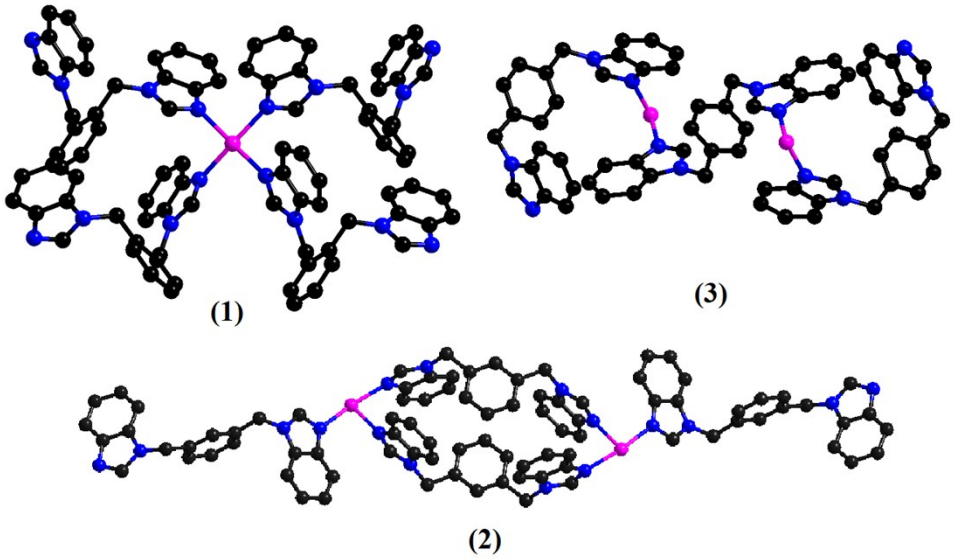


Fig. S5. Different N-containing ligands connect adjacent Co^{II} centers of **1**, **2** and **3**.

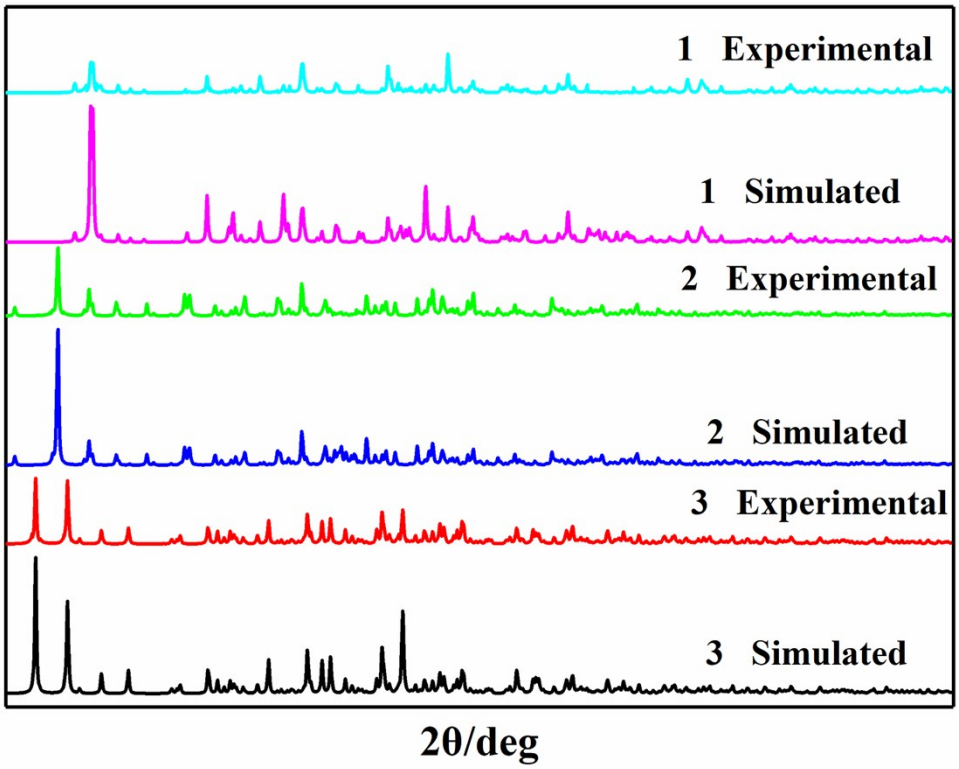


Fig. S6. Powder X-ray diffraction (PXRD) patterns of **1**, **2** and **3**.

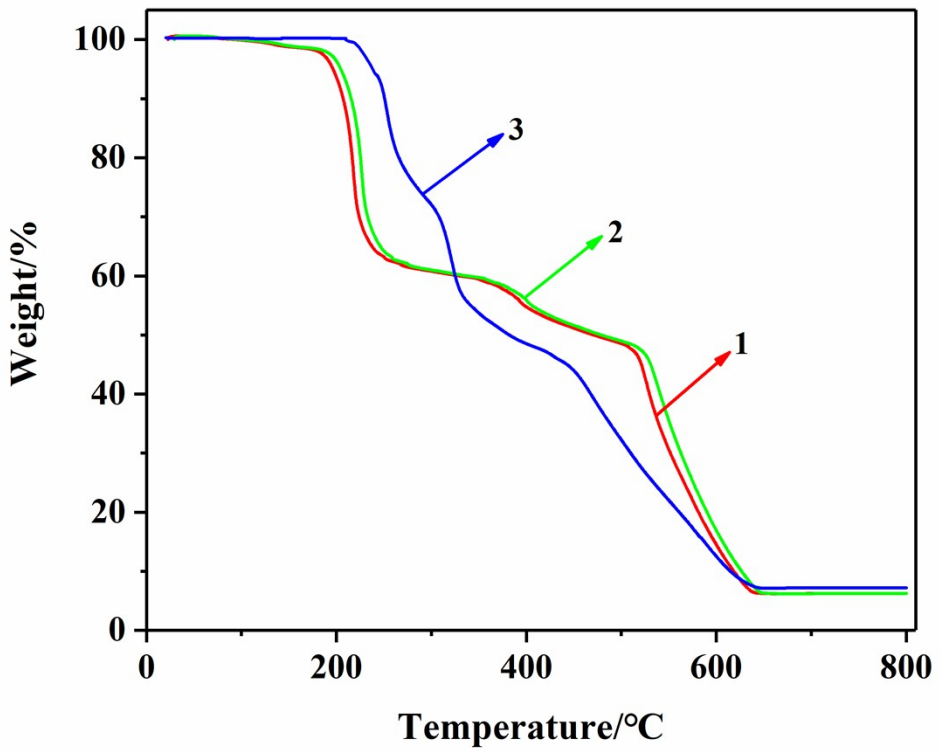


Fig. S7. TGA curves of **1**, **2** and **3**.

