Supporting Information

A new triazine-based covalent organic polymer for efficient photodegradation of both acidic and basic dyes under visible light

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Supplementary captions:

S1. PXRD patterns of COP-NT under different conditions

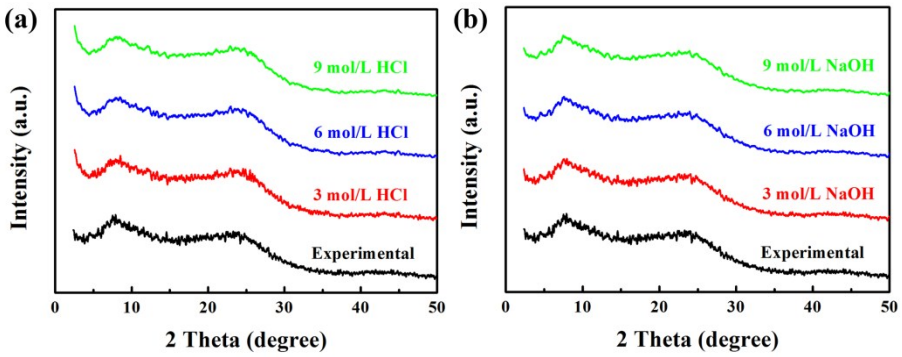

Fig. S1 The PXRD patterns of COP-NT under different conditions.

S2. TGA curves of COP-NT

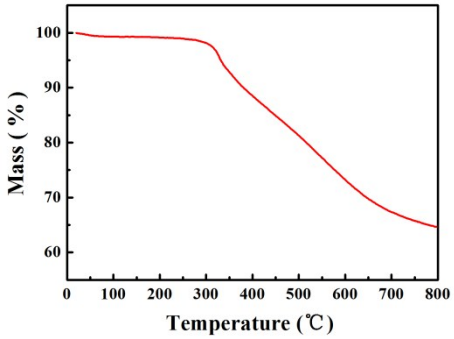

Fig. S2 TGA curves of COP-NT.

S3. The semiconductor property of COP-NT

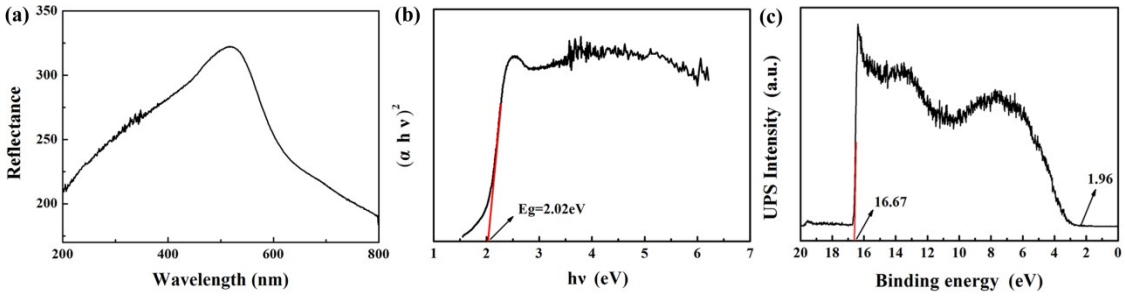

Fig. S3 (a) UV-vis diffuse reflectance spectrum, (b) $(\alpha h\nu)^2$ versus $h\nu$ curve, and (c) UPS spectrum of COP-NT.

