Supporting Information

Controlling the band structure and photocatalytic performance

of single atom Ag/C$_3$N$_4$ catalysts by variation of silver

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Tel.: 86 431 85167482;
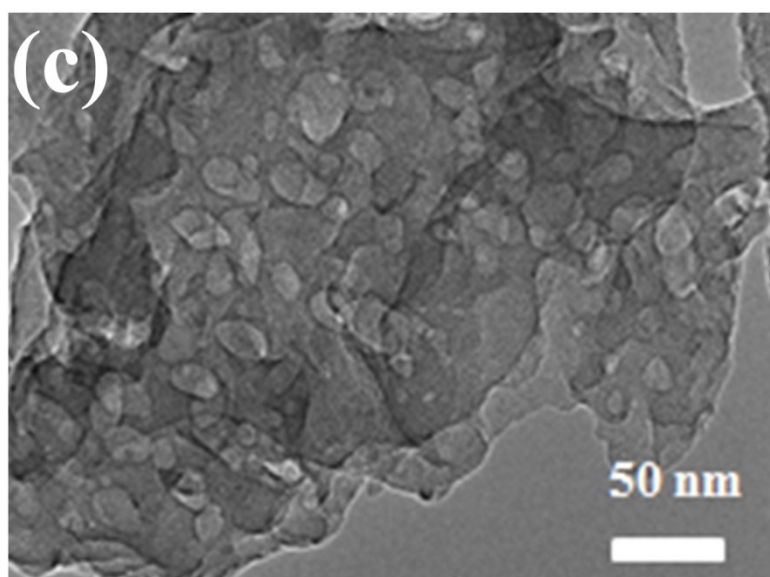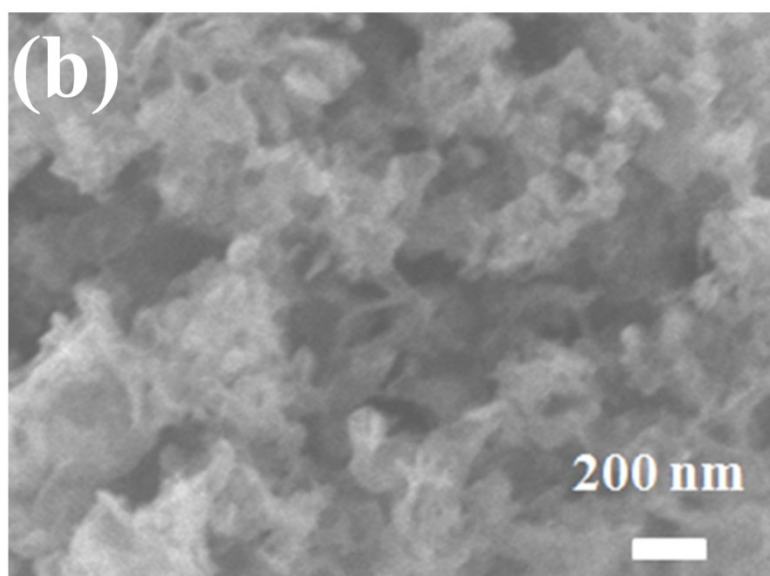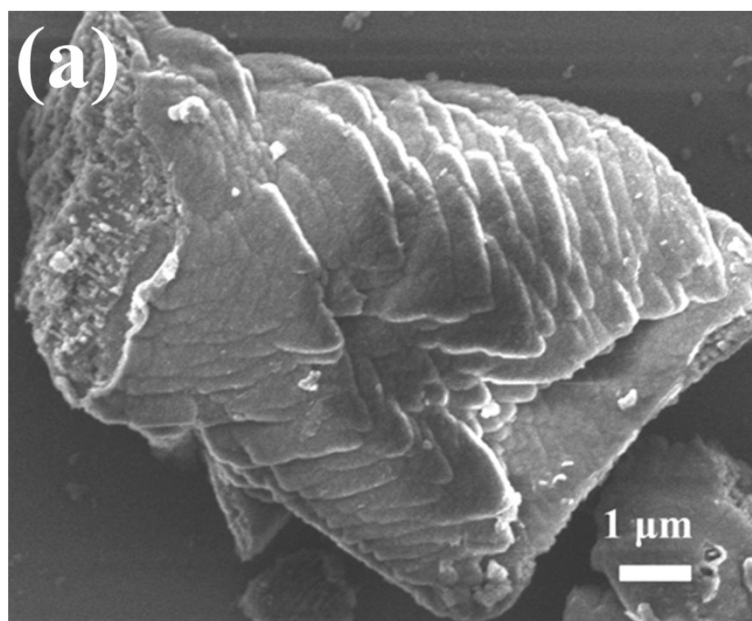
[*] E-mail address: wangyu@jlu.edu.cn (Y. Wang);

