Supplementary Material (ESI) for Dalton Transactions
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A series of Keggin-based compounds constructed by conjugate ring-riched pyrazine and quinoxaline derivatives

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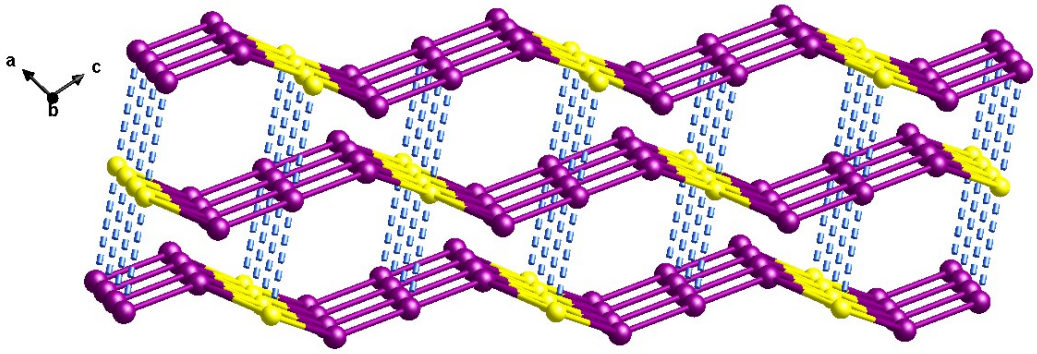

Fig. S1. The supramolecular 3D network of **1** linked by intermolecular weak interactions between layers.

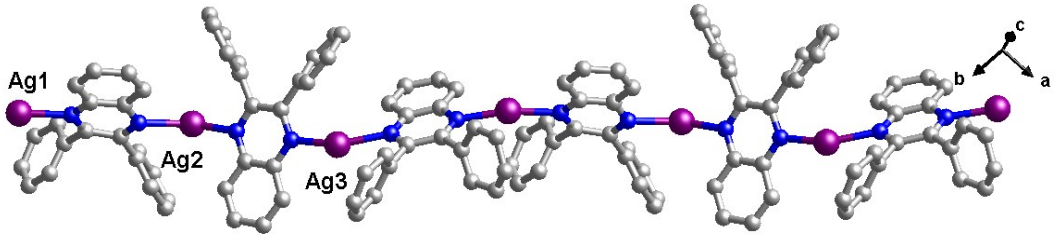

Fig. S2. View of 1D Ag-$\mathbf{L^2}$ line in **3**.

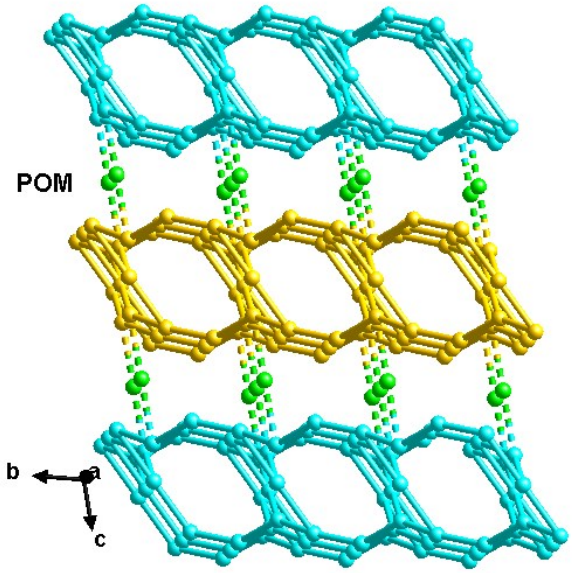

Fig. S3. The 3D supramolecular structure of **3** connected by intermolecular force.

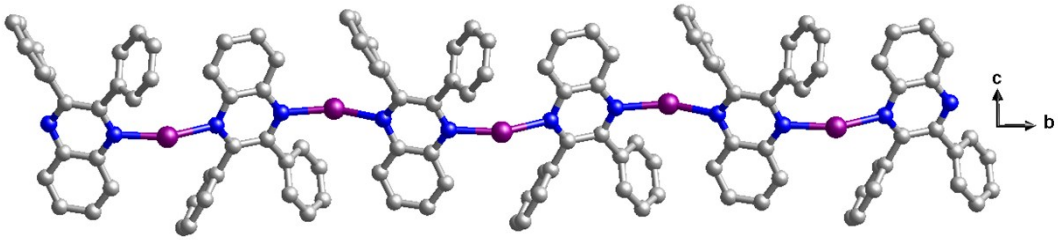

Fig. S4. The 1D wave-like Ag-$\mathbf{L^2}$ chain of compound **4**.

