SUPPORTING INFORMATION

Unveiling Non-Covalent Interactions in Novel Cooperative Photoredox Systems for Efficient Alkene Oxidation in Water

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Figure S1. IR spectrum of **Ag[Cl_6-1].**

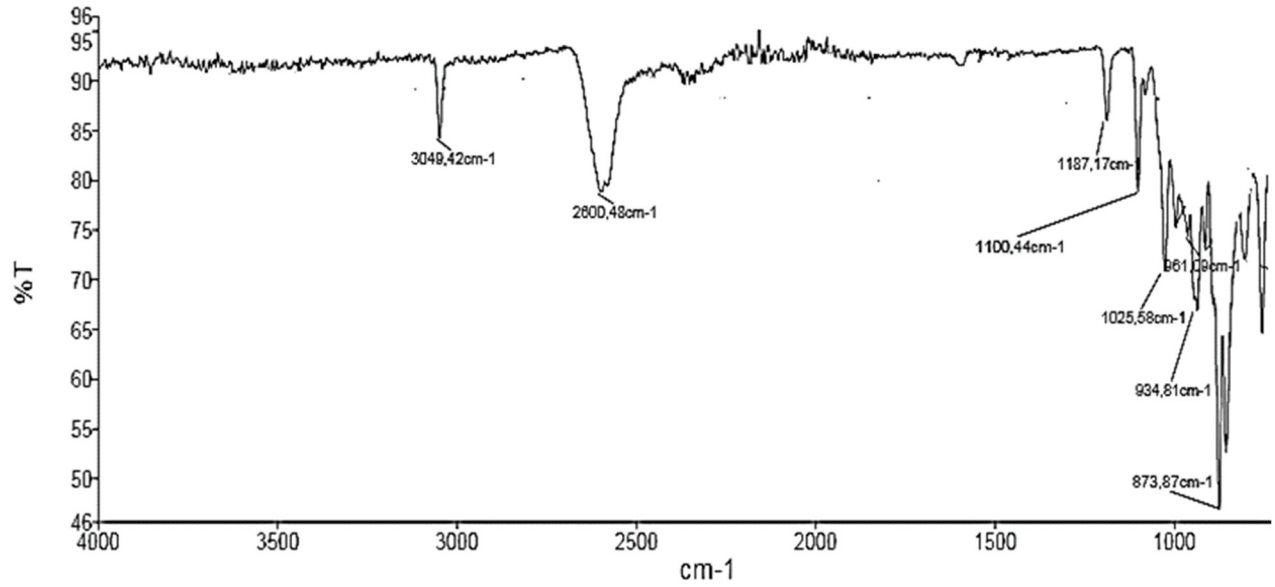


Figure S2. IR spectrum of **5**.

