Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

In-situ growth of Bi-MOFs on cotton fabrics via ultrasonic synthesis strategy for recyclable photocatalytic textiles

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To evaluate the loading of MOF on the CCF under different synthesis conditions, three different methods were used.

By weighing data:

$$loading\ mass\ (\%) = \frac{M_{MOF@CCF} - M_{CCF}}{M_{CCF}} \times 100\% \#(S1)$$

Where $^{M_{MOF@CCF}}$ (g) is the dry weight of the sample after MOF loading and $^{M_{CCF}}$ (g) is the dry weight of the CCF substrate. The synthesis experiments were repeated three times for each sample and the average values were calculated.

By BET data[1]:

$$loading\ mass\ (\%) = \frac{SA_{MOF@CCF} - SA_{CCF}}{SA_{MOF} - SA_{CCF}} \times 100\% \#(S2)$$

Where $^{SA_{MOF@CCF}}$ (m^2/g), $^{SA_{CCF}}$ (m^2/g) and $^{SA_{MOF}}$ (m^2/g) are the surface area of MOF@CCF composites, bare CCF and MOF powder, respectively.

By TG data[2]:

$$loading\ mass\ (\%) = \frac{wt\%_{MOF,\,275℃}/wt\%_{MOF,\,600℃}}{wt\%_{MOF@CCF,\,275℃}/wt\%_{MOF@CCF,\,600℃}} \#(S3)$$

Where $^{wt\%_{MOF,\,275℃}}$, $^{wt\%_{MOF,\,600℃}}$ and $^{wt\%_{MOF@CCF,\,275℃}}$,$^{wt\%_{MOF@CCF,\,600℃}}$ are the weight percent for the MOF powder and MOF@CCF composites of the TG curve, respectively. In this equation, it is assumed that the absorbed solvent in the sample is removed at 275 °C and that the MOF is completely transformed to Bi_2O_3 at 600 °C.

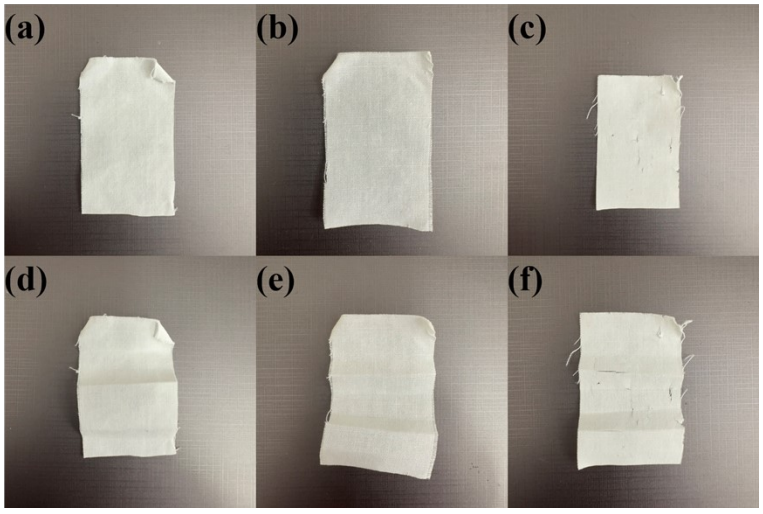

Fig. S1 Images of samples after CAU-17 loading. (a, d) CAU-17_0@CCF, (b, e) CAU-17_200@CCF, (c, f) CAU-17_ST@CCF. (d-f) Folding the sample 2 times and maintaining the same pressure for 1 min.

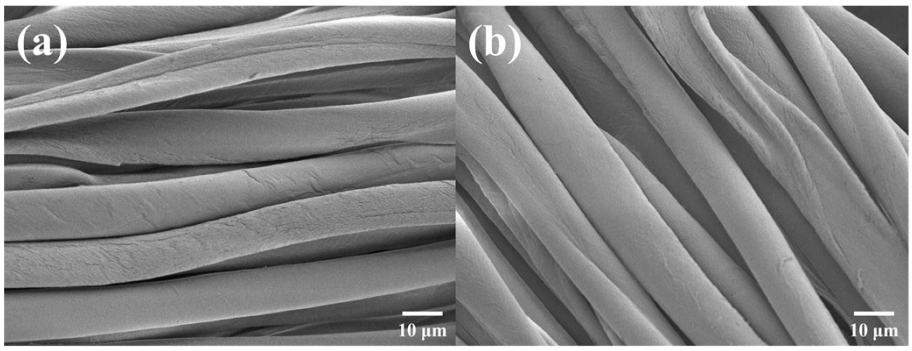

Fig. S2 SEM of (a) cotton fabric and (b) carboxymethylated cotton fabric.

