Supplementary Information (SI) for RSC Advances.

Efficient visible-light-driven photocatalytic detoxification of a sulfur mustard simulant in air using Rose Bengal-functionalized MOFs

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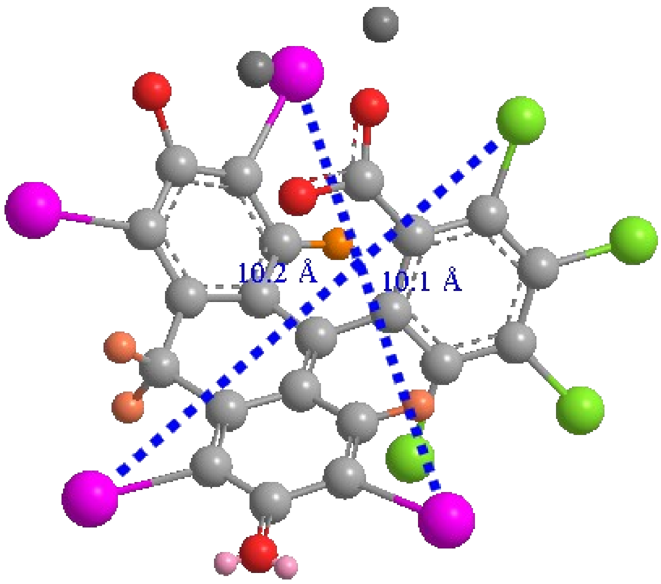

Fig. S1 The structure of RB.

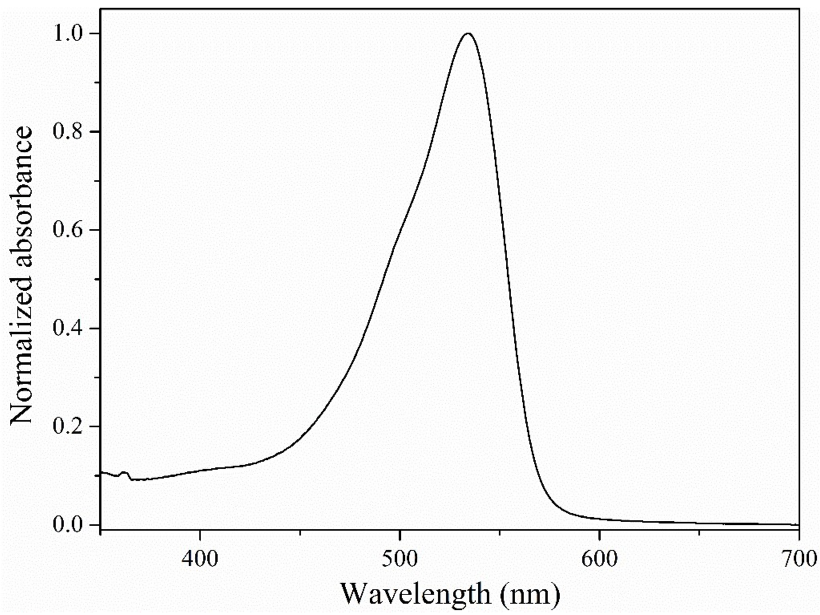

Fig. S2 UV-Vis absorption spectrum of RB solution in H_2O.

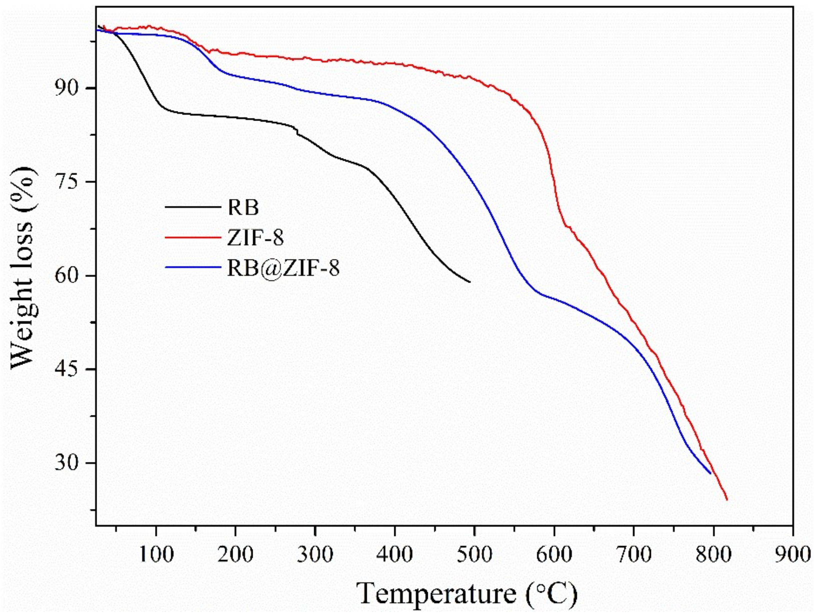

Fig. S3 TGA curves of RB, ZIF-8 and RB@ZIF-8 composite.