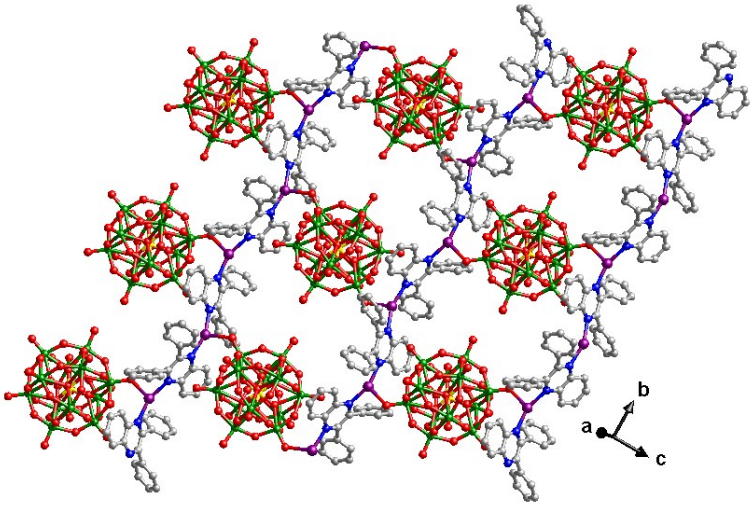

Fig. S5. The 2D grid-like metal-organic layer of compound **4**.

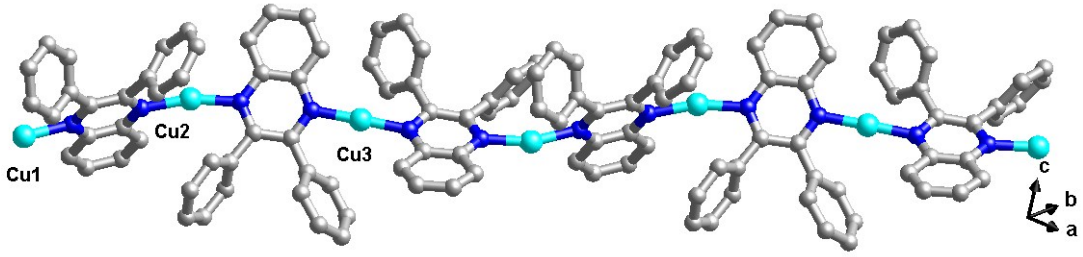

Fig. S6. The 1D wave-like Cu-**L²** line of compound **5**.

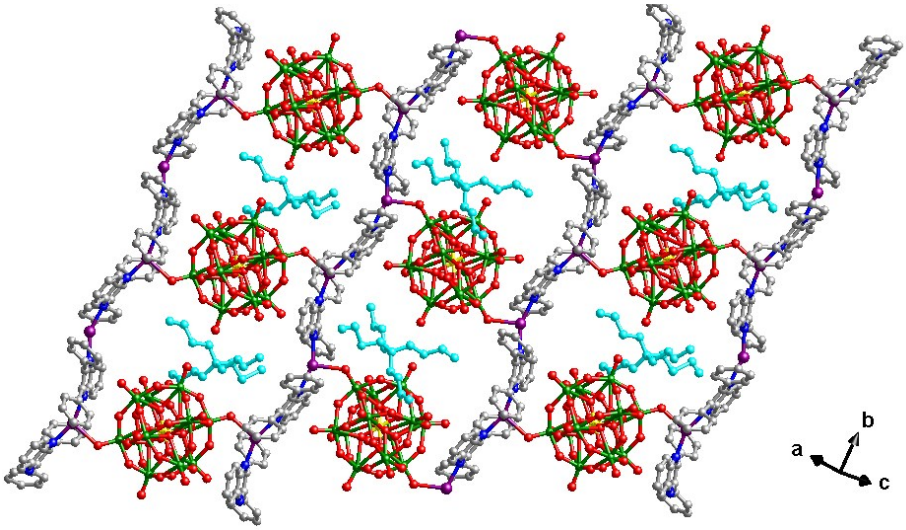

Fig. S7. The tetrabutyl ammonium ions accommodated in the grid of the layer for compound **4**.