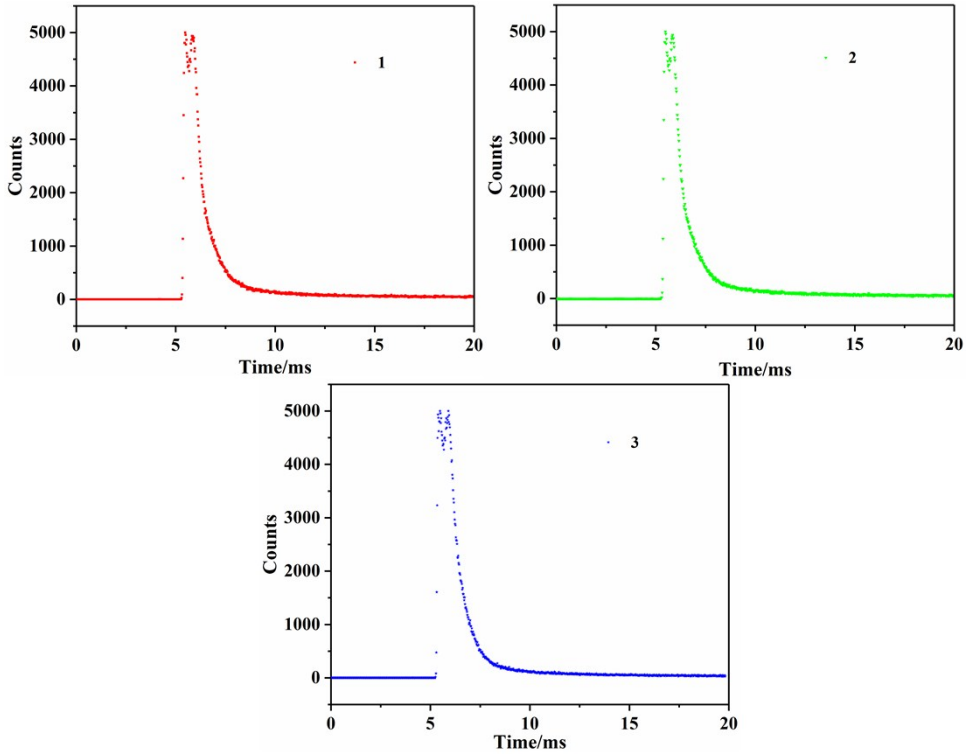
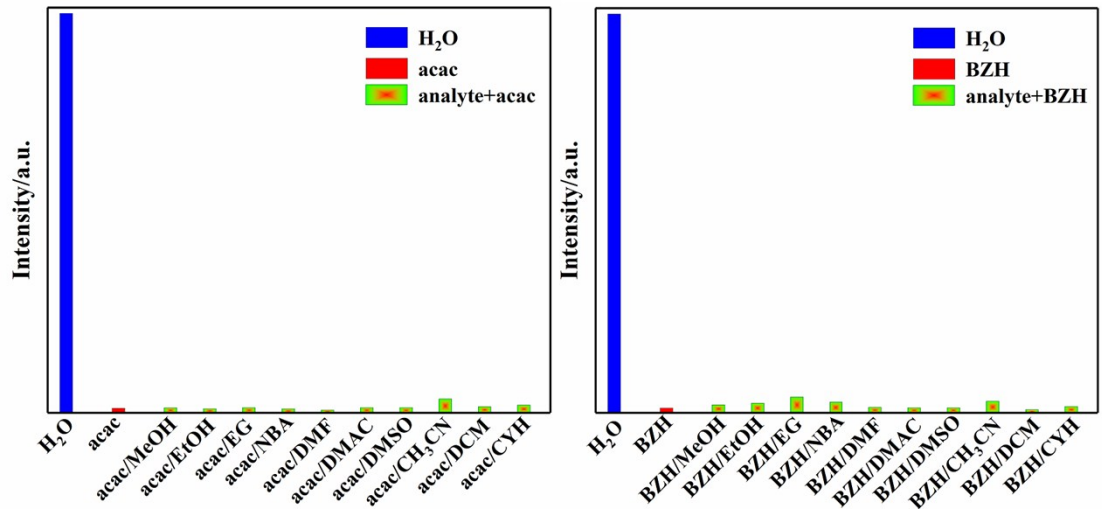
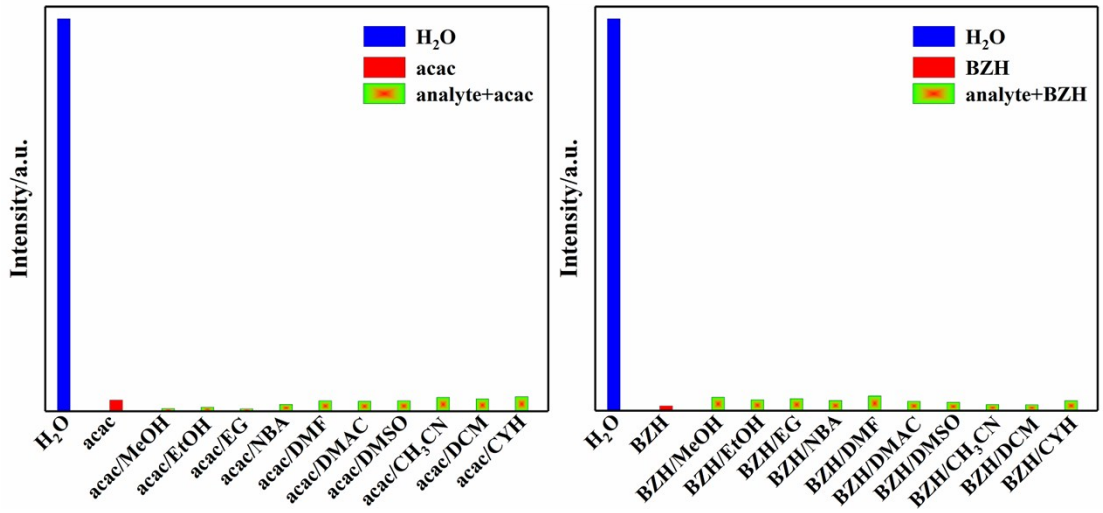


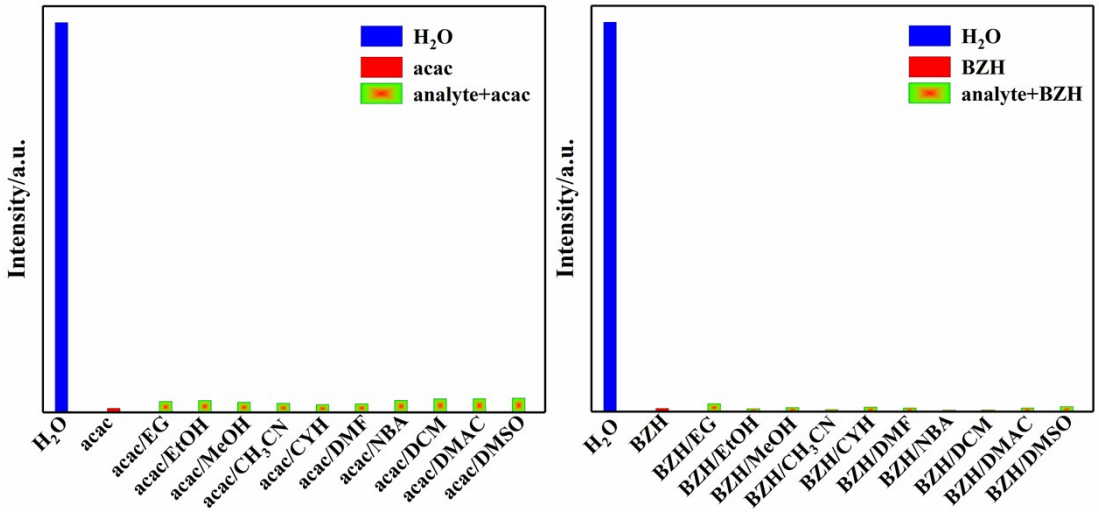
Fig. S8. Time resolved luminescence decay curves of **1**, **2** and **3**.