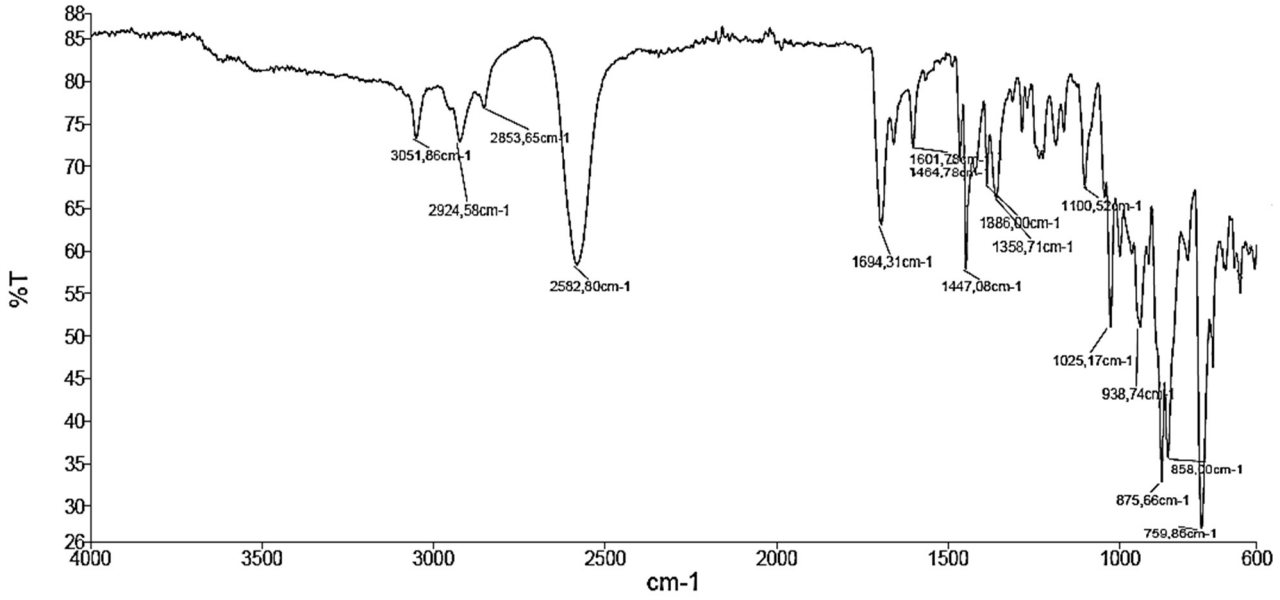
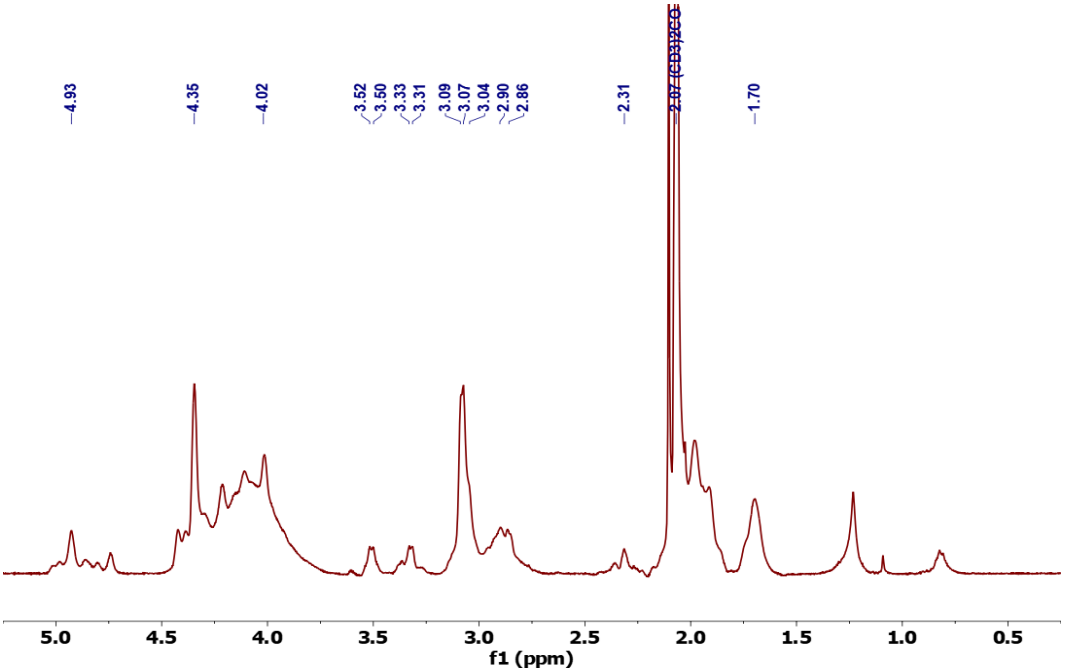


Figure S3. a) $^{1}H\{^{11}B\}$-NMR and b) $^{11}B\{^{1}H\}$-NMR spectra of **Ag[Cl_6-1]** compound in acetone-d_6.

a)



b)