S4. The 4-factor and 3-level orthogonal tests for degradation of MO, RhB and MB

Table S1 Design of 4-factor and 3-level orthogonal test of MO

Levels	Factors			
	pH (A)	Time/(h) (B)	30% H_2O_2/(mol/L) (C)	Initial MO/10^{-5}(mol/L) (D)
1	4	6	0.12	1
2	7	8	0.20	2
3	10	10	0.28	5

Table S2 Orthogonal experimental results of MO

Entry	pH (A)	Time/(h) (B)	30%H_2O_2/(mol/L) (C)	Initial MO/10^{-5}(mol/L) (D)	Degradation rate/%
1	1(4)	1(6)	1(0.06)	1(1)	25.25
2	1(4)	2(8)	2(0.10)	2(2)	38.15
3	1(4)	3(10)	3(0.14)	3(5)	45.01
4	2(7)	1(6)	2(0.10)	3(5)	41.04
5	2(7)	2(8)	3(0.14)	1(1)	33.97
6	2(7)	3(10)	1(0.06)	2(2)	35.99
7	3(10)	1(6)	3(0.14)	2(2)	32.78
8	3(10)	2(8)	1(0.06)	3(5)	30.76
9	3(10)	3(10)	2(0.10)	1(1)	37.91

Table S3 Optimization results of MO

Entry	pH (A)	Time/(h) (B)	30% H_2O_2 /(mol/L) (C)	Initial MO/10^{-5}(mol/L) (D)
K1	108.4	99.08	91.9	97.11
K2	111	102.88	117.09	106.92
K3	101.44	118.9	111.76	116.81
$\overline{K_1}$	36.13	33.01	30.63	32.37
$\overline{K_2}$	37.01	34.29	39.03	35.64
$\overline{K_3}$	33.81	39.63	37.25	38.93
R	3.2	6.62	8.4	6.56

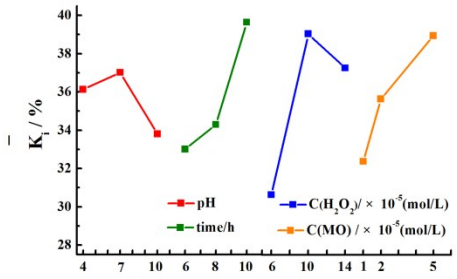

Fig. S4 $\bar{K}_i$ vs the levels of the factors for MO

Table S4 Design of 4-factor and 3-level orthogonal test of RhB

Levels	Factors			
	pH (A)	Time/(h) (B)	30% H_2O_2/(mol/L) (C)	Initial MO/10^{-5}(mol/L) (D)
1	4	2	0.03	1
2	7	3	0.05	2
3	10	4	0.07	5

Table S5 Orthogonal experimental results of RhB

Entry	pH (A)	Time/(h) (B)	30%H_2O_2/(mol/L) (C)	Initial RhB/10^{-5}(mol/L) (D)	Degradation rate/%
1	1(4)	1(2)	1(0.03)	1(1)	70.06
2	1(4)	2(3)	2(0.05)	2(2)	79.50
3	1(4)	3(4)	3(0.07)	3(5)	77.53
4	2(7)	1(2)	2(0.05)	3(5)	15.51
5	2(7)	2(3)	3(0.07)	1(1)	79.87
6	2(7)	3(4)	1(0.03)	2(2)	69.72
7	3(10)	1(2)	3(0.07)	2(2)	26.70
8	3(10)	2(3)	1(0.03)	3(5)	8.27
9	3(10)	3(4)	2(0.05)	1(1)	33.94

Table S6 Optimization results of RhB

Entry	pH (A)	Time/(h) (B)	30% H_2O_2 /(mol/L) (C)	Initial RhB/10^{-5}(mol/L) (D)
K1	227.09	112.26	148.08	183.87
K2	165.10	167.67	128.94	175.92
K3	68.93	181.19	184.10	101.32
$\overline{K_1}$	75.70	37.42	49.36	61.29
$\overline{K_2}$	55.03	55.89	42.98	58.64
$\overline{K_3}$	22.98	60.40	61.37	33.77
R	52.72	22.98	18.39	27.52

