A novel photochromic coordination polymer based on a robust viologen ligand exhibiting multiple detection properties in solid state

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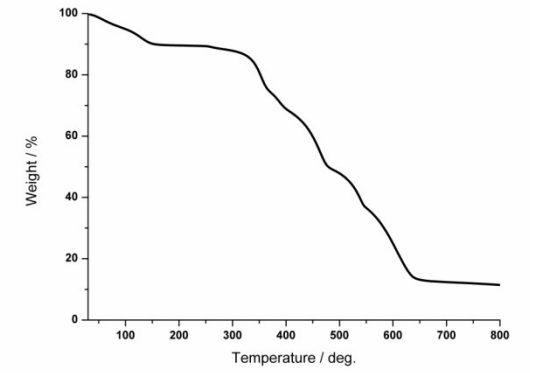

Fig. S1 The TGA date of the complex **Cd- bcbpy**.

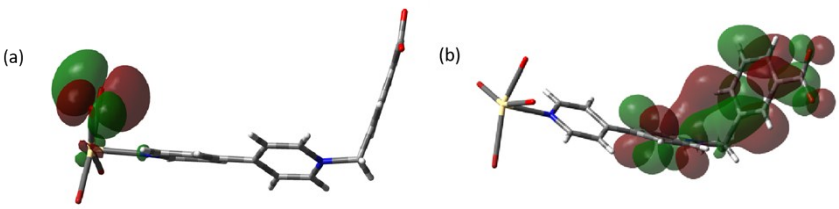

Fig. S2 Calculated highest and lowest occupied molecule orbital HOMO (a) and LUMO (b) of **Cd- bcbpy**.

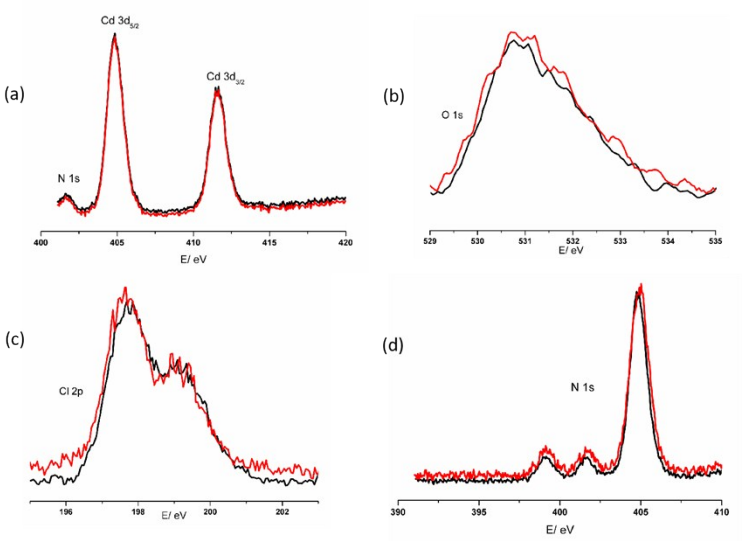

Fig. 3 XPS spectra of **Cd- bcbpy** before(black) and after (red)irradiation.

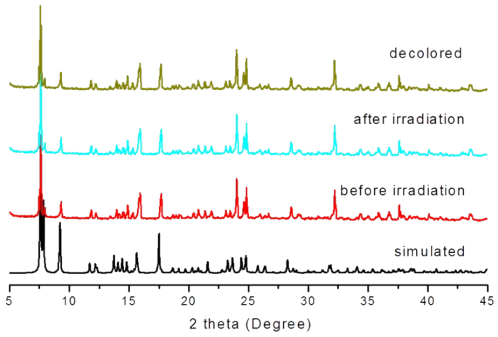

Fig. S4 PXRD patterns of **Cd- bcbpy** before irradiation (red), after irradiation (sky blue), heat (red), decolored in dark(dark yellow). The black line is simulated curve.

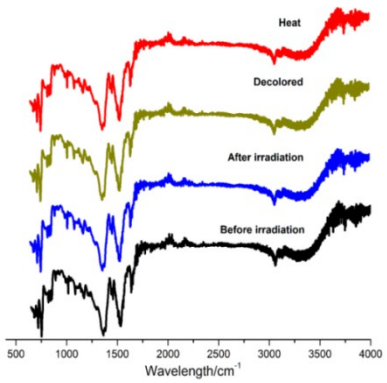

Fig. S5 FTIR spectra of **Cd- bcbpy** before irradiation (black), after irradiation (blue), decolored (dark yellow) and heat at 100 °C for 2 hours(red).