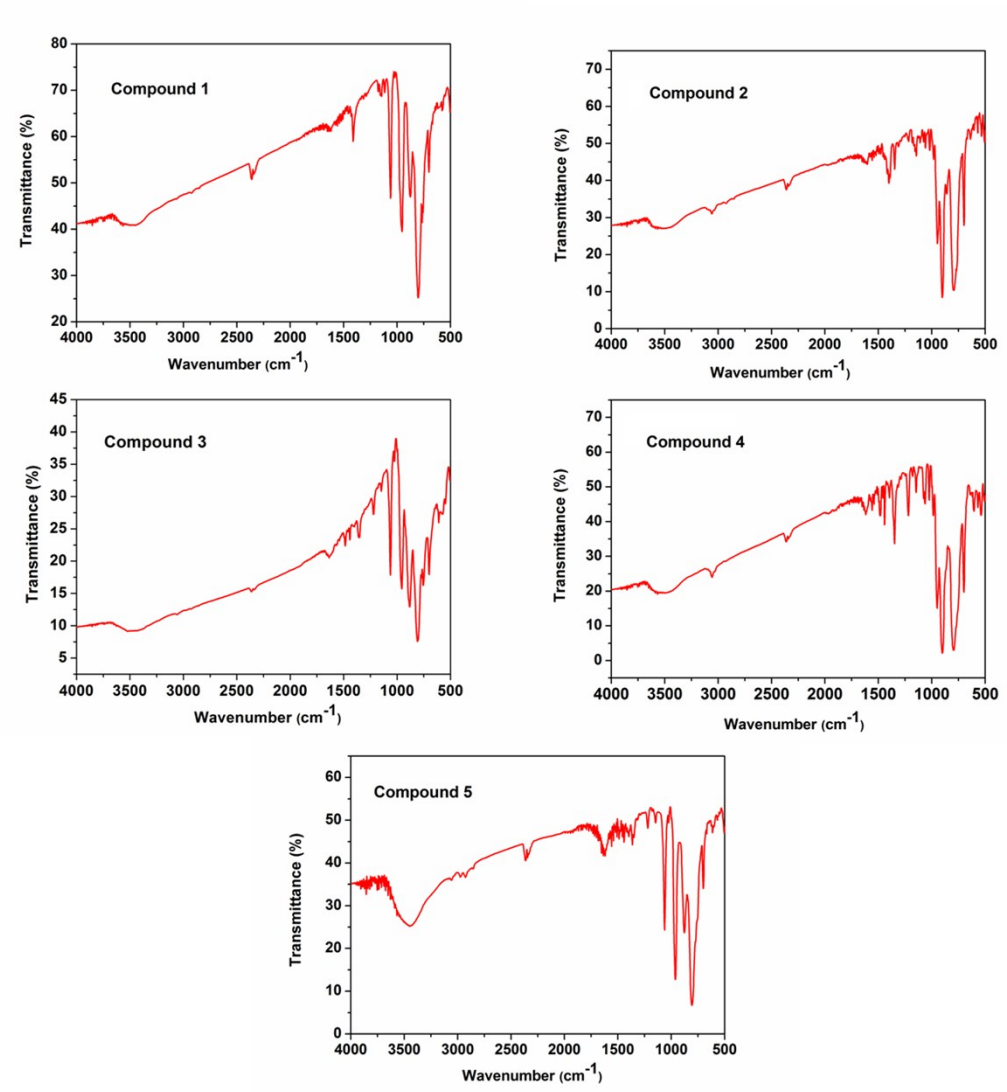

Fig. S8. The IR spectra of compounds **1**–**5**.