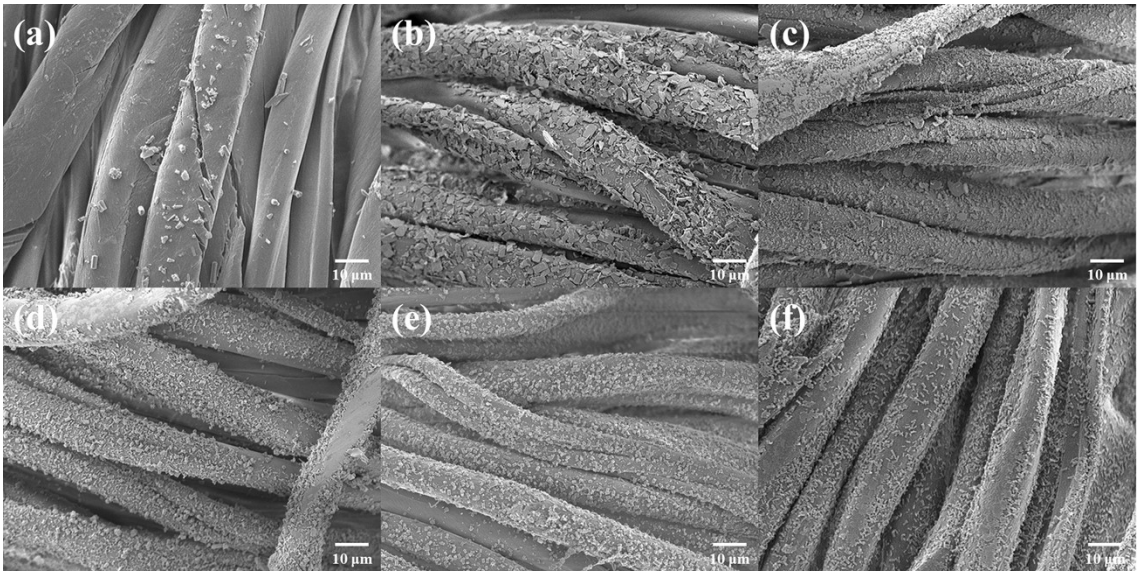

Fig. S3 SEM images of (a) CAU-17_ST@CF, (b) CAU-17_0@CF, (c) CAU-17_50@CF, (d) CAU-17_100@CF, (e) CAU-17_150@CF, and (f) CAU-17_200@CF.

Table. S1 Atomic percent of element obtained from XPS spectrum of MOF@CCF composites.

	Atomic percentage (%)		
Sample	**C 1s**	**O 1s**	**Bi 4f**
CAU-17_ST@CCF	52.79	40.03	7.18
CAU-17_0@CCF	54.29	37.70	8.01
CAU-17_50@CCF	54.83	38.29	6.88
CAU17_100@CCF	51.37	42.01	6.62
CAU-17_150@CCF	52.14	41.40	6.46