Intensity/a.u.
H2O
acac
analyte+acac
H2O
acac/MeOH
acac/EtOH
acac/EG
acac/NBA
acac/DMF
acac/DMAC
acac/DMSO
acac/CH3CN
acac/DCM
acac/CYH
Intensity/a.u.
H2O
BZH
analyte+BZH
H2O
BZH
BZH/MeOH
BZH/EtOH
BZH/EG
BZH/NBA
BZH/DMF
BZH/DMAC
BZH/DMSO
BZH/CH3CN
BZH/DCM
BZH/CYH

(a)

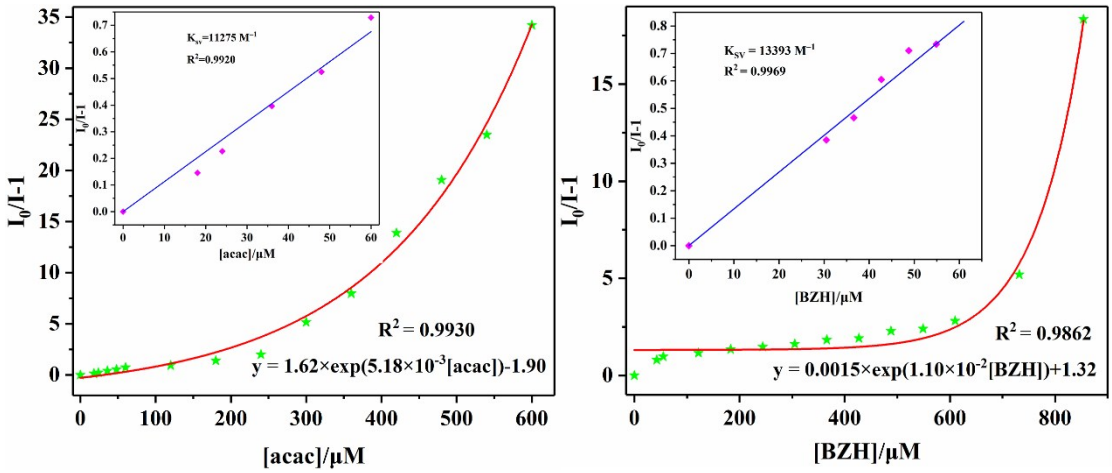

Intensity/a.u.
H2O
acac
analyte+acac
H2O
acac
acac/MeOH
acac/EtOH
acac/EG
acac/NBA
acac/DMF
acac/DMAC
acac/DMSO
acac/CH3CN
acac/DCM
acac/CYH
Intensity/a.u.
H2O
BZH
analyte+BZH
H2O
BZH
BZH/MeOH
BZH/EtOH
BZH/EG
BZH/NBA
BZH/DMF
BZH/DMAC
BZH/DMSO
BZH/CH3CN
BZH/DCM
BZH/CYH

(b)

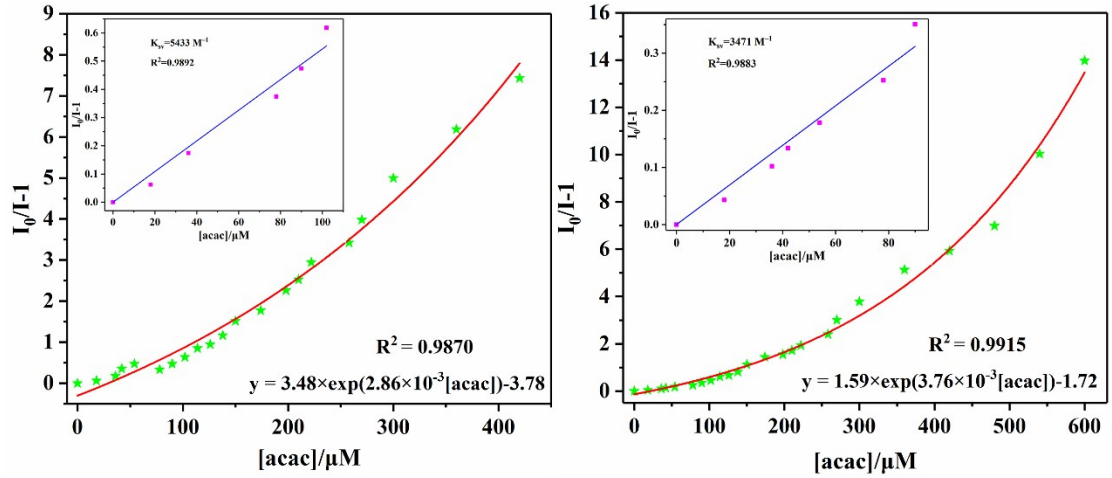


(c)

Fig. S9. (a) Comparison of the luminescence emission intensity of **1** for sensing of acac/BZH in the presence of other organic solvents; (b) Comparison of the luminescence emission intensity of **2** for sensing of acac/BZH in the presence of other organic solvents; (c) Comparison of the luminescence emission intensity of **3** for sensing of acac/BZH in the presence of other organic solvents.



(a)



(b)

Fig. S10. (a) Stern–Volmer plot of I_0/I –1 versus acac/BZH in different concentrations for **2**; (b) Stern–Volmer plot of I_0/I –1 versus acac/BZH in different concentrations for **3**.