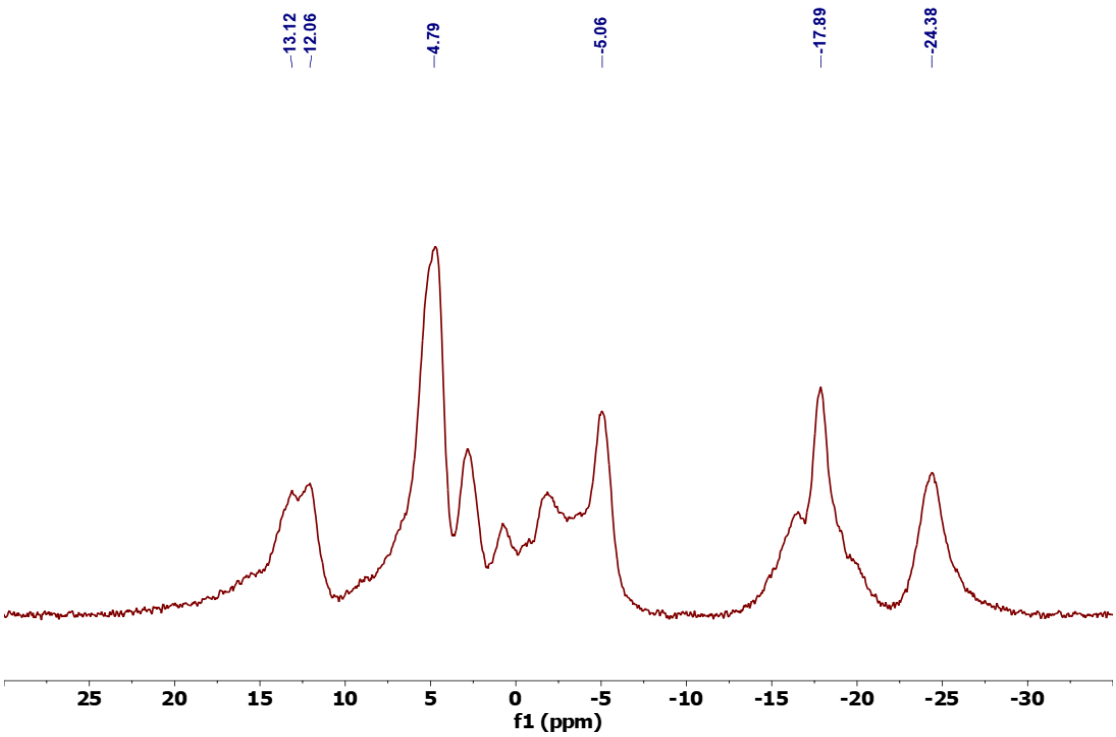
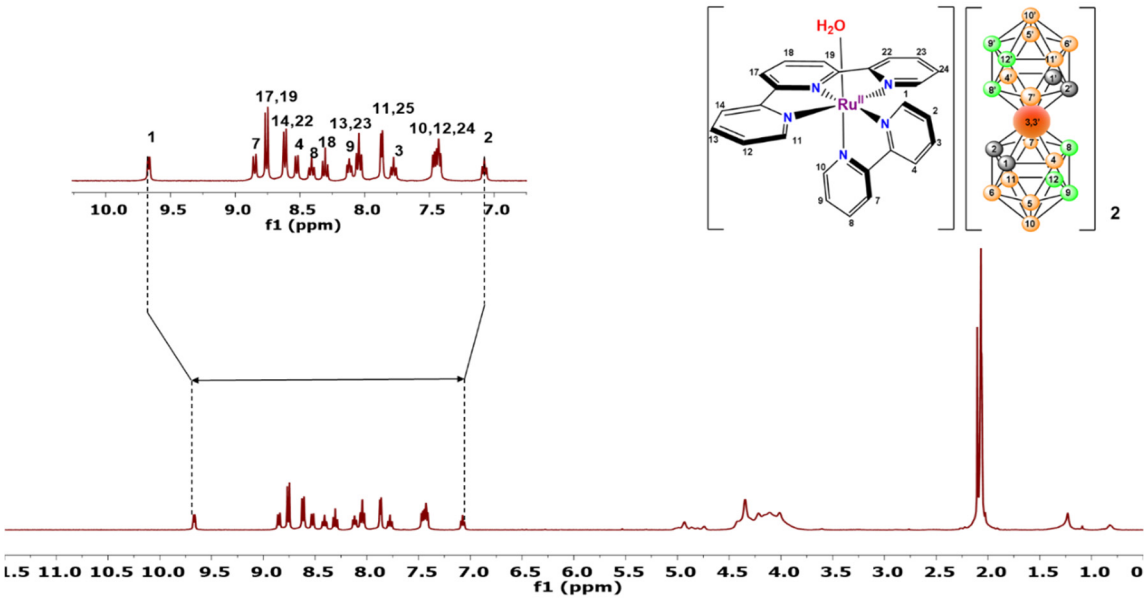
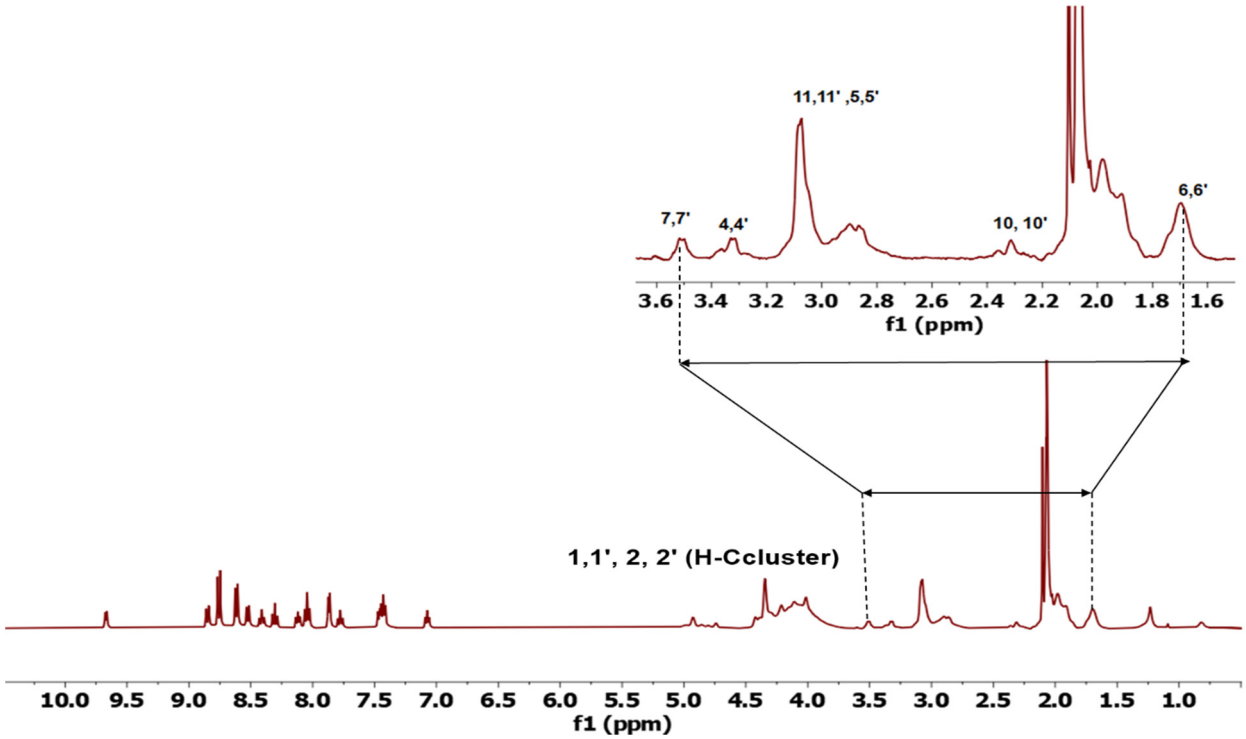