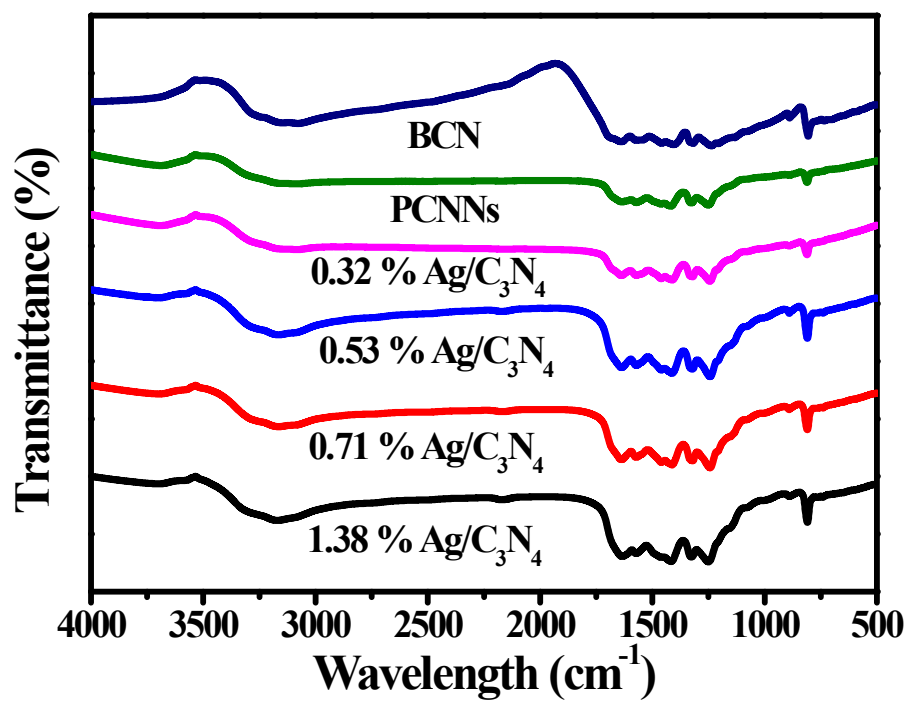**Fig.** S1 (a) SEM of BCN and (b) PCNNs and (c) TEM of PCNNs.

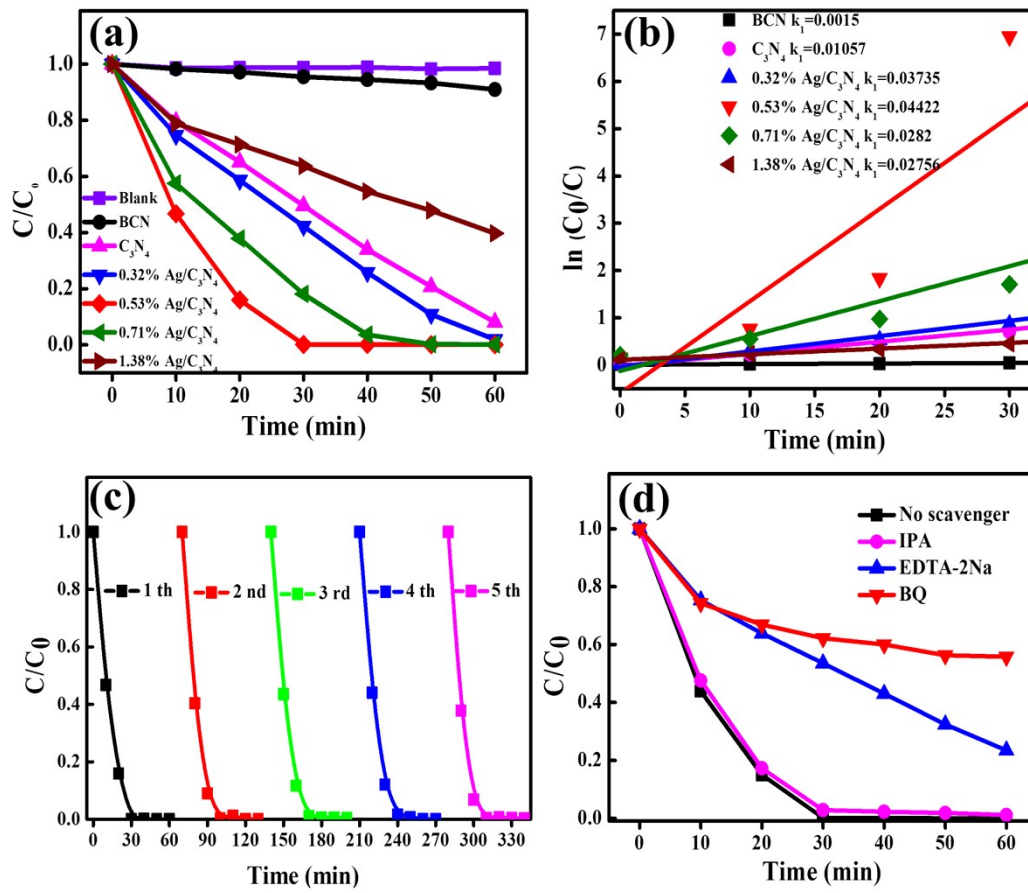**Fig.** S2 FT-IR spectra over the as-prepared catalysts.

