Supporting information

Preparation of mesoporous Cu-Mn/TiO$_2$ composites for degradation of Acid Red 1

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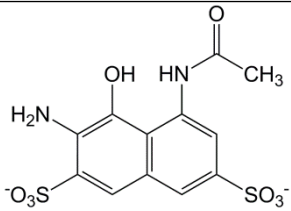
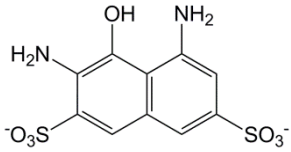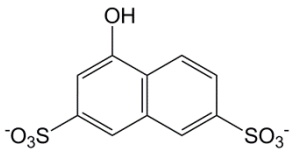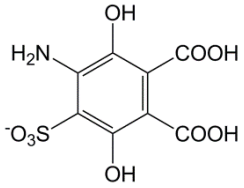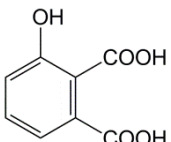wteng@tongji.edu.cn (Dr. Wei Teng)

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Table S1. The atomic contents and catalytic performance of the mesoporous Cu-Mn/TiO$_2$ catalysts with different Cu and Mn loadings ($C_{catalyst}$ = 0.6 g/L, $C_{H_2O_2}$ = 126.4 mM, T = 70 °C, PH = 6.7).

|	Decolorization efficiency	Content (wt.%)		
	(%)	Cu	Mn	Ti
L-Cu-Mn/TiO$_2$	89	2.4	2.5	57.2
Cu-Mn/TiO$_2$	99	5.7	6.0	50.6
H-Cu-Mn/TiO$_2$	24	9.7	10.1	45.0

Table S2. Compounds identified by LC-MS during the degradation of Acid Rea 1 by AOPs.

| Number	Molecular formula	m/z
1		374
2		332
3		302
4		292
5		182

Fig. S1. Reusability study of mesoporous Cu-Mn/TiO$_2$ catalyst (C$_{catalyst}$ = 1.0 g/L, C$_{H_2O_2}$ = 126.4 mM, T = 70 °C, PH = 6.7).
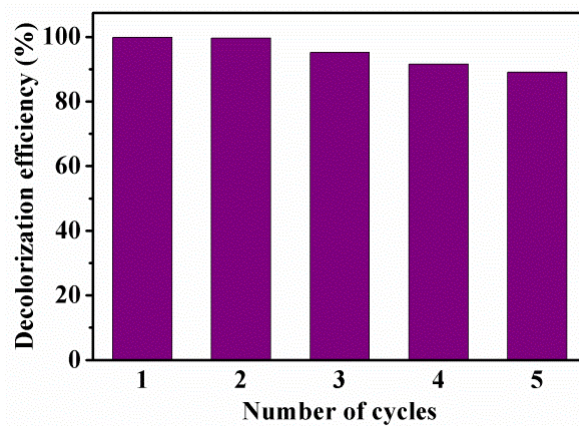
Fig. S2. Effect of initial pH ($C_{catalyst}$ = 0.6 g/L, $C_{H_2O_2}$ = 126.4 mM, T = 70 °C) (A), catalyst dosage ($C_{H_2O_2}$ = 126.4 mM, T = 70 °C, pH = 6.7) (B), H_2O_2 concentration ($C_{catalyst}$ = 0.6 g/L, T = 70 °C, pH = 6.7) (C) and reaction temperature ($C_{catalyst}$ = 0.6 g/L, $C_{H_2O_2}$ = 126.4 mM, pH = 6.7) (D) on the degradation of Acid Red 1 solution by using the mesoporous Cu-Mn/TiO$_2$ as a catalyst.
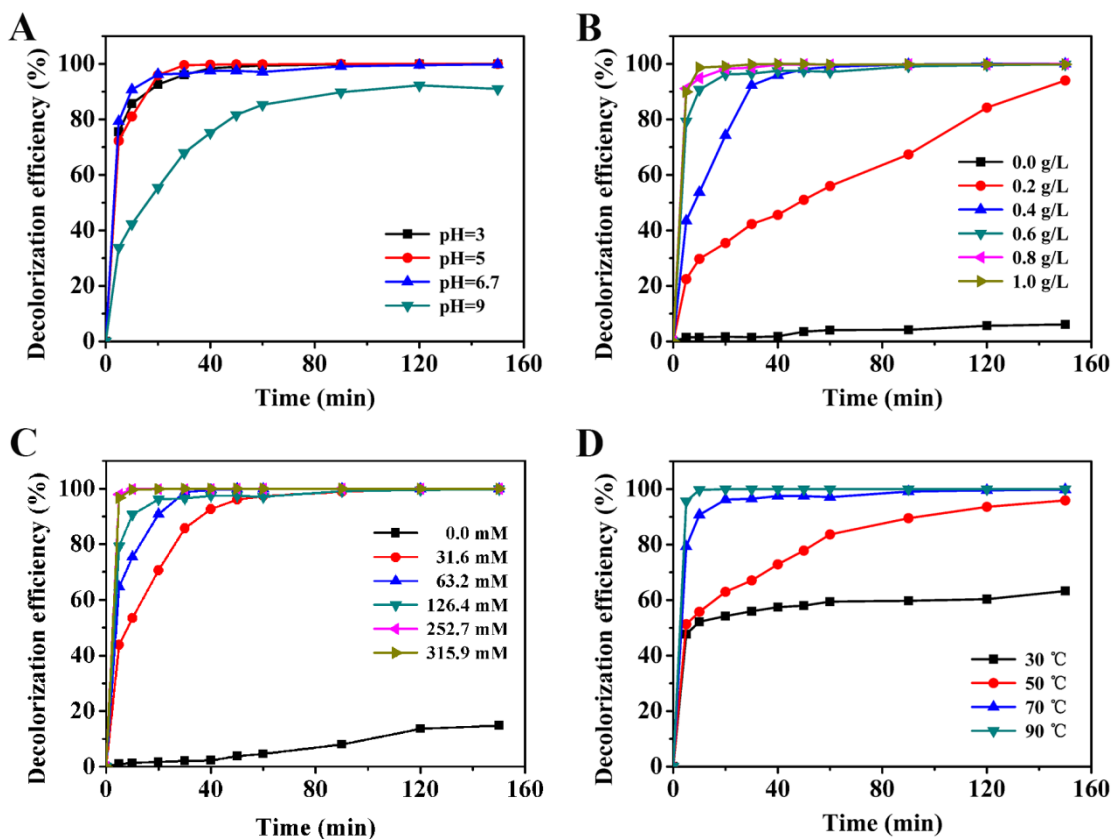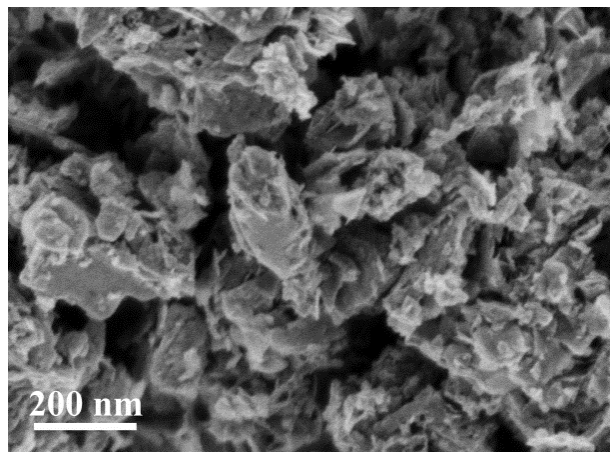
Fig. S3. The pseudo-first order exponential relationship for reaction kinetic curve ($C_{catalyst}$ = 0.6 g/L, $C_{H_2O_2}$ = 126.4 mM, T = 70 °C, pH = 6.7).