Figure S4. a) ^{1}H-NMR; b) ^{1}H{^{11}B}-NMR; c) ^{11}B{^{1}H}-NMR d) ^{11}B-NMR and e) COSY NMR spectra of **5.** compound in acetone-d_6.

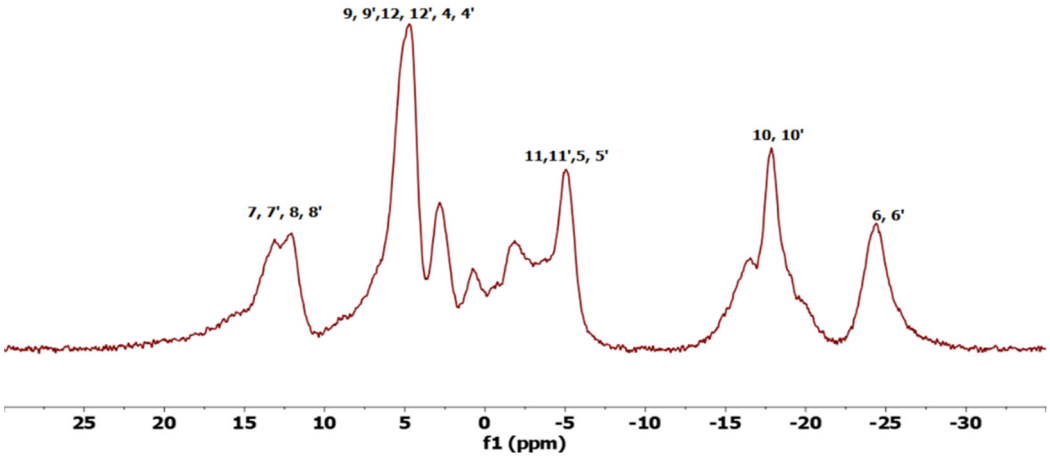
a)