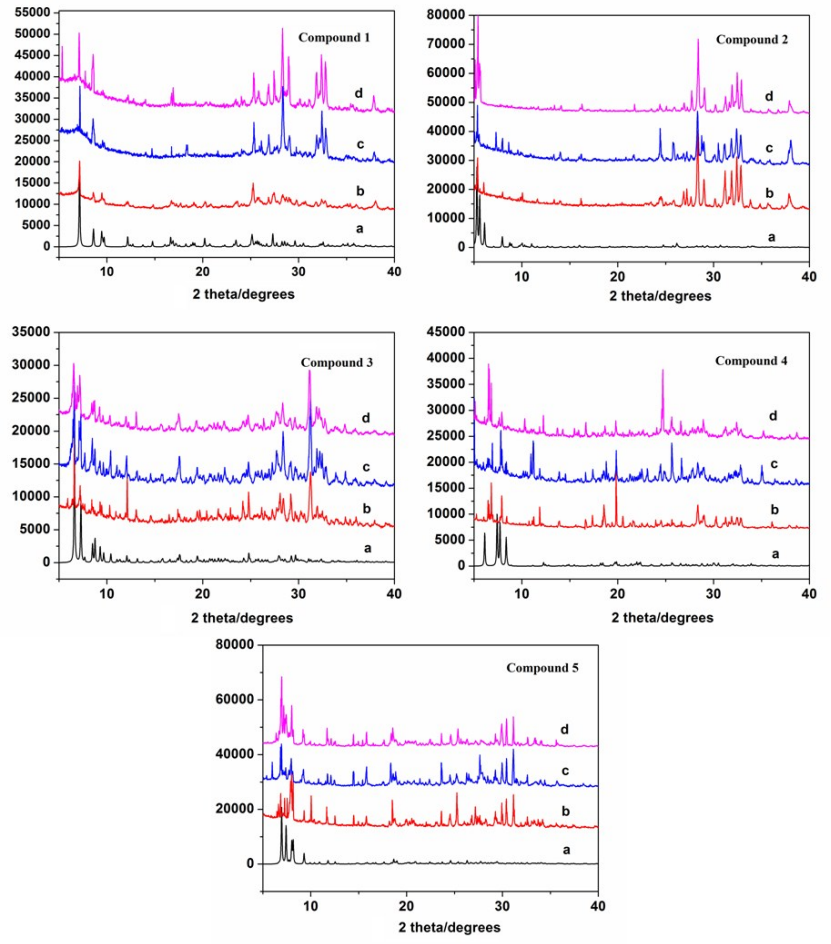

Fig. S9. The simulative (a), experimental (b) and recycled after photocatalysis (c for MB and d for RhB) powder X-ray diffraction patterns for compounds **1**–**5**.

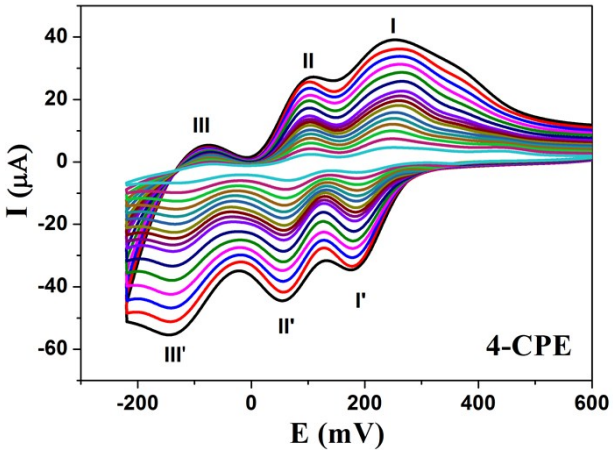

Fig. S10. The cyclic voltammograms of the **4**–CPE in 0.1M H_2SO_4 + 0.5M Na_2SO_4 aqueous solution at different scan rates (from inner to outer: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 250, 300, 350, 400, 450 and 500 $mV \cdot s^{-1}$, respectively.).

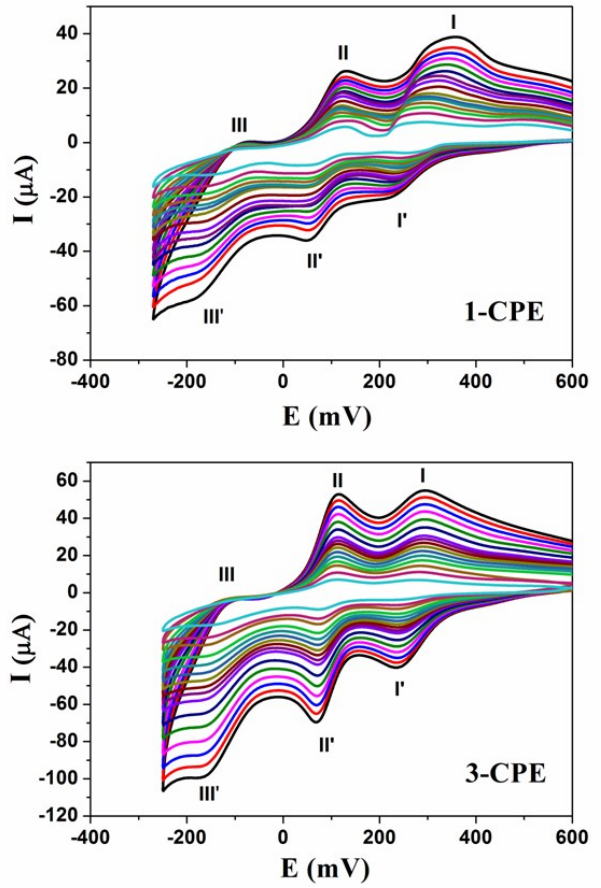

Fig. S11. The cyclic voltammograms of the **1**–CPE and **3**–CPE in 0.1M H_2SO_4 + 0.5M Na_2SO_4 aqueous solution at different scan rates (from inner to outer: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 250, 300, 350, 400, 450 and 500 $mV \cdot s^{-1}$, respectively.).