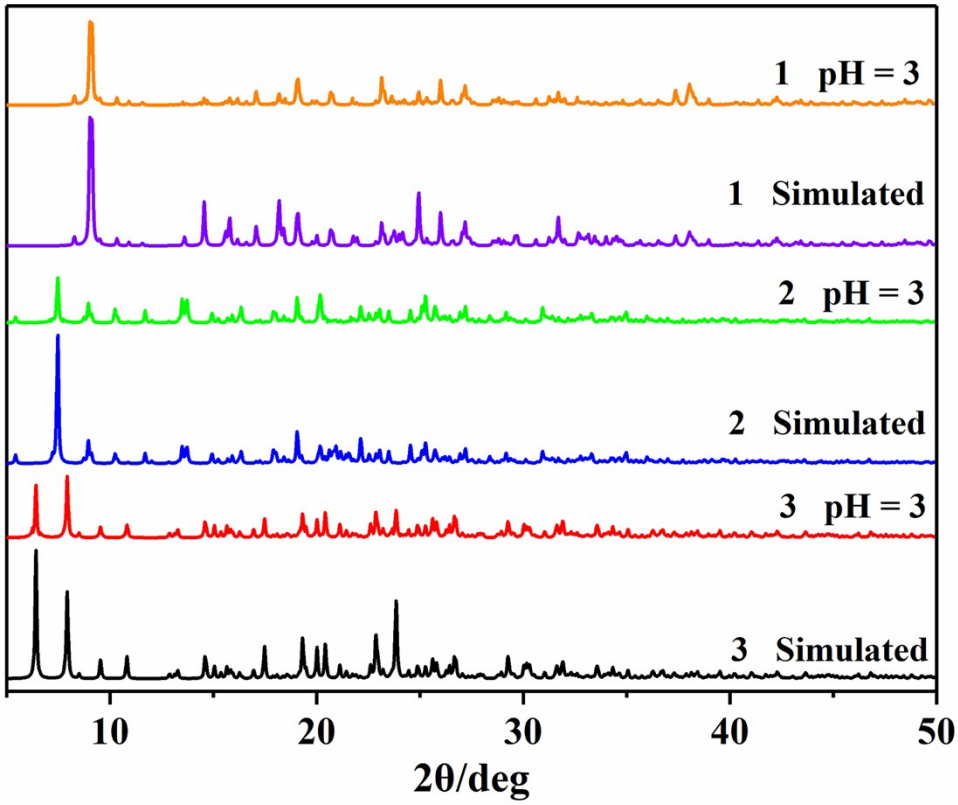


Fig. S11. PXRD patterns of **1**, **2** and **3** after treating in acidic aqueous solution (pH = 3).

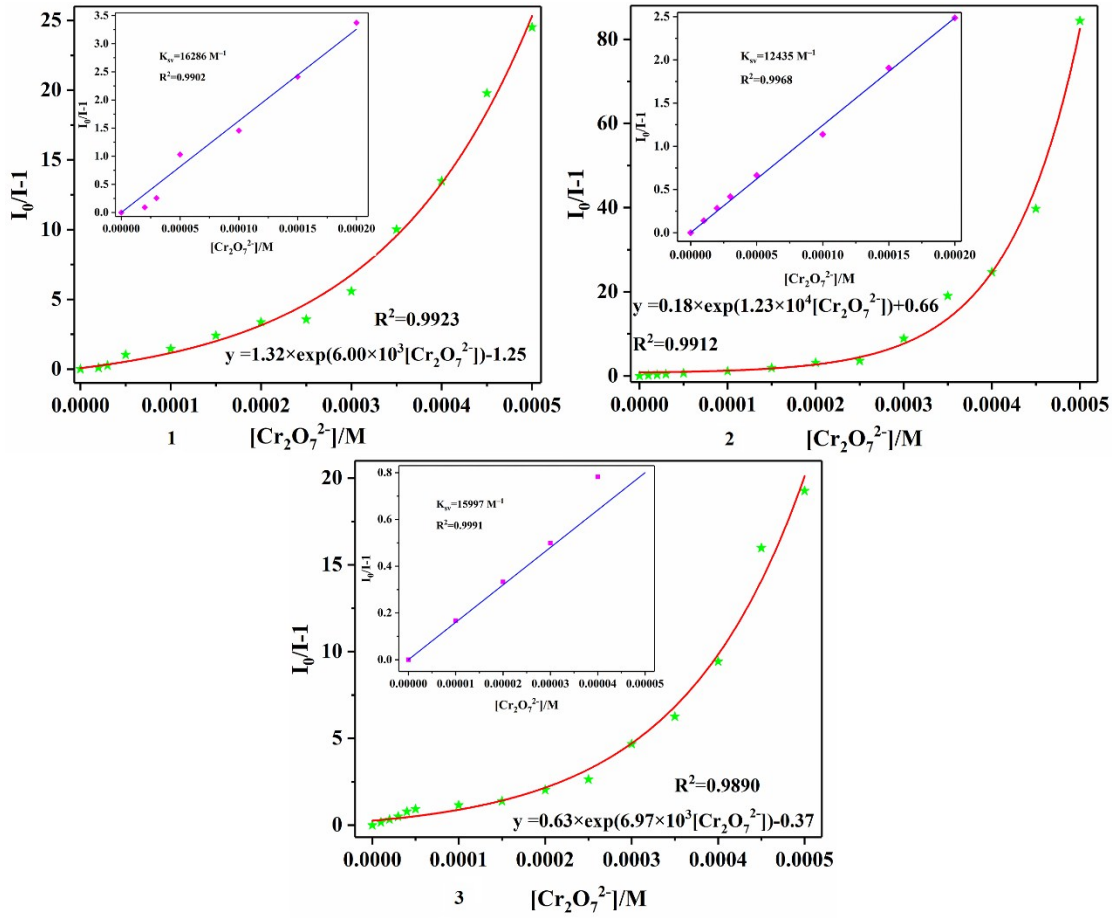


Fig. S12. Stern–Volmer plot of I_0/I –1 versus $Cr_2O_7^{2-}$ ions in range from 0 to 2×10^{-4} M (top); Nonlinear Stern–Volmer of **1**, **2** and **3** in aqueous solutions with different concentrations (bottom).