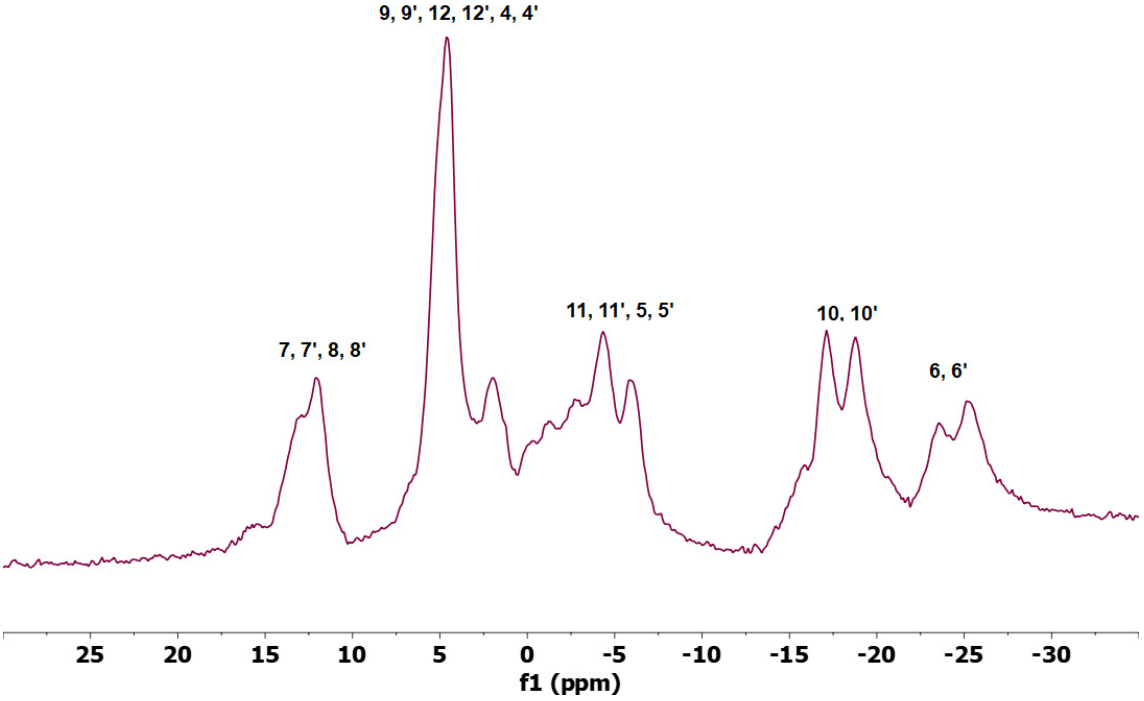
b)



c)


9, 9',12, 12', 4, 4'
11,11',5, 5'
10, 10'
7, 7', 8, 8'
6, 6'
25 20 15 10 5 0 -5 -10 -15 -20 -25 -30
f1 (ppm)

d)


9, 9', 12, 12', 4, 4'
11, 11', 5, 5'
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7, 7', 8, 8'
6, 6'
25 20 15 10 5 0 -5 -10 -15 -20 -25 -30
f1 (ppm)

e)

