Support information

S1. Material and methods

Cobalt chloride ($CoCl_2 \cdot 6H_2O$, 98%), 2,2'-Bipyridine-5,5'-dicarboxylic acid, potassium bromide (IR), barium sulfate (UV) were commercially available from Aladdin Company and used as received. Infrared spectra were characterized using a Bruker Vertex 80 infrared spectrometer with a measurement range of 400-4000 cm^{-1}. UV spectra were recorded using a Shimadzu UV-Vis spectrophotometer UV-2600 in the range 200~800 nm. Fluorescence emission spectra were measured with a Perkin Elmer LS55 fluorescence spectrometer. The data required for elemental analysis were tested on the Perkin-Elmer PE 2400 elemental analyzer.

S2. Synthesis

The synthesis of Co-MOF were according to the previously reported method, roughly as follows: 0.238 g (1 mmol) $CoCl_2 \cdot 6H_2O$, 0.244 g (1 mmol) 2,2'-Bipyridine-5,5'-dicarboxylic acid were put in 20 ml Teflon-lined stainless-steel autoclave, add 10 ml deionized water. Then the autoclave was heated 120 °C for 72 h. The products were filtrated and washed several times with water, and reddish brown block-like crystals were obtained. (The yield of 43%.) Elemental analysis calcd (%) for : C 26.23, H 2.36, N 4.37; found (%): C 26.11, H 2.14, N 4.38.

S3. Single-crystal X-ray diffraction

The X-ray single crystal data diffraction data of the Co-MOF was collected at 293 K on a Bruker APEXII CCD diffractometer with graphite-monochromated Mo Kα radiation (λ = 0.71069 Å). Absorption corrections were applied using multi-scan technique. The structure was solved by Direct Method and refined by full-matrix least-squares techniques using the SHELXL-2018 program1 within WINGX software2. Non-hydrogen atoms were refined with anisotropic temperature parameters. All the solvent molecules which are highly disordered and not able to be modeled were treated by the SQUEEZE[3] routine in PLATON[4]. The detailed crystallographic

data and structure refinement parameters for Co-MOF are summarized in Table S1. Selected bond lengths (Å) and angles (°) for Co-MOF are given in Table S2.

Table S1 Crystal data and structure refinements for Co-MOF.

Empirical formula	$C_{12}H_{10}N_2O_6Co$
CCDC number	171671
Formula weight	337.15
Temperature	270.17K
Wavelength	0.78 Å
Crystal system	monoclinic
Space group	$P2_1/n$
a(Å)	11.953(7)
b(Å)	8.326(5)
c(Å)	12.760(8)
α (°)	90
β (°)	97.484(16)
γ (°)	90
Volume ($Å^3$)	1259.2(13)
Z	4
Density (g/m^3) calculated	1.778
Absorption coefficient (mm^{-1})	1.394
F(000)	684.0
Crystal size (mm^3)	0.36 × 0.22 × 0.18
Theta range (°)	4.392-33.228
Limiting indices	$-9 \le h \le 9$, $-6 \le k \le 6$, $-10 \le l \le 10$
Reflections collected / unique	7445 / 688 [R_{int} = 0.0969]
Data / restraints / parameters	688/66/194
Goodness-of-fit on F^2	1.106
Final R indices [$I > 2\sigma(I)$]	R_1 = 0.0258, ωR_2 = 0.0550
R indices (all data)	R_1 = 0.0356, ωR_2 = 0.0670
Largest diff. peak and hole (e $Å^{-3}$)	0.19 and -0.20

Table S2 Selected bond lengths (Å) and angles (°) for Co-MOF.

Bond	Å	Angle	(°)
Co1-O(4)[1]	2.181(4)	O(4)[1]-Co1-O(5)[1]	59.75(16)
Co1-O(5)[1]	2.237(4)	O(1)-Co1-O(4)[1]	91.54(16)
Co1-O(1)	2.095(4)	O(1)-Co1-O(5)[1]	90.50(16)
Co1-O(3)	2.030(5)	O(1)-Co1-N(2)[2]	168.59(18)
Co1-N(2)[2]	2.109(5)	O(1)-Co1-N(2)[1]	94.58(19)
Co1-N(1)[2]	2.108(5)	O(3)-Co1-O(4)[1]	103.96(17)
O4-Co(1)[3]	2.043(4)	O(3)-Co1-O(5)[1]	162.28(17)
O5-Co(1)[3]	2.237(4)	O(3)-Co1-O(1)	97.29(18)
N2-Co(1)[4]	2.109(5)	O(3)-Co1-N(2)[2]	91.04(18)
N1-Co(1)[4]	2.108(5)	O(3)-Co1-N(1)[2]	95.94(18)
N(1)[2]-Co1-O(4)[1]	158.26(18)	N(2)[2]-Co1-O(4)[1]	94.01(19)
N(1)[2]-Co1-N(2)[2]	76.7(2)	N(2)[2]-Co1-O(5)[1]	83.73(16)

[1]1+X,-1+Y,+Z; [2]3/2-X,-1/2+Y,1/2-Z; [3]-1+X,1+Y,+Z; [4]3/2-X,1/2+Y,1/2-Z

S4. LC-MS/MS spectra of CR products over Co-MOF/PMS system.

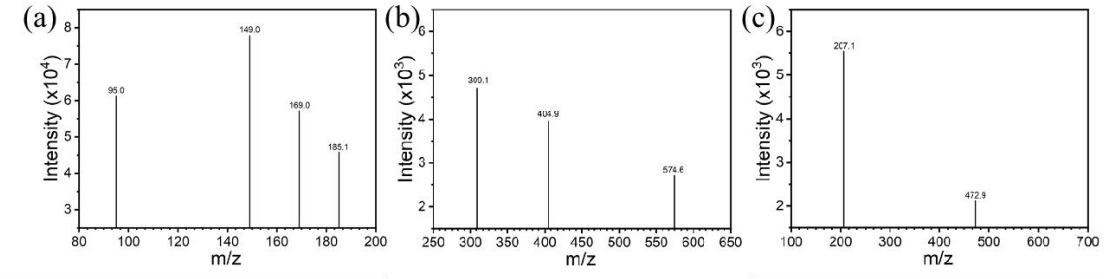

Fig. S1 Spectra of CR degradation**.**

S5. CR degradation by Co-MOF/PMS

The degradation of CR in the Co-MOF/PMS system appeared to fit the pseudo-first order kinetic model:

$$\ln [CR]_0/ [CR] = k_{obs}\, t$$

where $[CR]_0$ and [CR] represent the CR concentrations (mg/L) at time 0 and t, respectively, k_{obs} is the apparent reaction rate coefficient for CR degradation (min^{-1}).