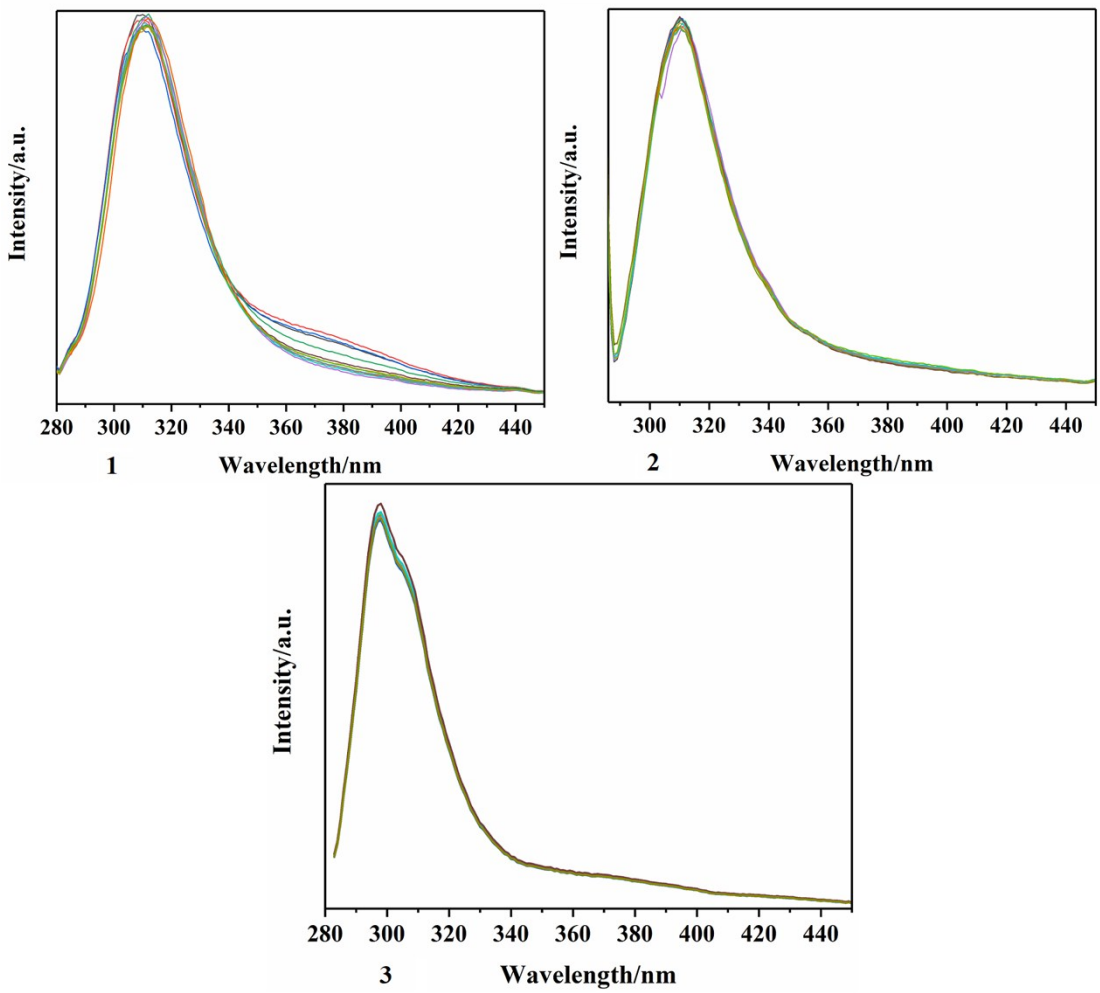
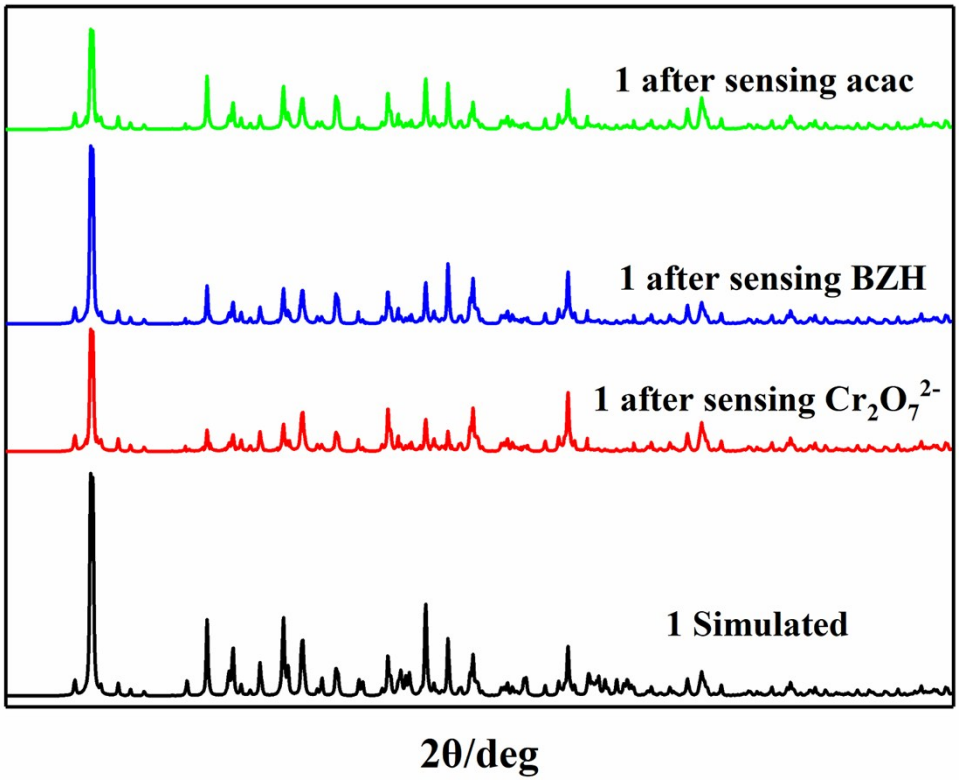
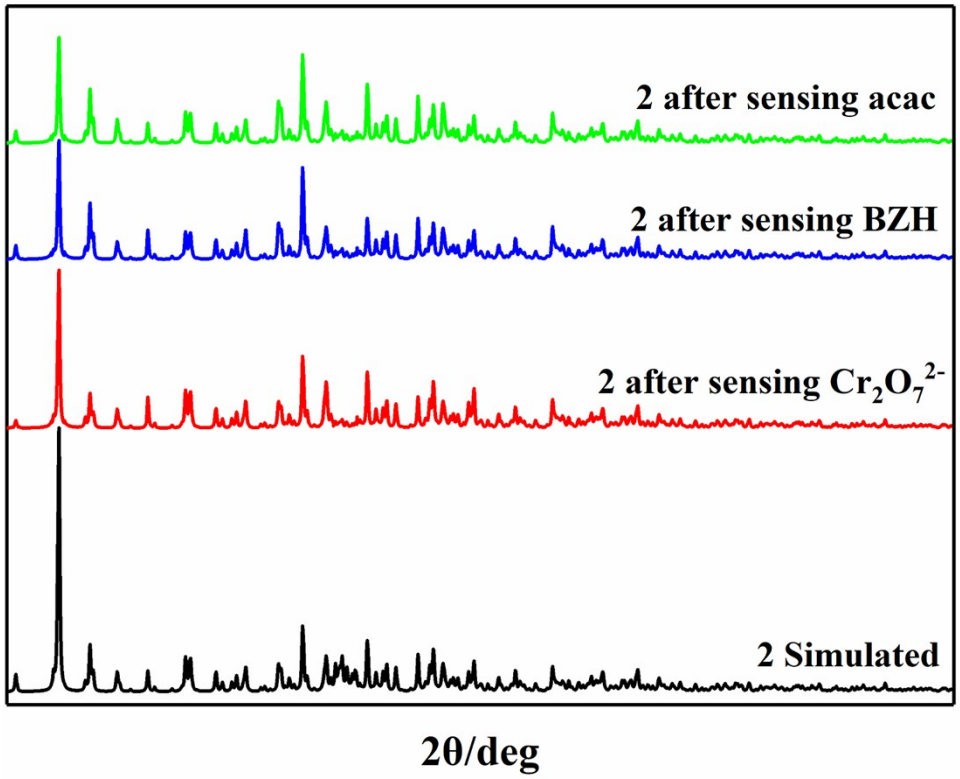