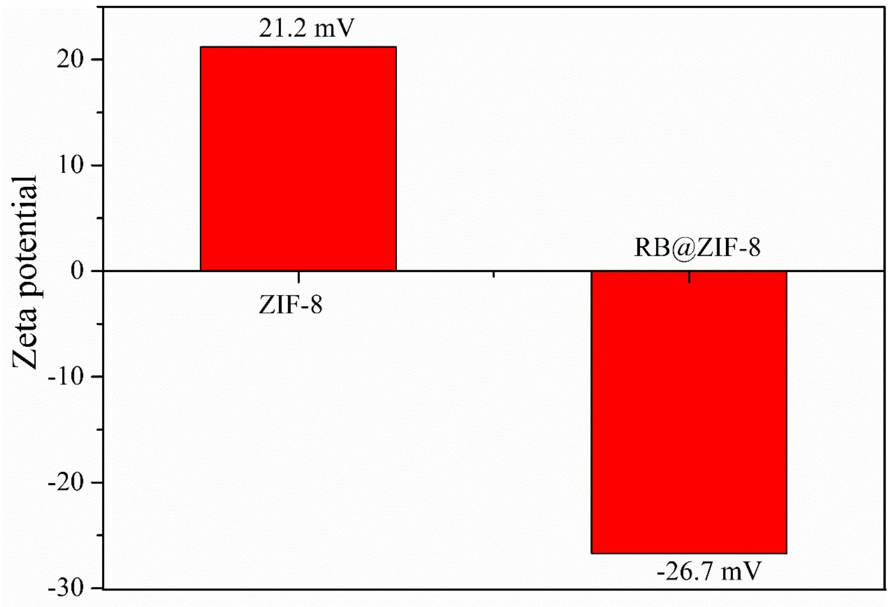

Fig. S4 The zeta potential of ZIF-8 and the RB@ZIF-8 composite.

Fig. S5 The color of the mixture of ZIF-8+RB.

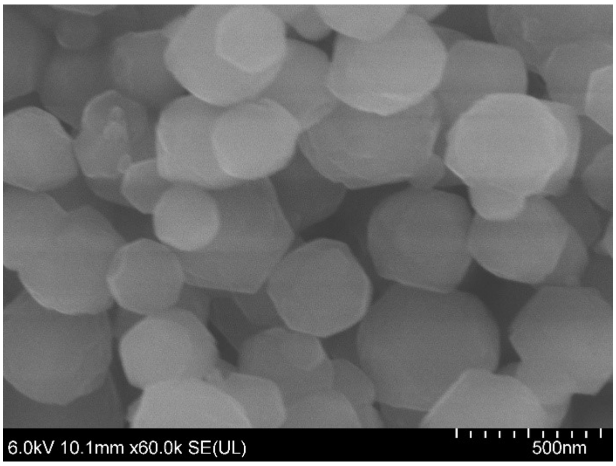

Fig. S6 The SEM of RB@ZIF-8 composite.