Fig. S3 (a) Photocatalytic degradation of RhB, (b) the first-order-kinetic plots of all the samples, (c) the stability of the 0.53% Ag/C$_3$N$_4$, and (d) photocatalytic degradation of RhB over 0.53% Ag/C$_3$N$_4$ in the presence of different radical scavengers.
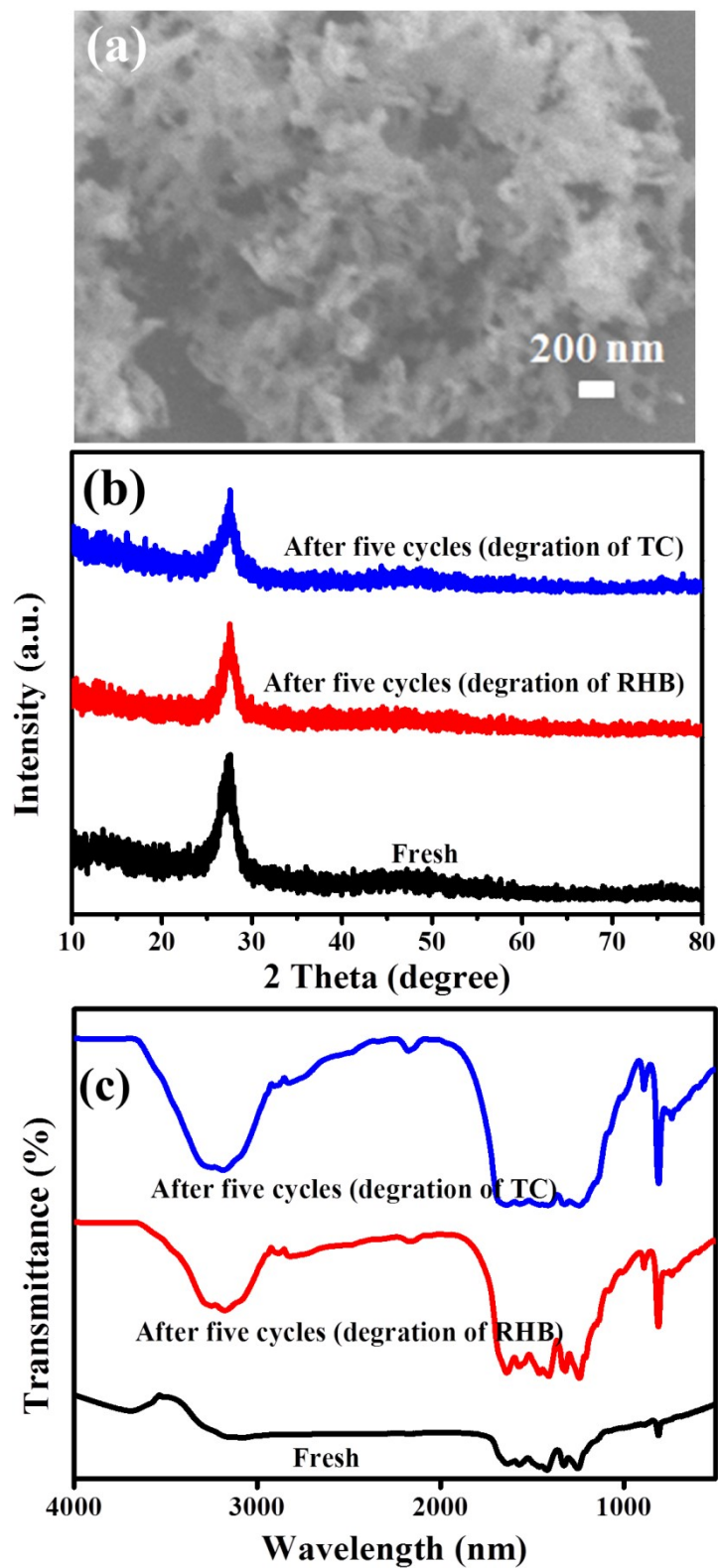
Fig. S4 The comparisons of (a) SEM patterns, (b) XRD patterns and (c) FT-IR spectra of 0.53 % Ag/C$_3$N$_4$ before and after photocatalytic degradation.