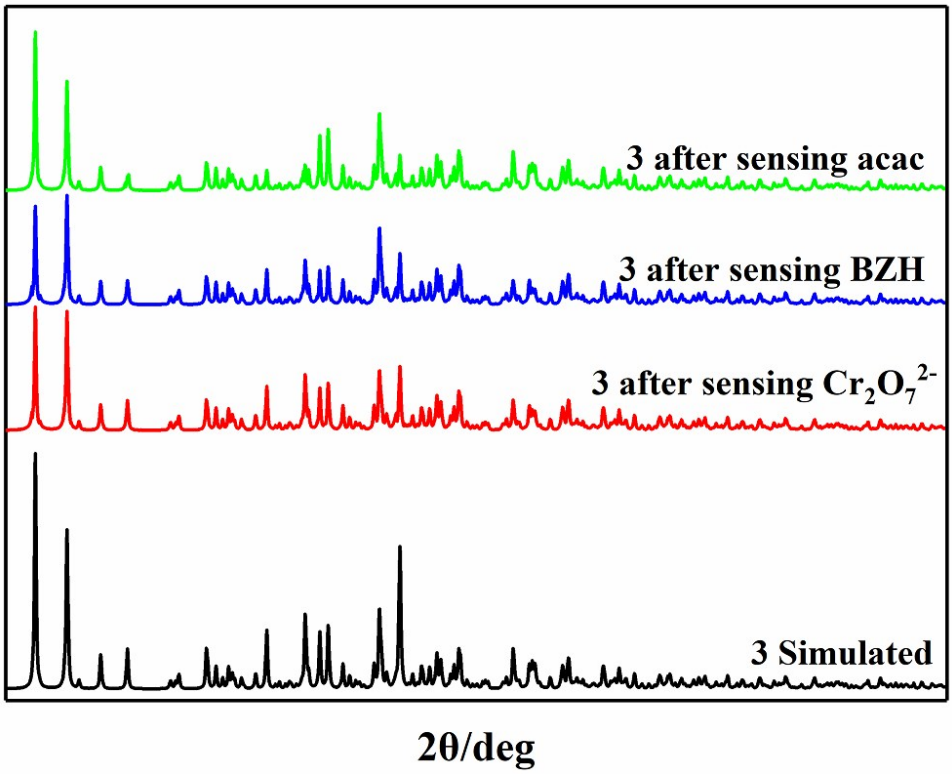
Fig. S13. Luminescence emission spectra of **1**, **2** and **3** in water from 0 to 60 min by 5 min step.


1 after sensing acac
1 after sensing BZH
1 after sensing $Cr_2O_7^{2-}$
1 Simulated
2θ/deg

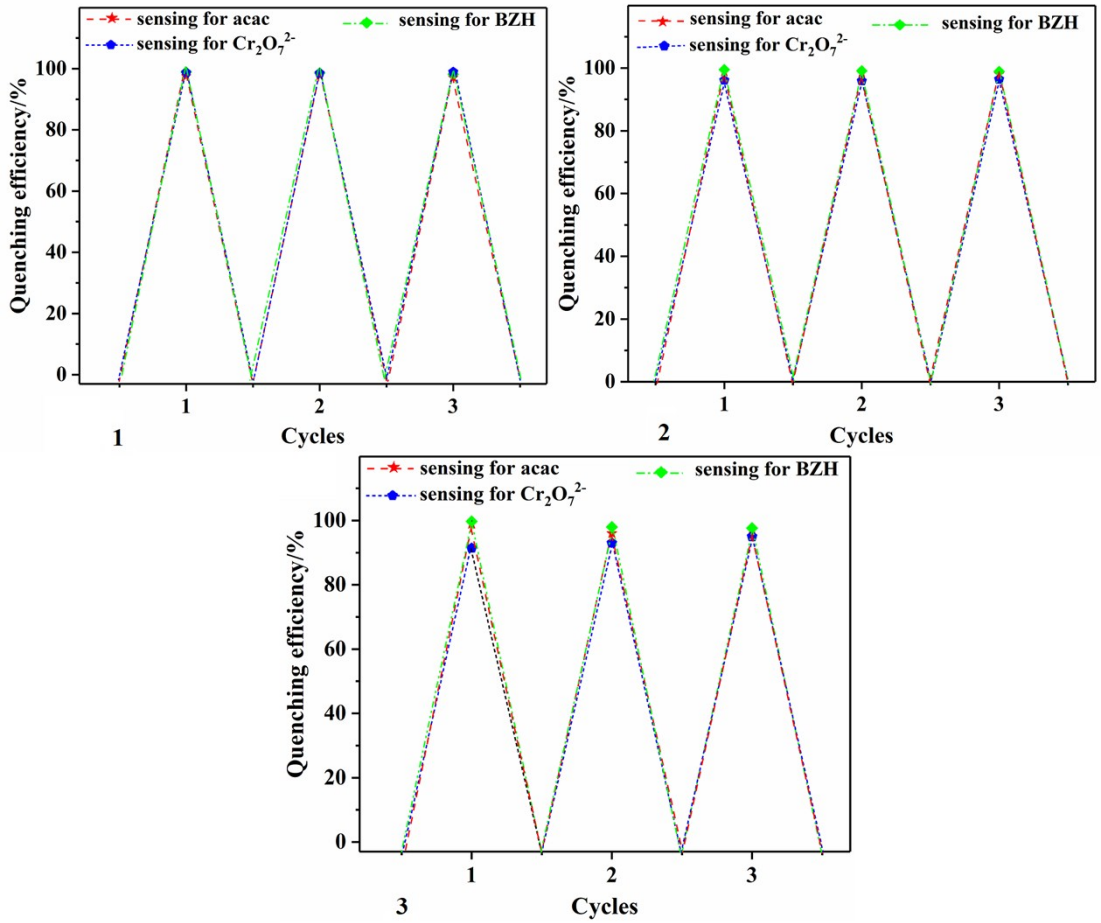
(a)


2 after sensing acac
2 after sensing BZH
2 after sensing $Cr_2O_7^{2-}$
2 Simulated
2θ/deg

(b)

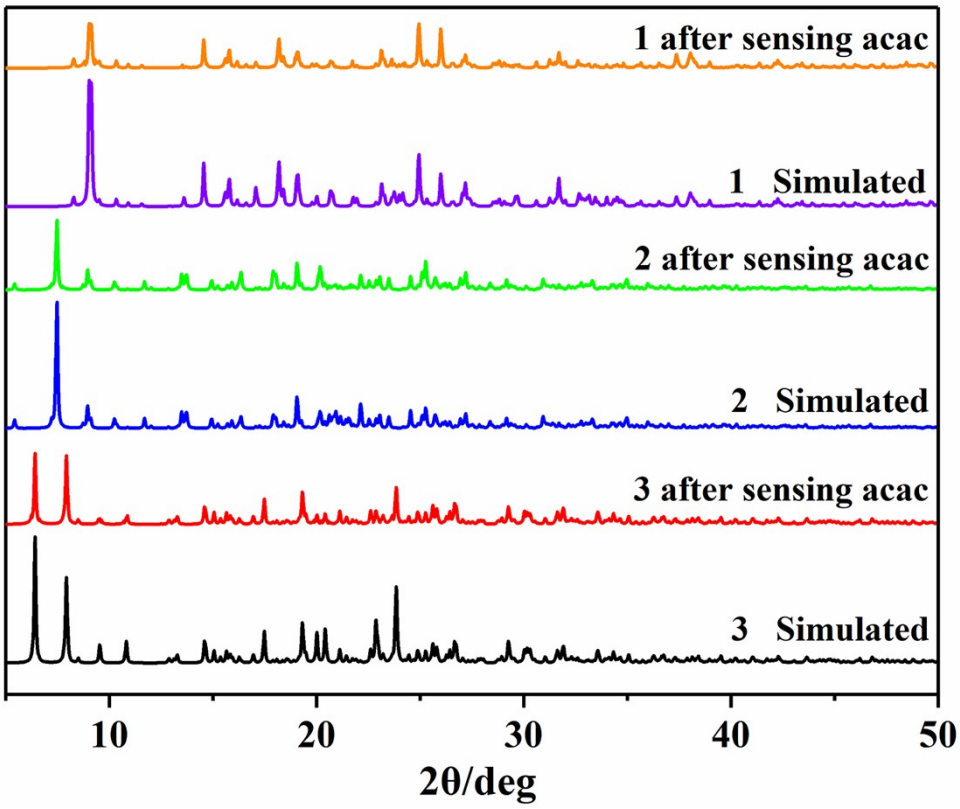

3 after sensing acac
3 after sensing BZH
3 after sensing $Cr_2O_7^{2-}$
3 Simulated
2θ/deg