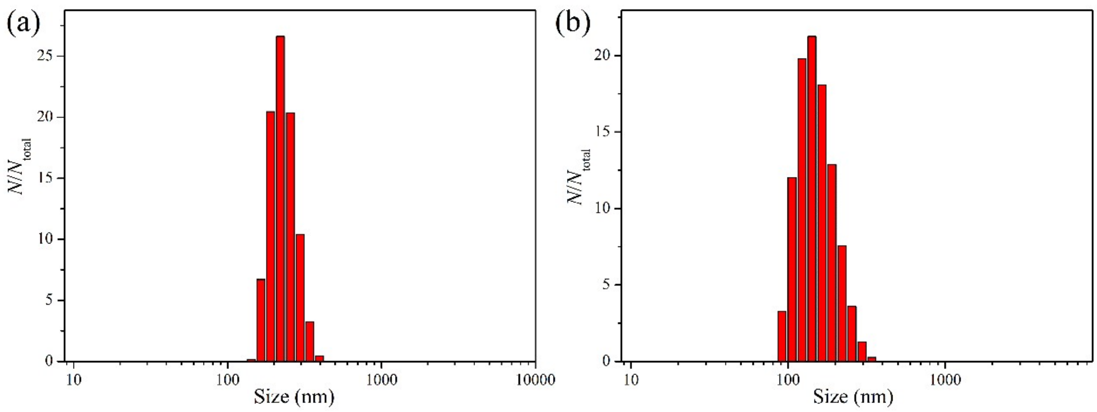

Fig. S7 The size distributions of (a) ZIF-8 and (b) RB@ZIF-8 composite.

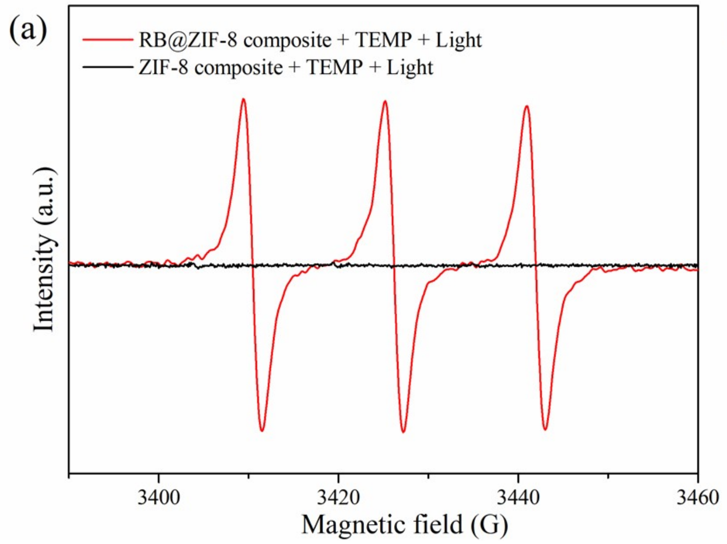

Fig. S8 EPR signals of the TEMP-$^1O_2$ under different conditions.

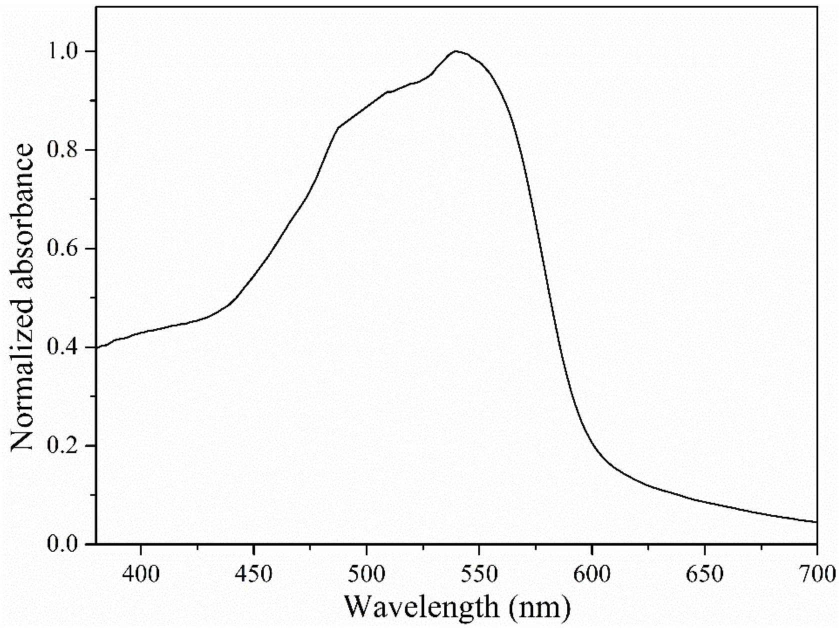

Fig. S9 Solid-state UV-Vis diffused reflectance spectrum of the RB@ZIF-8 composite after catalysis.