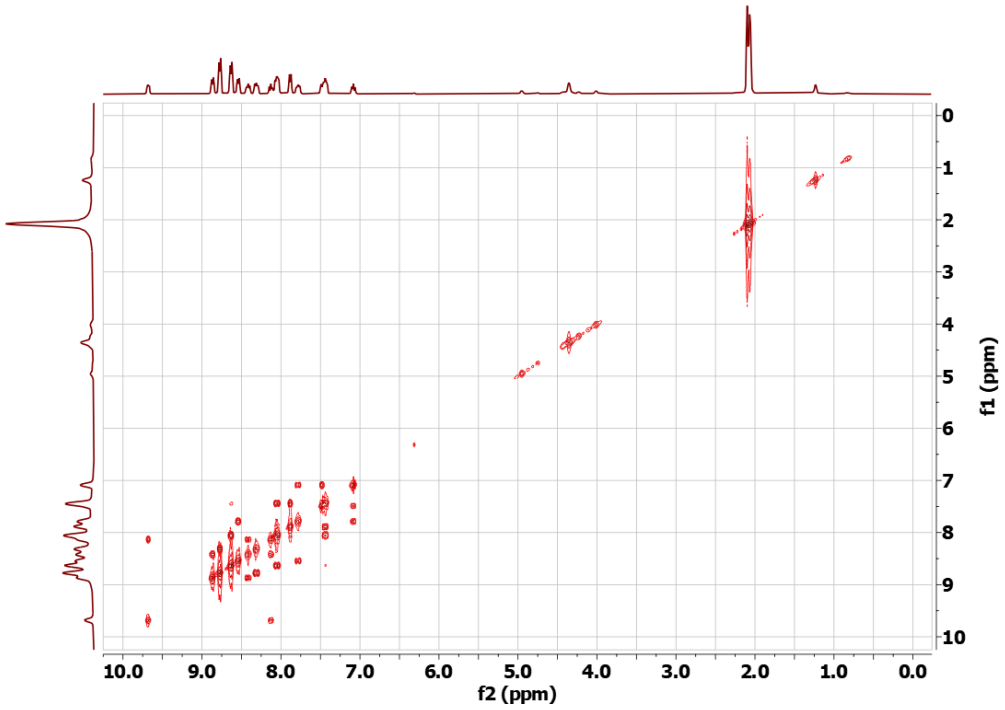


Figure S5. UV-visible of **Ag[Cl_6-1]** compound in CH_2Cl_2.