(c)

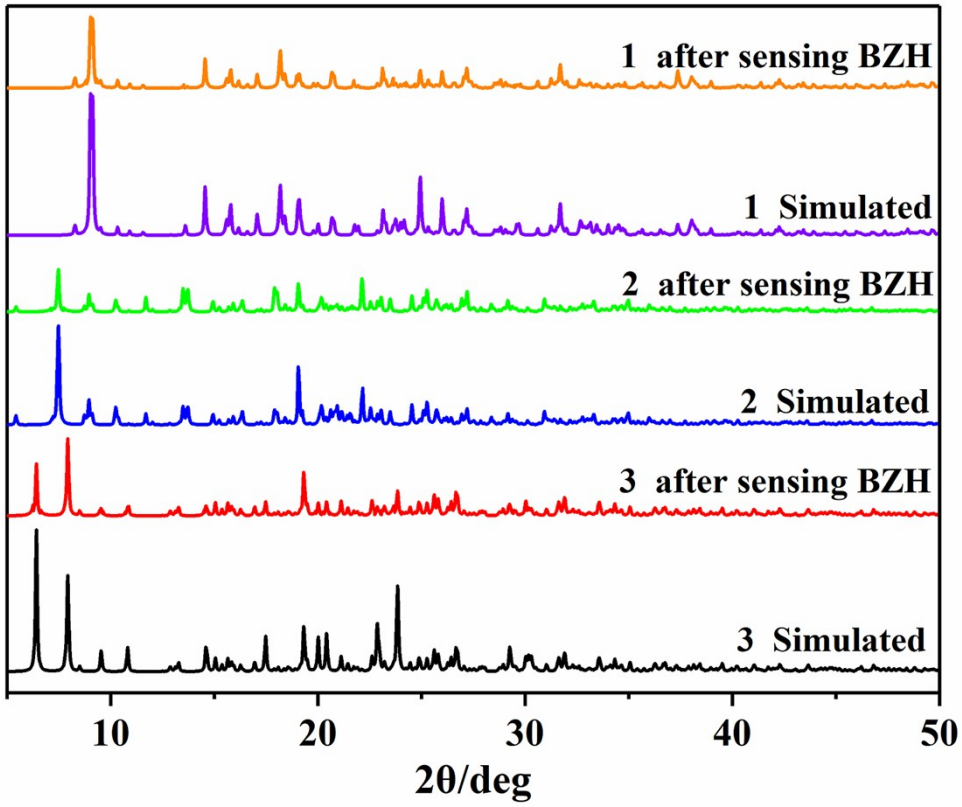


(d)

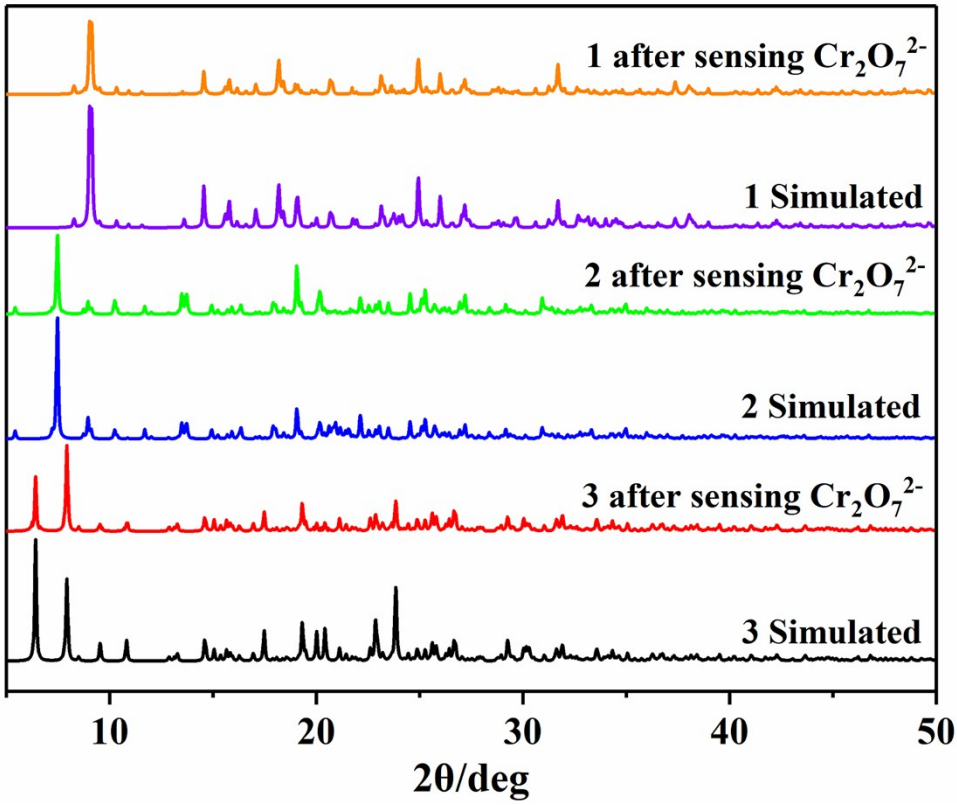
Fig. S14. (a) PXRD patterns of the simulated of **1** after sensing of acac, BZH and $Cr_2O_7^{2-}$ for three cycles in water; (b) PXRD patterns of the simulated of **2** after sensing of acac, BZH and $Cr_2O_7^{2-}$ for three cycles in water; (c) PXRD patterns of the simulated of **3** after sensing of acac, BZH and $Cr_2O_7^{2-}$ for three cycles in water; (d) Comparison of the quenching efficiency of **1**, **2** and **3** for sensing of acac, BZH and $Cr_2O_7^{2-}$ over three cycles.