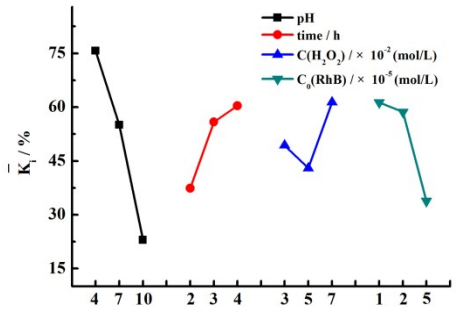

Fig. S5 $\overline{K_i}$ vs the levels of the factors for RhB

Table S7 Design of 4-factor and 3-level orthogonal test of MB

Levels	Factors			
	pH (A)	Time/(min) (B)	30% H_2O_2/(mol/L) (C)	Initial MB/10^{-5}(mol/L) (D)
1	4	60	0.01	4
2	7	80	0.02	4.5
3	10	100	0.03	5

Table S8 Orthogonal experimental results of MB

Entry	pH (A)	Time/(min) (B)	30%H_2O_2/(mol/L) (C)	Initial MB/10^{-5}(mol/L) (D)	Degradation rate/%
1	1(4)	1(60)	1(0.01)	1(4)	18.61
2	1(4)	2(80)	2(0.02)	2(4.5)	29.00
3	1(4)	3(100)	3(0.03)	3(5)	28.57
4	2(7)	1(60)	2(0.02)	3(5)	44.92
5	2(7)	2(80)	3(0.03)	1(4)	47.55
6	2(7)	3(100)	1(0.01)	2(4.5)	51.61
7	3(10)	1(60)	3(0.03)	2(4.5)	52.69
8	3(10)	2(80)	1(0.01)	3(5)	54.97
9	3(10)	3(100)	2(0.02)	1(4)	55.38

Table S9 Optimization results of MB

Entry	pH (A)	Time/(min) (B)	30% H_2O_2 /(mol/L) (C)	Initial MB/10^{-5}(mol/L) (D)
K1	76.18	116.22	125.18	121.53
K2	144.07	131.52	129.30	133.30
K3	163.03	135.56	128.81	128.46
$\overline{K_1}$	25.39	38.74	41.73	40.51
$\overline{K_2}$	48.02	43.84	43.10	44.43
$\overline{K_3}$	54.34	45.18	42.94	42.82
R	28.95	6.44	1.21	3.92

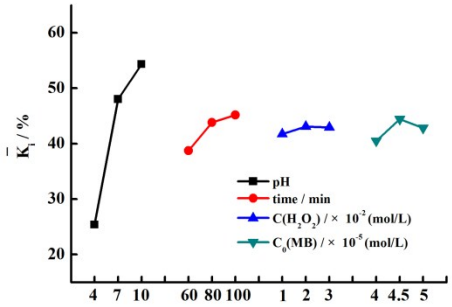

Fig. S6 $\overline{K_i}$ vs the levels of the factors for MB

S5. The reaction rate constants of degrade dyes in different temperature

Table S10 The reaction rate constants of degrade dyes in different temperature

Dye	**T/℃**	***k*** **/min^{-1}**	**R^2 of *k***	***E*a /(J/mol)**	**R^2 of *E*a**
MO	30	0.00151	0.967	9396	0.954
	35	0.00156	0.959		
	40	0.00166	0.971		
	45	0.00174	0.989		
	50	0.00191	0.979		
RhB	30	0.00871	0.994	30940	0.979
	40	0.01613	0.973		
	50	0.01903	0.961		
	60	0.02856	0.971		
MB	30	0.00610	0.998	17543	0.998
	35	0.00685	0.979		
	40	0.00753	0.992		
	45	0.00841	0.979		
	50	0.00944	0.965		

S6. The half-life time $t_{1/2}$ for degradation of MO, RhB and MB compared with other materials at room temperature