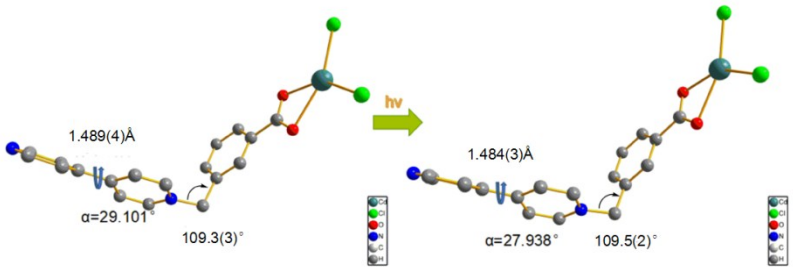

Fig. S6 Coordination environment around the Cd(II) ion in **Cd- bcbpy** (lefy) and in photoirradiated sample **1P** (right).

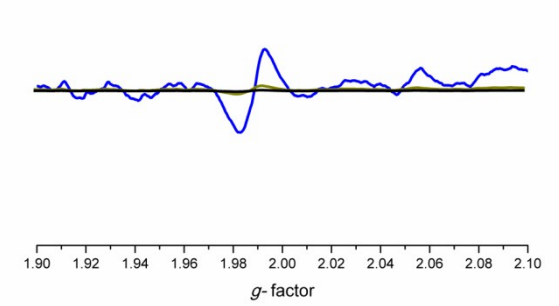

Fig. S7 EPR spectral changes of CP@NH_3 (blue) and CP@Aniline (dark yellow).

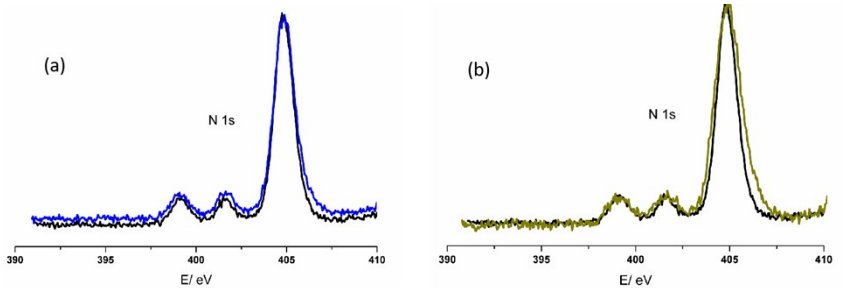

Fig. S8 XPS spectra of **Cd- bcbpy** @NH_3(a) and aniline (b)irradiation. The black line is the XPS spectrum of original sample.

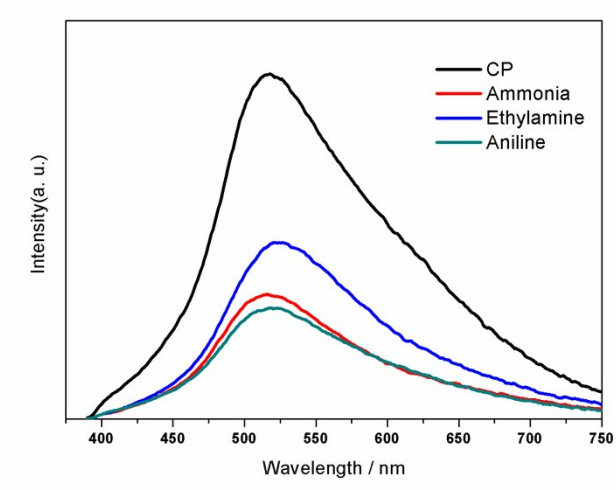

Fig. S9 The luminescence emission spectral changes (λ ex = 380 nm), when **Cd- bcbpy** detected different organic amines in solid state.

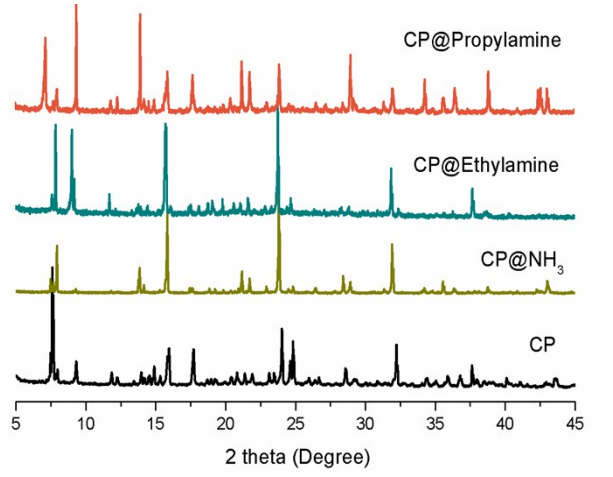

Fig. S10 PXRD patterns of MOF@ different organic amines. The black line is simulated curve.

Fig. S11 Photographs of CP, CP@ NH_3 and CP @ NH_3 in dark for 30 min.