1 after sensing acac
1 Simulated
2 after sensing acac
2 Simulated
3 after sensing acac
3 Simulated
10
20
30
40
50
2θ/deg

(a)

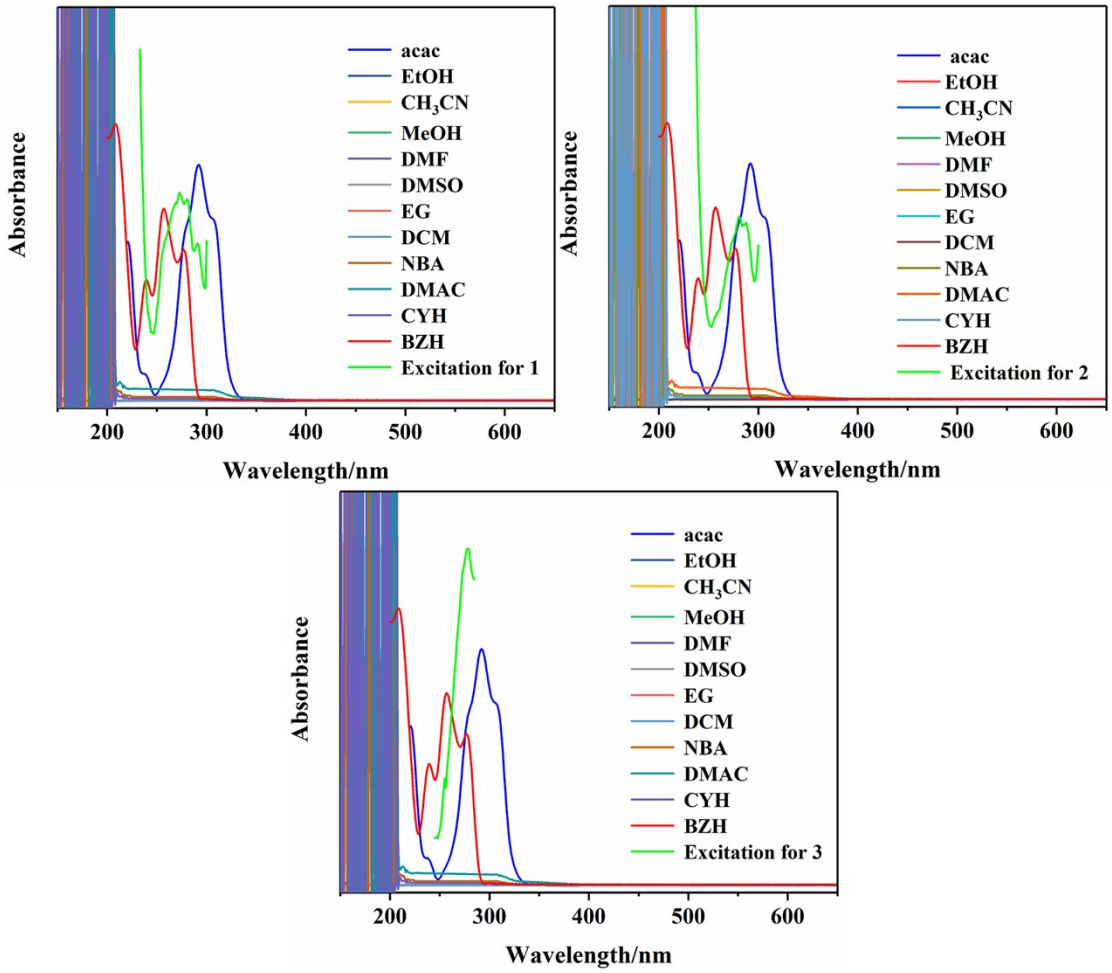

1 after sensing BZH
1 Simulated
2 after sensing BZH
2 Simulated
3 after sensing BZH
3 Simulated
10
20
30
40
50
2θ/deg

(b)

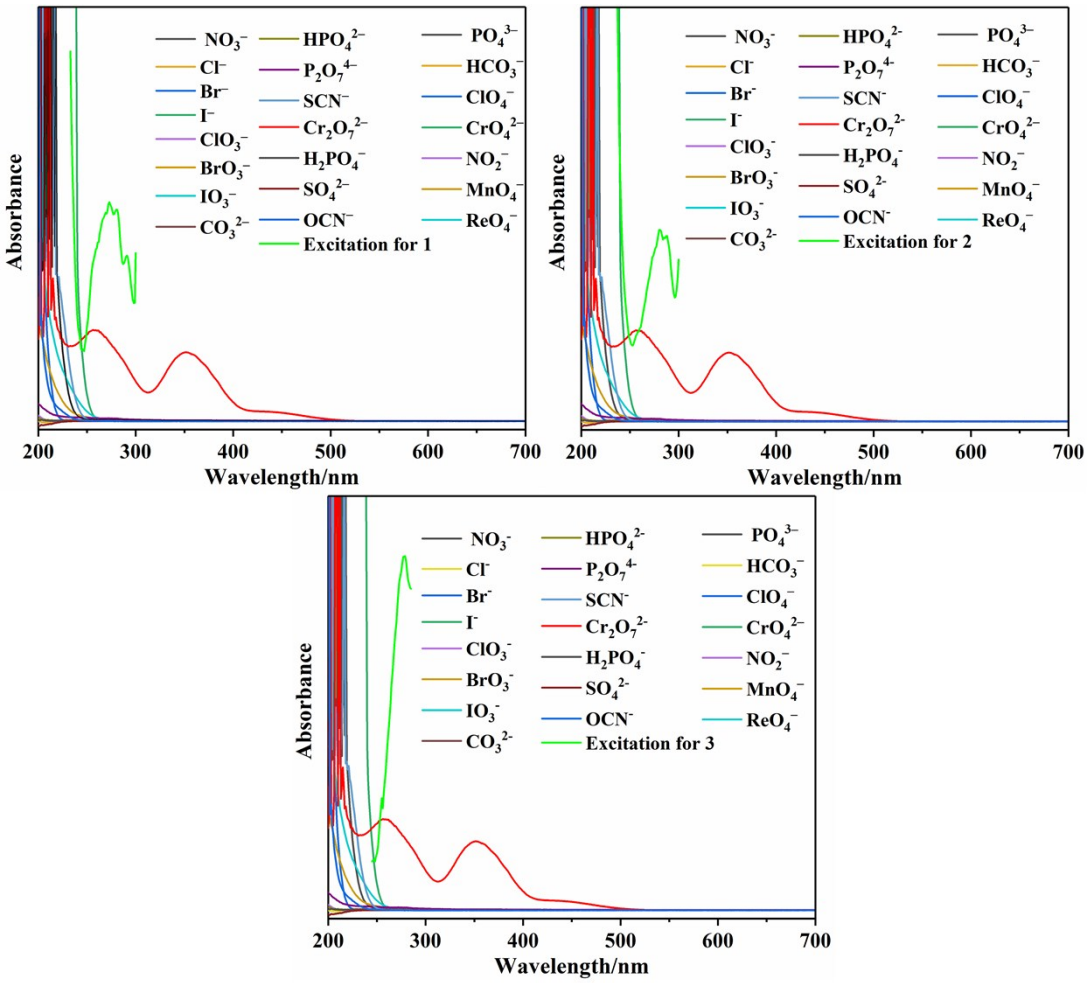


(c)

Fig. S15. (a) PXRD patterns of CPs and sensing for acac, respectively; (b) PXRD patterns of CPs and sensing for BZH, respectively; (c) PXRD patterns of CPs and sensing for $Cr_2O_7^{2-}$, respectively.


Absorbance
Wavelength/nm
200
300
400
500
600
acac
EtOH
CH3CN
MeOH
DMF
DMSO
EG
DCM
NBA
DMAC
CYH
BZH
Excitation for 1
Excitation for 2
Excitation for 3

(a)



(b)

Fig. S16. (a) Spectral overlap between the absorption spectra of different solvents and the excitation spectra of **1**, **2** and **3**; (b) Spectral overlap between the absorption spectra of anions and the excitation spectra of **1**, **2** and **3**.