Table S11 The half-life time $t_{1/2}$ (min) for degradation of MO compared with other materials

catalytic	half-life (min)	reference
BWO/UiO-66-1	64.8	*RSC Adv.,* 2014, **4**, 64977–64984
complexes 1	180	*Cryst. Growth Des.,* 2013, **13**, 901–907
PANI/2	216	*Z. Anorg. Allg. Chem.,* 2015, **632**, 1125–1129
COP-NT	***459***	***In this work***
TiO_2	5460	*Ind. Eng. Chem. Res.*, 2013, **52**, 2201−2208

Table S12 The half-life time $t_{1/2}$ (min) for degradation of RhB compared with other materials

catalytic	half-life (min)	reference
MOF-3	37	*Cryst. Growth Des.*, 2016, **16**, 2277-2288.
α-Fe_2O_3 MRs	71	*J. Phys. Chem.C,* 2010, **114**, 17051-17061.
COP-NT	***79***	***In this work***
β -NaYF4:Yb^{3+},Tm^{3+} @SiO_2@TiO_2	114	*ACS Appl. Mater. Interfaces*, 2014, **6**, 340-348.
β -$NaYF_4$:Yb^{3+},Er^{3+} @SiO_2@TiO_2	142	*ACS Appl. Mater. Interfaces*, 2014, **6**, 340-348.
$In(OH)_3$ nanocubes	251	*Cryst. Growth Des.,* 2013, **10**, 597-601.
cubic $ZnIn_2S_4$	346	*ACS Appl. Mater. Interfaces,* 2012, **4**, 2273-2279.
ZnWO4 nanocubes	356	*ACS Appl. Mater. Interfaces,* 2014, **6**, 14423-14432.

Table S13 The half-life time $t_{1/2}$ (min) for degradation of MB compared with other materials

catalytic	**half-life (min)**	**reference**
Compound 3	38	*Cryst. Growth Des.,* 2016, **16**, 2277−2288
G-V_2O_5	40	*ACS Appl. Mater. Interfaces,* 2015, **7**, 14905−14911
COP-NT	***113***	***In this work***
compound 1	120	*RSC Adv.,* 2014, **4**, 24755–24761
$TiO_{2-X}N_X$	212	*J. Phys. Chem. C,* 2010, **114**, 6472–6477
$BiTaO_4$	285	*J. Phys. Chem. C,* 2010, **114**, 6472–6477
Fe-TiO_2	300	*Ind. Eng. Chem. Res.*,2015, **54**, 7346−7351

S7. The PXRD patterns and FT-IR spectra of COP-NT before and after the photocatalytic experiments

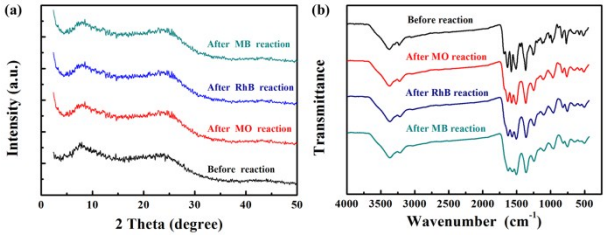

Fig. S7 (a) PXRD patterns and (b) FT-IR spectra of COP-NT before and after reaction.