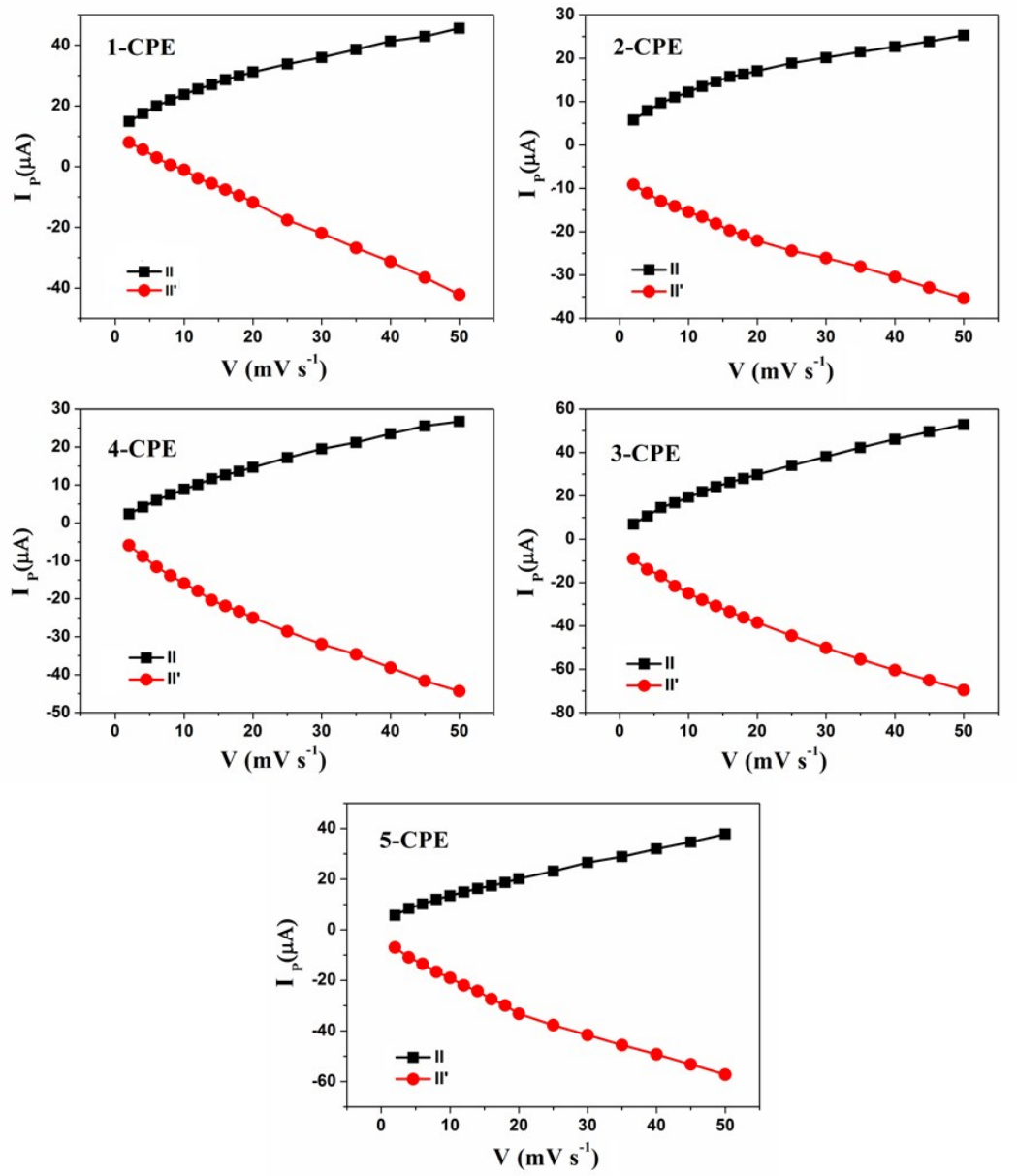

Fig. S12. The dependence of anodic peak (II) and cathodic peak (II') currents of **1**–**5**–CPE on scan rates.