Plot showing C/C₀ versus Time (min) with equation $C/C_0 = \exp(-0.3092 \times t)$
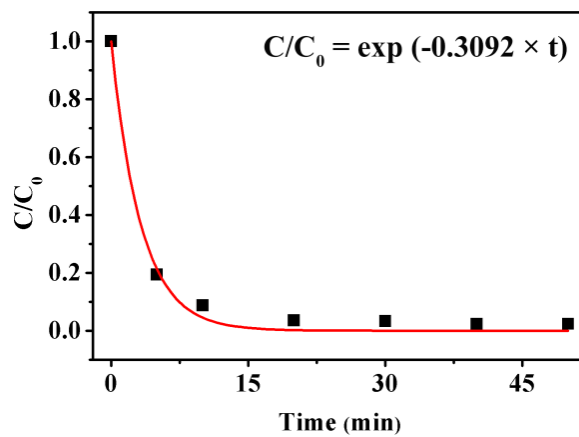
Fig. S4. Arrenhius plot for the pseudo-first order kinetic constant of the model.

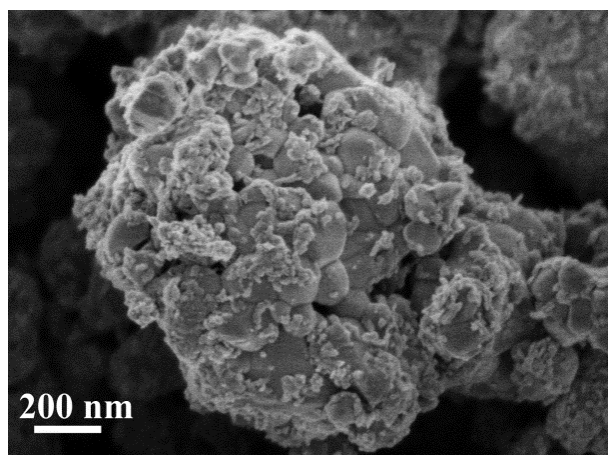$\ln(k) = -9099.4 \times (1/T) + 25.3$

$1/T\ (K^{-1})$
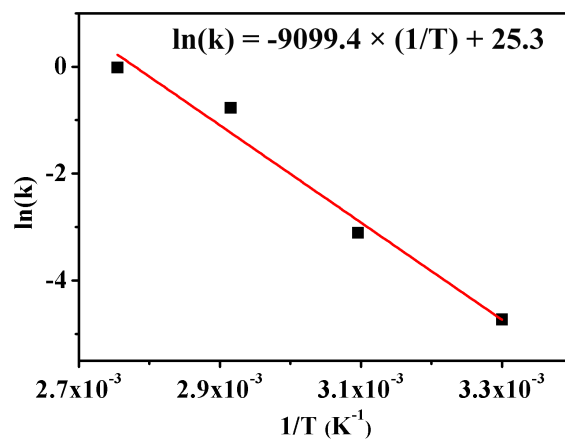
Fig. S5. SEM image of bulk Cu-Mn oxide prepared by calcination at 450 °C for 5 h.

Fig. S6. SEM image of Cu-Mn/P25 prepared via wet-impregnation and calcination at 450 °C for 5 h.

Fig. S7. SEM image of Cu-Mn/SBA-15 prepared via wet-impregnation and calcination at 450 °C for 5 h.

Fig. S8. A proposed reaction pathway of degradation of Acid Red 1.