S8. The [1] H NMR spectra of compound 1 and compound 2

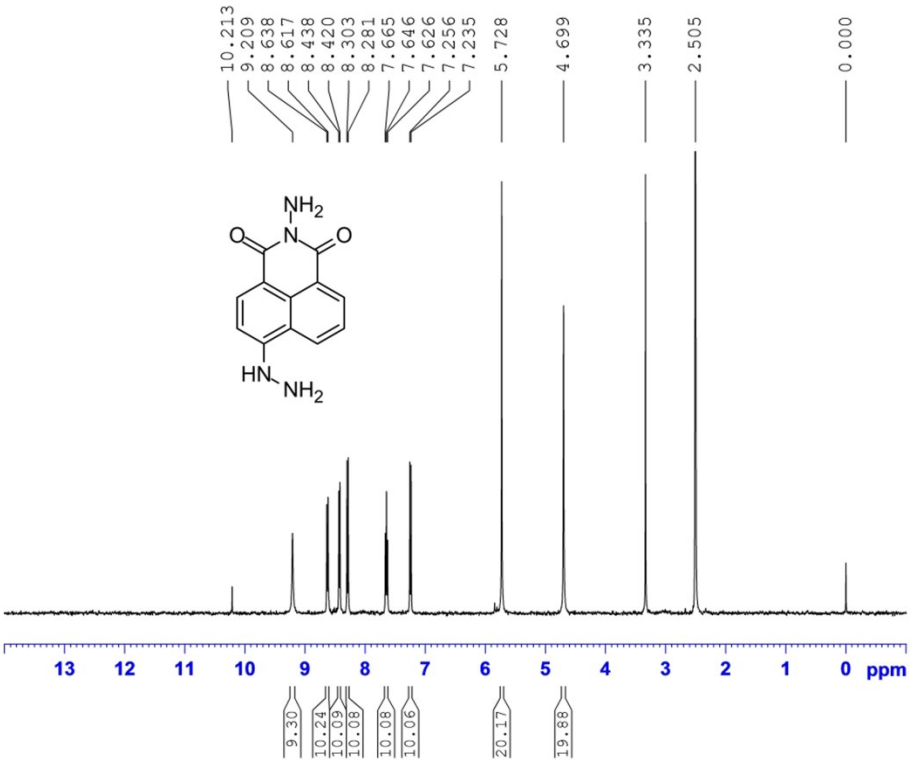

Fig. S8 The [1] H NMR spectra of compound 1.

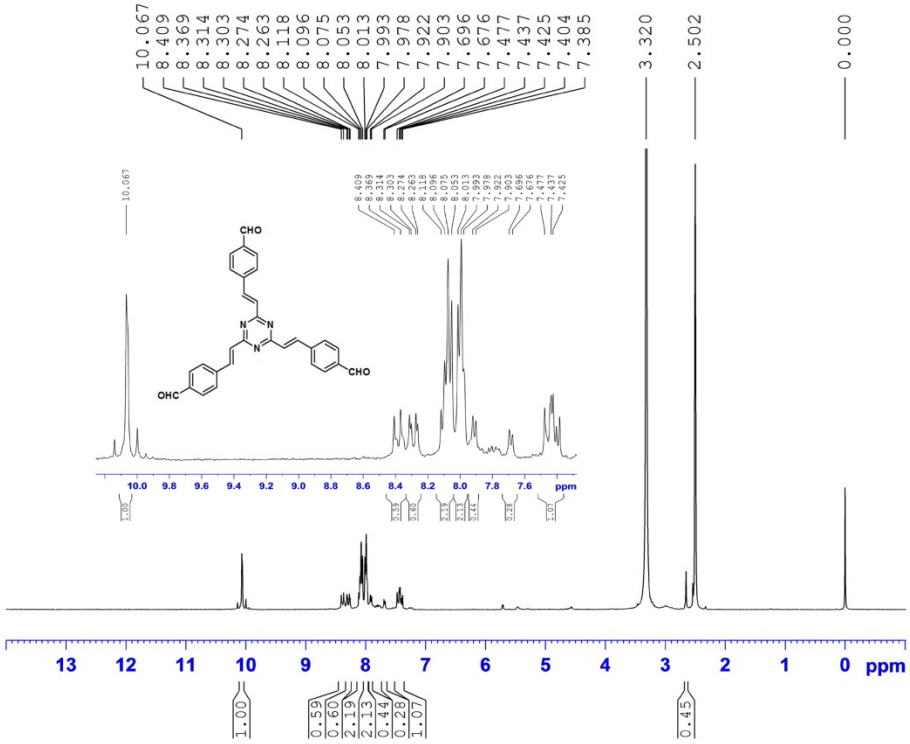

Fig. S9 The [1] H NMR spectra of compound 2.