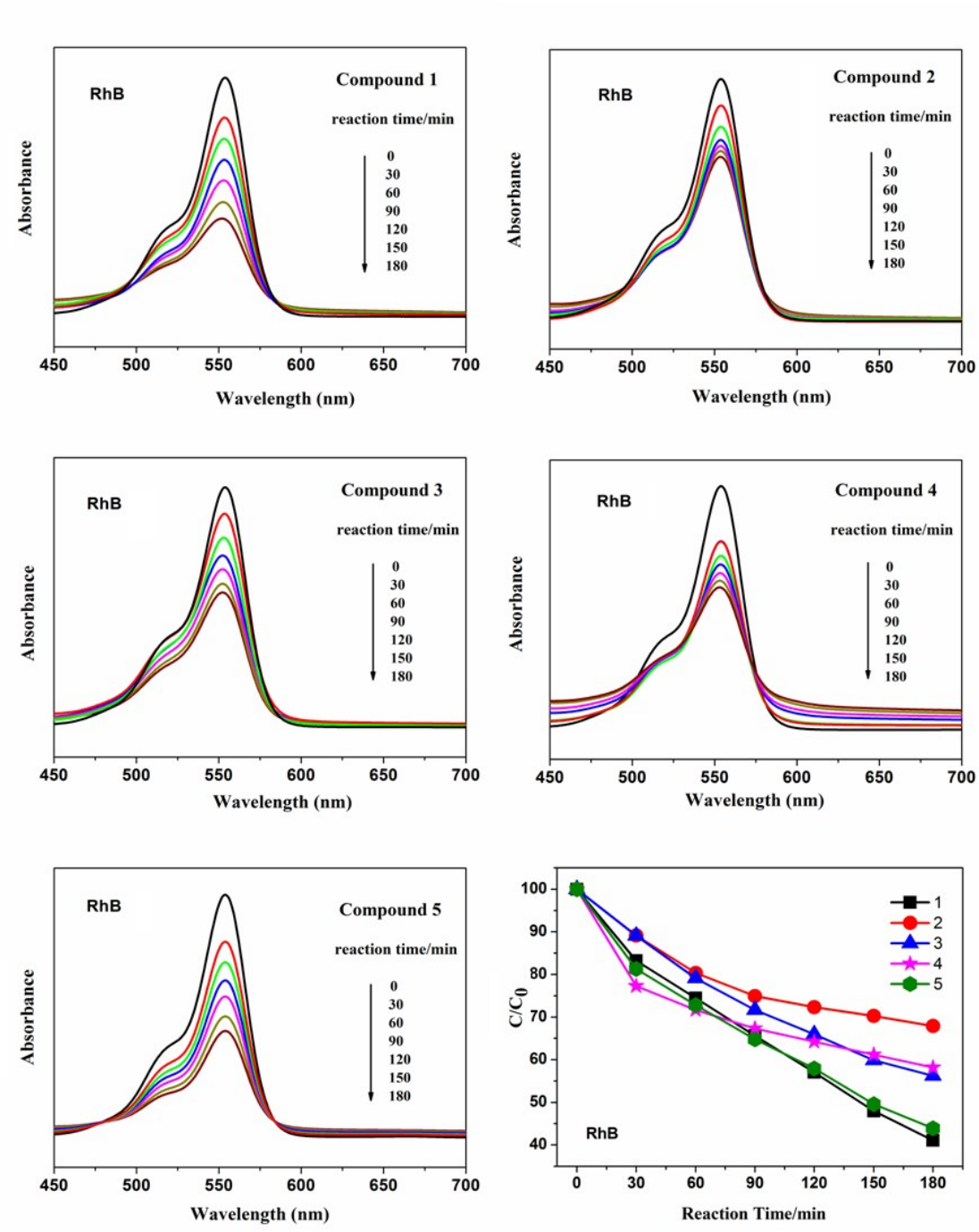

Fig. S13. Absorption spectra of the RhB solution during the decomposition reaction under UV irradiation with the compounds **1–5** as the catalysts.