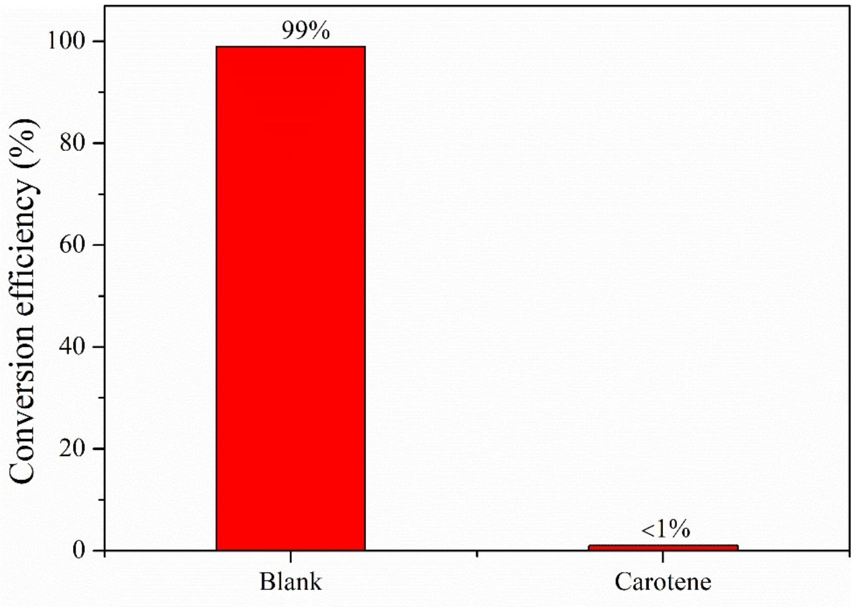

Fig. S10 Conversion efficiency for the detoxification of CEES in the absence or presence of $^1O_2$ scavenger (carotene) upon light irradiation (carotene: 1.0 mmol; RB@ZIF-8 composite: 20.0 mg; CEES: 20 μL; methanol: 1.5 mL; reaction time: 10 min).

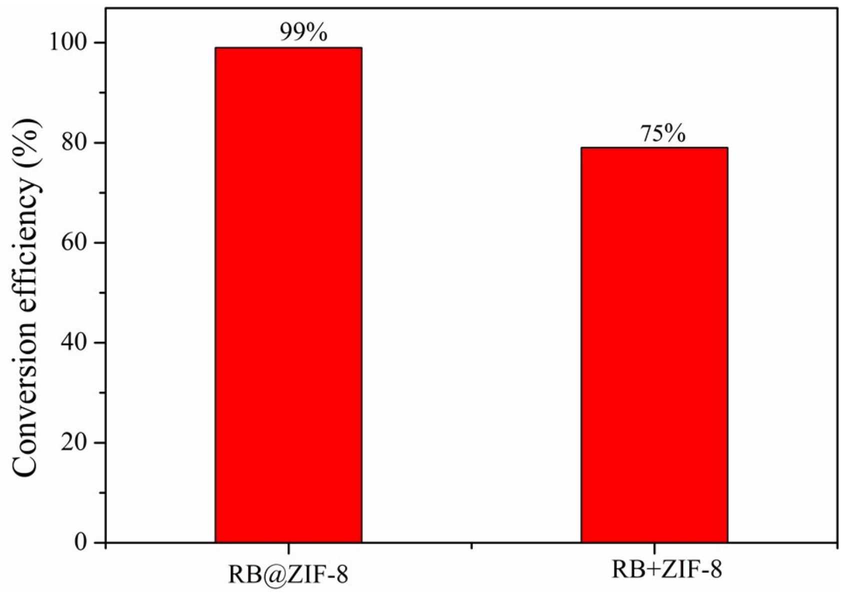

Fig. S11 Conversion efficiency for the detoxification of CEES in the presence of RB@ZIF-8 and RB+ZIF-8 upon light irradiation (RB@ZIF-8 composite: 20.0 mg; RB+ZIF-8 composite: 20.0 mg; CEES: 20 μL; methanol: 1.5 mL; reaction time: 6 min).