CAU-17_200@CCF	53.92	40.22	5.86

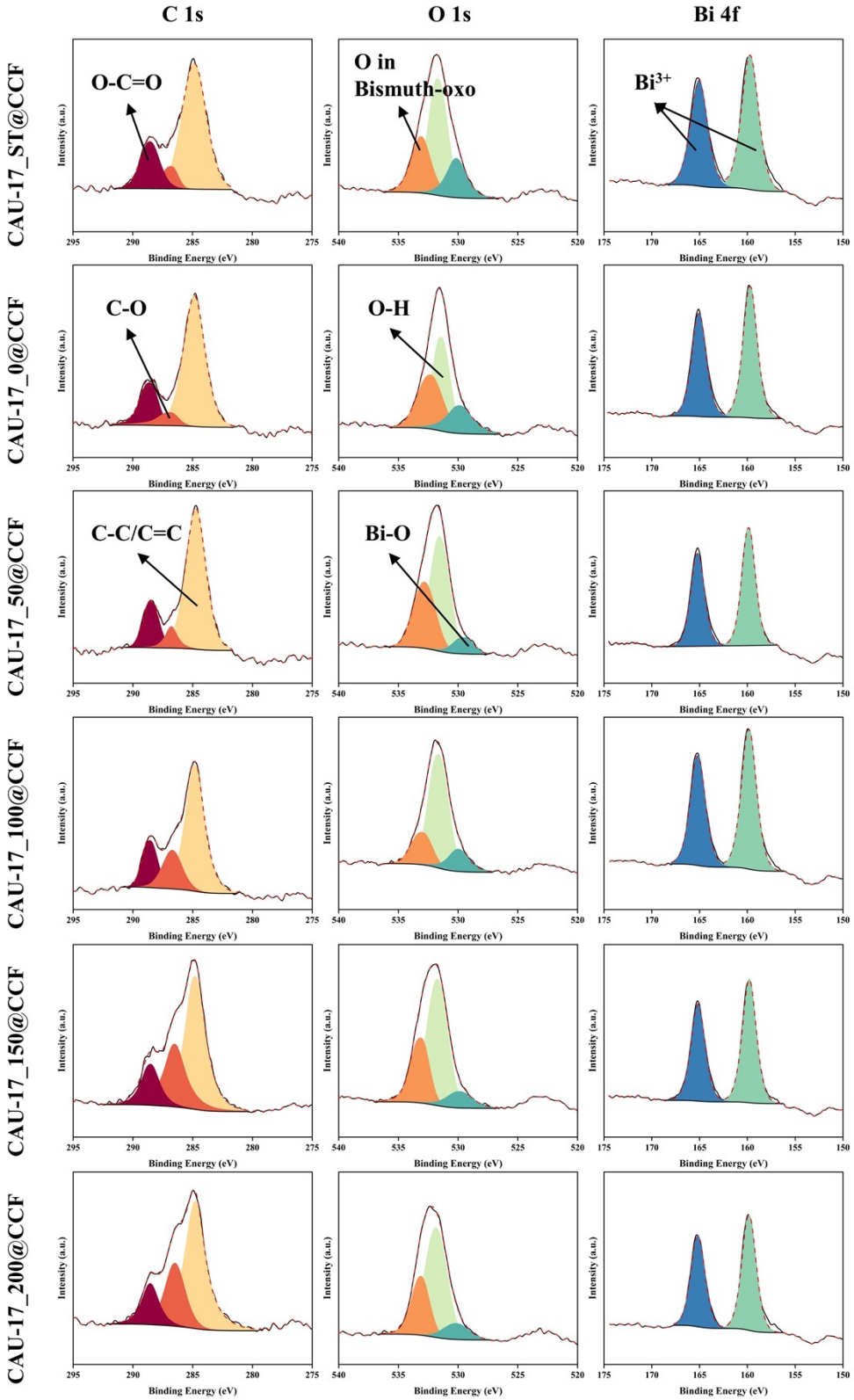

Fig. S4 XPS high-resolution spectra of MOF@CCF composites.

Table. S2 The photocatalysis performance results of samples.

Samples	Eg (eV)	K (min^{-1})	R^2
Blank RhB	-	$2.5379*10^{-5}$	0.9054
CCF	-	$5.1195*10^{-5}$	0.7929
CAU-17_0@CCF	3.85	0.0012	0.9303
CAU-17_50@CCF	3.48	0.0059	0.9695
CAU-17_100@CCF	3.03	0.0151	0.9903
CAU-17_150@CCF	2.96	0.0242	0.9980
CAU-17_200@CCF	2.92	0.0158	0.9938
CAU-17_ST@CCF	3.58	$4.5699*10^{-4}$	0.8802
CF	-	$3.7899*10^{-5}$	0.9707
CAU-17_0@CCF	3.82	0.0013	0.9805
CAU-17_50@CCF	3.51	0.0025	0.9863
CAU-17_100@CCF	3.36	0.0026	0.9861
CAU-17_150@CCF	3.32	0.0042	0.9914
CAU-17_200@CCF	3.17	0.0025	0.9863
CAU-17_ST@CCF	3.36	$1.7359*10^{-4}$	0.1814

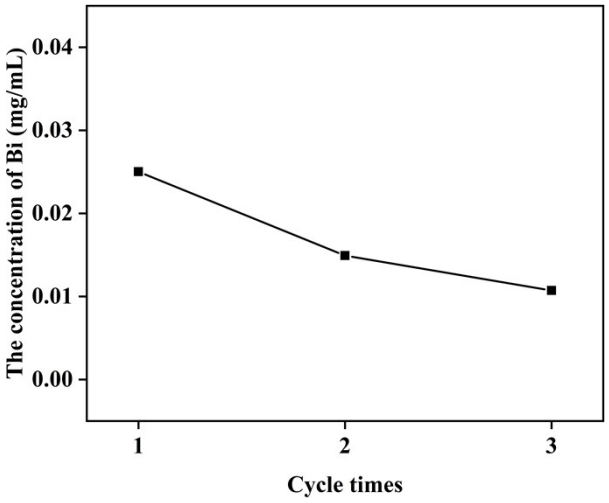

Fig. S5 The concentration of Bi in solution after each cycle of photodegradation reaction.

Table. S3 Comparison of RhB photodegradation performance with other cotton fabric composite photocatalytic materials

Photocatalyst	**Time (min)**	**Photocatalytic Efficiency (%)**	**References**
MIL-100(Fe)@cotton	660	96	Lee et. al[3]
ST-400 composite	120	94	Landi et. al[4]
Cotton/PDA/Ag/AgCl	180	95	Ding et. al[5]
Ag_3VO_4@MIL-125-NH_2@Cotton	160	92	Emam et. al[6]
WCF/BWO-1.5	180	93.73	Qin et. al[7]
ZnO/BiOBr coated cotton fabrics	240	96.4	Yang et. al[8]
Cot-Ag@AgBr	480	98	Wang et. al[9]
TiO_2-coated cotton fabric	70	73	Özdemir et. al[10]
CAU-17_150@CCF	**180**	**98.77**	**This work**

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