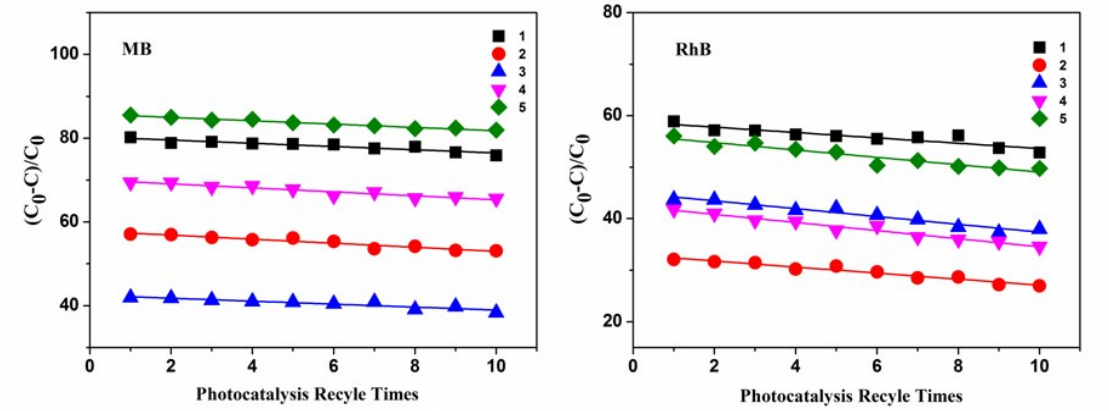

Fig. S14. The recycle test of catalysts **1**–**5**.

Table S1. Selected bond distances (Å) and angles (deg) for compounds **1**–**5**.

compound **1**			
O(4)-Ag(1)	2.475(8)	Ag(1)-N(1)	2.286(9)
Ag(1)-O(1W)	2.33(2)	Ag(1)-O(1W')	2.33(3)
Ag(2)-N(2)	2.173(9)	Ag(2)-N(2)#2	2.173(9)
Mo(6)-O(4)-Ag(1)	134.4(5)	N(1)-Ag(1)-O(1W)	124.7(7)
N(1)-Ag(1)-O(1W')	145.9(7)	O(1W)-Ag(1)-O(1W')	35.7(10)
N(1)-Ag(1)-O(4)	98.2(3)	O(1W)-Ag(1)-O(4)	136.8(7)
O(1W')-Ag(1)-O(4)	104.8(9)	N(2)-Ag(2)-N(2)#2	179.999(1)
C(2)-N(1)-Ag(1)	122.1(7)	C(4)-N(1)-Ag(1)	118.9(8)
C(1)-N(2)-Ag(2)	119.5(8)	C(3)-N(2)-Ag(2)	120.9(7)
O(1W')-O(1W)-Ag(1)	72.4(17)	O(1W')#3-O(1W')-Ag(1)	138(4)
O(1W)-O(1W')-Ag(1)	72.0(14)		
Symmetry transformations used to generate equivalent atoms for **1**: #1 -x+1,-y+1,-z-2; #2 -x,-y+1,-z-1; #3 -x,-y+2,-z-2			
compound **2**			
Ag(1)-N(1)	2.187(9)	Ag(1)-N(3)	2.265(9)
Ag(1)-O(15)	2.511(8)	Ag(2)-N(5)	2.311(10)
Ag(2)-N(4)	2.311(10)	N(2)-Ag(4)#1	2.228(9)
Ag(3)-N(6)	2.265(10)	Ag(3)-N(7)	2.307(10)
Ag(4)-N(2)#2	2.228(9)	Ag(4)-N(8)	2.257(9)
Ag(4)-N(9)	2.496(12)	N(1)-Ag(1)-N(3)	142.9(3)
N(1)-Ag(1)-O(15)	104.1(3)	N(3)-Ag(1)-O(15)	97.4(3)
C(4)-N(1)-Ag(1)	123.7(7)	C(1)-N(1)-Ag(1)	117.5(7)
N(5)-Ag(2)-N(4)	130.8(3)	C(3)-N(2)-Ag(4)#1	118.8(8)
C(2)-N(2)-Ag(4)#1	123.1(8)	N(6)-Ag(3)-N(7)	139.6(4)
C(20)-N(3)-Ag(1)	124.5(8)	C(17)-N(3)-Ag(1)	113.9(7)
N(2)#2-Ag(4)-N(8)	152.9(4)	N(2)#2-Ag(4)-N(9)	91.8(4)
N(8)-Ag(4)-N(9)	112.6(4)	C(18)-N(4)-Ag(2)	116.0(8)
C(19)-N(4)-Ag(2)	124.0(8)	C(33)-N(5)-Ag(2)	119.1(8)