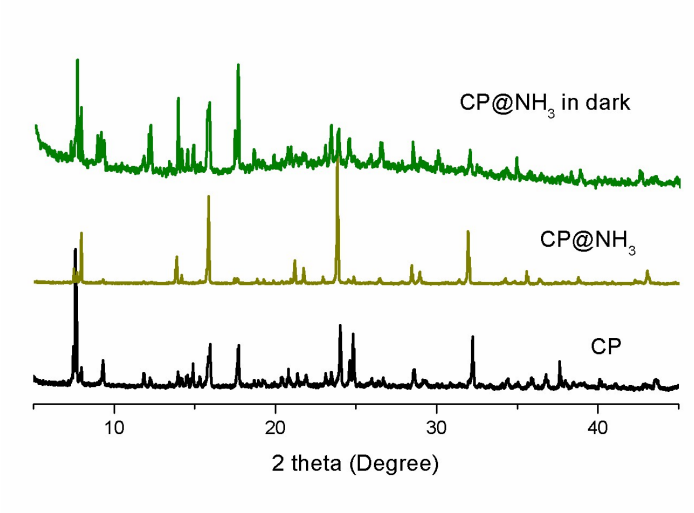

Fig. S12 PXRD patterns of CP@ NH_3 and CP@ NH_3 in dark for 30 min. The black line is simulated curve.

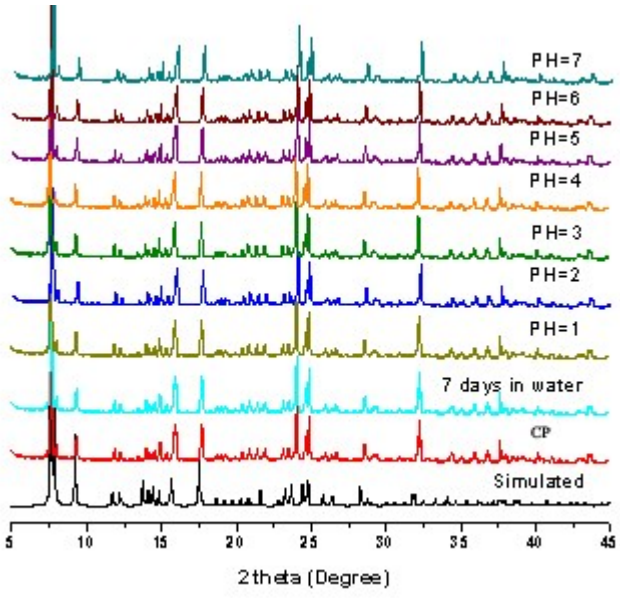

Fig. S 13 PXRD profiles for simulated and **Cd- bcbpy** samples soaked in boiling water and aqueous solutions with pH values from1 to 7.

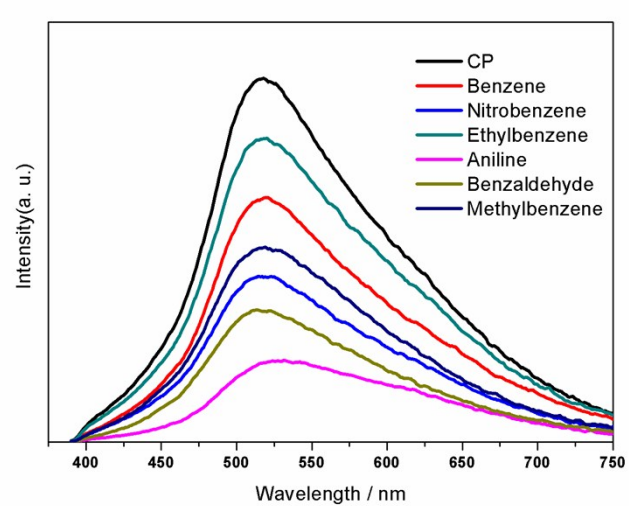

Fig. S14 The luminescence emission spectral changes (λ ex = 380 nm), when **Cd- bcbpy** detected different benzenes in solid state.

Table S1 Selected Bond Lengths (Å) and Bond Angles (°) of **Cd- bcbpy** and **1P**.

Cd- bcbpy		**1P**	
Bonds	Dist. (Å)	Bonds	Dist. (Å)
Cd1-Cl1	2.6016(7)	Cd1-Cl1	2.5972(6)
Cd1-Cl2	2.4964(7)	Cd1-Cl2	2.4919(7)
Cd1-O1	2.3730(19)	Cd1-O1	2.3629(17)
Cd1-O2	2.3855(18)	Cd1-O2	2.3838(16)
Cd1-N2	2.396(2)	Cd1-N2	2.3998(19)
Angle	(°)	Angle	(°)
Cl2-Cd1-Cl1	111.07(3)	Cl2-Cd1-Cl1	111.03(2)
O1-Cd1-Cl1	148.30(5)	O1-Cd1-Cl1	147.94(4)
O1-Cd1-Cl2	100.48(5)	O1-Cd1-Cl2	100.85(5)
O1-Cd1-O2	55.04(6)	O1-Cd1-O2	55.09(6)