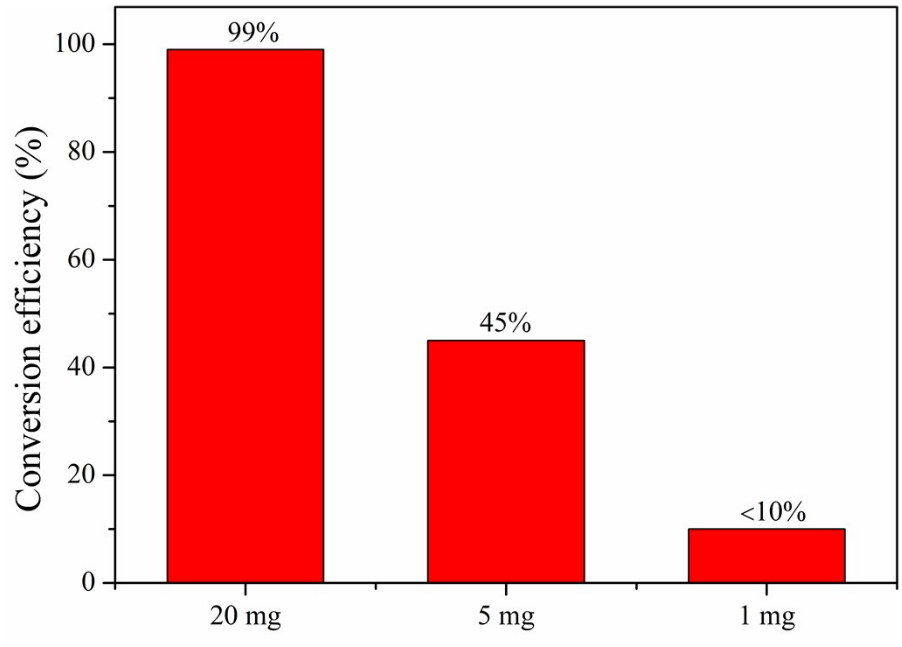

Fig. S12 Conversion efficiency for the detoxification of CEES in the presence of RB@ZIF-8 upon light irradiation (RB@ZIF-8 composite: 20.0 mg, 5 mg and 1 mg; CEES: 20 μL; methanol: 1.5 mL; reaction time: 6 min).

Scheme S1. Proposed mechanism for the photochemical detoxification of CEES by the RB@ZIF-8 composite.

Table S1 Comparison of the performances in the detoxification of of CEES using various MOFs-based heterogeneous photosensitizers.

Catalyst[a]	Solvent	Effective Photosensitizer	Atmo.[b]	Light	Half-life (min)	Ref.

TCPP@MIL-101(Cr)	MeOH	Porphyrin	O_2	Blue LED	1	1
Au/TCPP@MIL-101(Cr)	MeOH	Porphyrin	O_2	Blue LED	0.75	1
Ag_{12}TPyP	CD_3OD	Porphyrin	O_2	White LED	1.5	2
Br-BDP@NU-1000	MeOH	BODIPY	O_2	Green LED	2	3
Br-BDP@NU-1000	MeOH	BODIPY	O_2	Green LED	2.5	3
UiO-68-TBTD	MeOH	TBTD	air	Blue LED	3	4
PCN-67-Se	MeOH	Benzoselenadiazole	O_2	Purple LED	3.5	5
NU-1000-PCBA	MeOH	Pyrene and C_{60}	O_2	UV LED	3.5	6
UMCM-313	MeOH	Pyrene	O_2	Blue LED	4	7
Al-PMOF on fiber	MeOH	Porphyrin	O_2	Blue LED	4	8
I_2-BODIPY@ZIF-8	MeOH	BODIPY	O_2	Green LED	4.5	9
MOF/BA/textile	No solvent	Porphyrin	O_2	Blue LED	4.4	10
MOF/BA/textile	No solvent	Porphyrin	air	Simulated sunlight	17.6	10
Ag_{12}TPyP	CD_3OD	Porphyrin	air	White LED	6	11
NU-1000	MeOH	Pyrene	O_2	UV LED	6	12
PCN-222/MOF-545	MeOH	Porphyrin	O_2	Blue LED	11	12
PCN-57-S	MeOH	Benzothiadiazole	O_2	UV LED	7.5	13
PCN-222/MOF	MeOH	Porphyrin	O_2	Blue (325)	13	14
PCN-222/MOF	MeOH	Porphyrin	O_2	White LED	26	14
PCN-222/MOF	MeOH	Porphyrin	O_2	Red LED	33	14
ZnTTP@ZIF-8	MeOH	Porphyrin	air	Blue LED	1.5	15
MB@UiO-66-$(COOH)_2$	MeOH	Methylene blue	air	Red LED	1.8	16
RB@ZIF-8	MeOH	Rose Bengal	air	Green LED	2.5	This work

[a]The catalysts from literature have been named as published; [b]Atmo.: atmosphere

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