C(36)-N(5)-Ag(2)	123.2(8)	C(35)-N(6)-Ag(3)	122.2(8)
C(34)-N(6)-Ag(3)	117.5(8)	C(52)-N(7)-Ag(3)	122.5(8)
C(49)-N(7)-Ag(3)	114.1(8)	C(51)-N(8)-Ag(4)	122.6(8)
C(50)-N(8)-Ag(4)	119.1(8)	C(65)-N(9)-Ag(4)	115.8(9)
C(68)-N(9)-Ag(4)	123.8(11)	Mo(5)-O(15)-Ag(1)	113.7(4)
Symmetry transformations used to generate equivalent atoms for **2**: #1 x+1,y,z+1; #2 x-1,y,z-1			
compound **3**			
Ag(1)-N(1)	2.139(3)	Ag(1)-N(6)#1	2.151(3)
Ag(2)-N(3)	2.194(3)	Ag(2)-N(2)	2.204(3)
Ag(3)-N(4)	2.223(3)	Ag(3)-N(5)	2.228(3)
N(6)-Ag(1)#4	2.151(3)	N(1)-Ag(1)-N(6)#1	168.1(13)
C(8)-N(1)-Ag(1)	127.4(3)	C(1)-N(1)-Ag(1)	114.2(3)
N(3)-Ag(2)-N(2)	138.3(11)	C(2)-N(2)-Ag(2)	116.6(3)
C(3)-N(2)-Ag(2)	121.3(3)	N(4)-Ag(3)-N(5)	147.5(11)
C(21)-N(3)-Ag(2)	119.3(3)	C(28)-N(3)-Ag(2)	120.8(2)
C(22)-N(4)-Ag(3)	118.1(3)	C(23)-N(4)-Ag(3)	122.6(3)
C(41)-N(5)-Ag(3)	118.3(2)	C(48)-N(5)-Ag(3)	121.9(2)
C(42)-N(6)-Ag(1)#4	117.3(3)	C(43)-N(6)-Ag(1)#4	122.1(2)
Symmetry transformations used to generate equivalent atoms for **3**: #1 x-1,y+1,z; #2 -x,-y+2,-z+1; #3 -x+1,-y+2,-z+2; #4 x+1,y-1,z			
Compound **4**			
Ag(1)-N(1)	2.167(4)	Ag(1)-N(2)#1	2.173(4)
Ag(1)-O(3)	2.505(4)	N(2)-Ag(1)#3	2.173(4)
N(1)-Ag(1)-N(2)#1	154.65(17)	N(1)-Ag(1)-O(3)	94.99(16)
N(2)#1-Ag(1)-O(3)	110.33(16)	C(1)-N(1)-Ag(1)	122.0(3)
C(8)-N(1)-Ag(1)	119.3(3)	C(2)-N(2)-Ag(1)#3	119.7(3)
C(3)-N(2)-Ag(1)#3	120.3(4)	Mo(4)-O(3)-Ag(1)	123.4(2)
Symmetry transformations used to generate equivalent atoms for **4**: #1 -x+1/2,y+1/2,-z+3/2; #2 -x,-y+2,-z+2; #3 -x+1/2,y-1/2,-z+3/2			
Compound **5**			
Cu(1)-N(1)	1.918(2)	Cu(1)-N(3)	1.932(2)
Cu(2)-N(5)	1.908(3)	Cu(2)-N(4)	1.920(2)
N(2)-Cu(3)	1.889(3)	Cu(3)-N(6)#3	1.908(3)
N(6)-Cu(3)#4	1.908(3)	N(1)-Cu(1)-N(3)	160.3(12)
C(2)-N(1)-Cu(1)	114.1(2)	C(1)-N(1)-Cu(1)	126.6(2)
N(5)-Cu(2)-N(4)	165.4(14)	C(3)-N(2)-Cu(3)	117.3(2)
C(4)-N(2)-Cu(3)	122.5(2)	C(22)-N(3)-Cu(1)	117.5(2)
C(21)-N(3)-Cu(1)	121.9(2)	N(2)-Cu(3)-N(6)#3	177.9(12)
C(23)-N(4)-Cu(2)	116.3(2)	C(24)-N(4)-Cu(2)	123.1(2)
C(42)-N(5)-Cu(2)	116.4(2)	C(41)-N(5)-Cu(2)	123.4(3)
C(43)-N(6)-Cu(3)#4	115.2(2)	C(44)-N(6)-Cu(3)#4	122.8(2)
Symmetry transformations used to generate equivalent atoms for **5**: #1 -x+1,-y+1,-z+1; #2 -x+2,-y,-z; #3 x+1,y+1,z; #4 x-1,y-1,z			