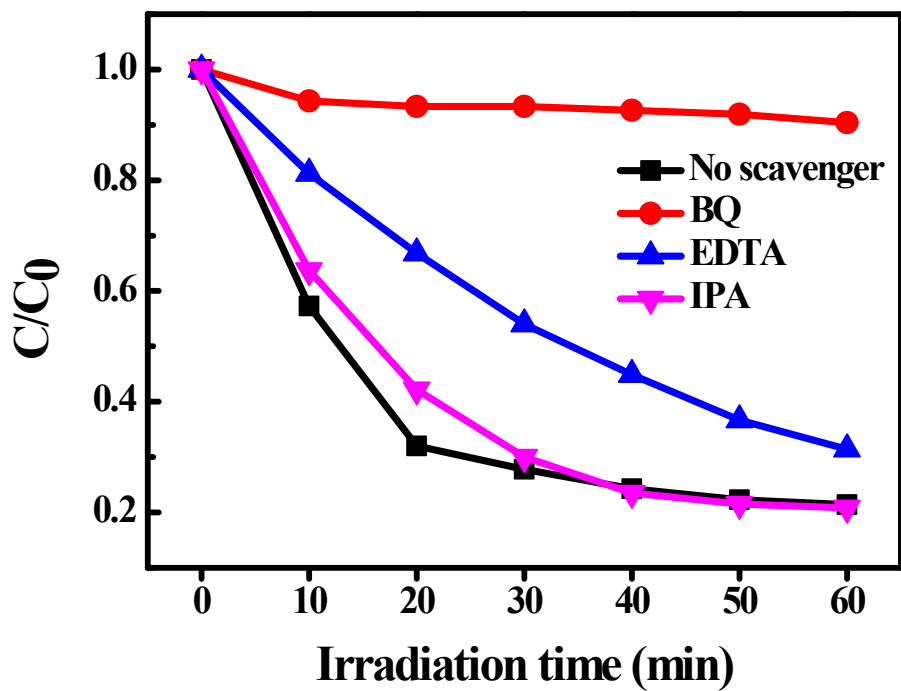**Fig.** S5 Photocatalytic degradation of TC over 0.53% Ag/C$_3$N$_4$ in the presence of different radical scavengers.

Table S1 The surface characteristics of the as-prepared catalysts.

Sample	S_{BET} (m^{2}g^{-1})	Pore size (nm)	Pore volume (cm^{3}g^{-1})
BCN	9.4429	20.4081	0.048178
PCNNs	40.4584	15.6042	0.15783
0.53 % Ag/C$_3$N$_4$	78.7804	14.3292	0.28221

Table S2 The elemental composition of BCN, PCNNs and 0.53 % Ag/C_3N_4.

Sample	C 1s (At. %)	N 1s (At. %)	O 1s (At. %)	Ag 3d (At. %)	C/N
BCN	53.1	42.86	4.04	0.00	1.239
PCNNs	59.93	34.6	5.47	0.00	1.732
0.32 % Ag/C_3N_4	50.24	44.68	4.57	0.33	1.124
0.53 % Ag/C_3N_4	53.15	39.98	6.48	0.39	1.329
0.79 % Ag/C_3N_4	51.44	41.57	6.52	0.47	1.237
1.38 % Ag/C_3N_4	62.71	31.32	5.44	0.53	2.002

Table S3 Dynamics analysis of emission decay for the different samples.

sample	τ_1	τ_2	τ_3	$\tau_{average}$
BCN	2.507 ns	7.61 ns	36.47 ns	12.62ns
PCNNs	1.382 ns	4.937 ns	23.9 ns	7.568ns
0.53 % Ag/C$_3$N$_4$	0.9168 ns	4.492 ns	28.72 ns	5.629ns