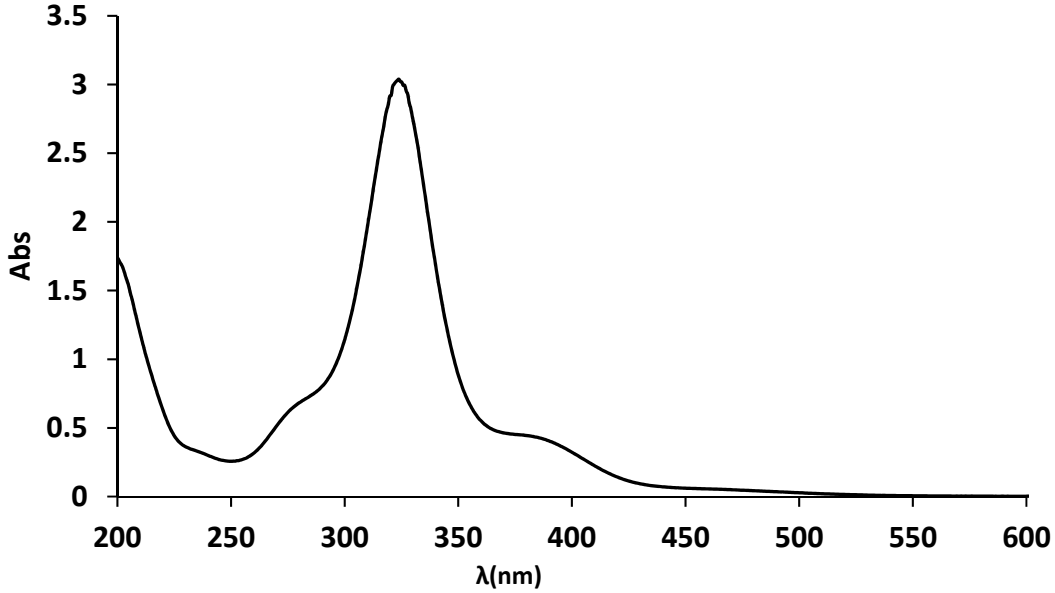
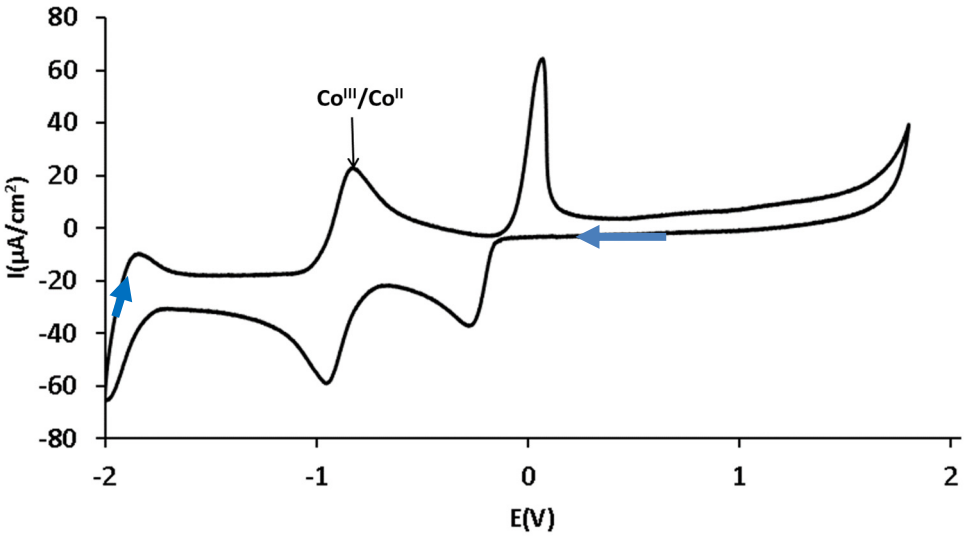
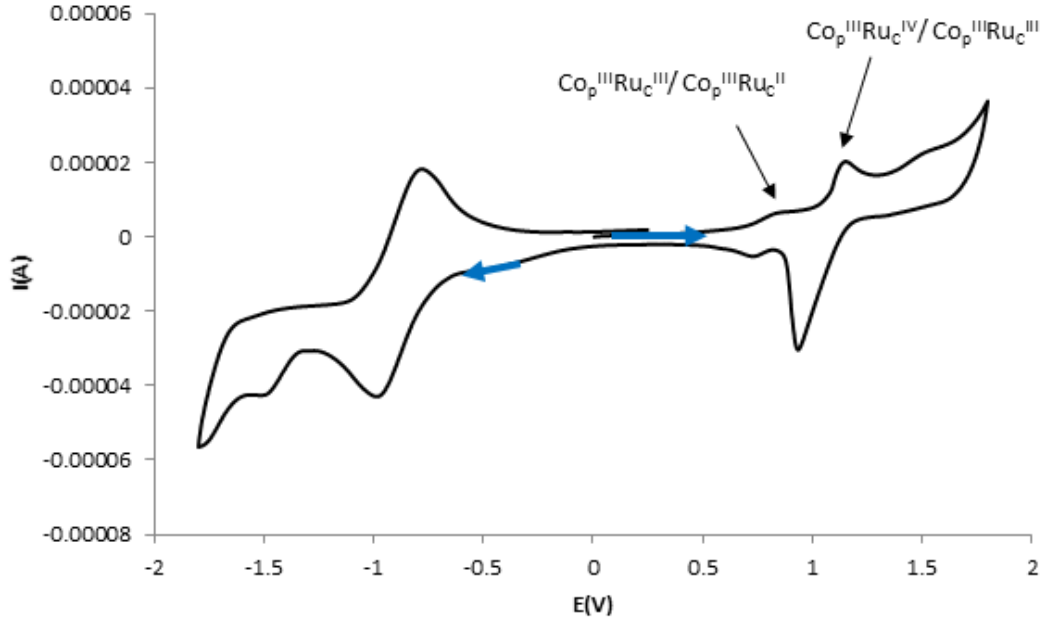


Figure S6. CV of a) **Ag[Cl$_6$-1]** compound in CH_3CN + 0.1 M TBAH vs Ag/AgCl; b) **5** in CH_3CN + 0.1 M TBAH vs Ag/AgCl; and c) **5** in a phosphate buffer (pH = 7.12) vs Ag/AgCl; scan rate V= 100 mV/s.

a)



b)



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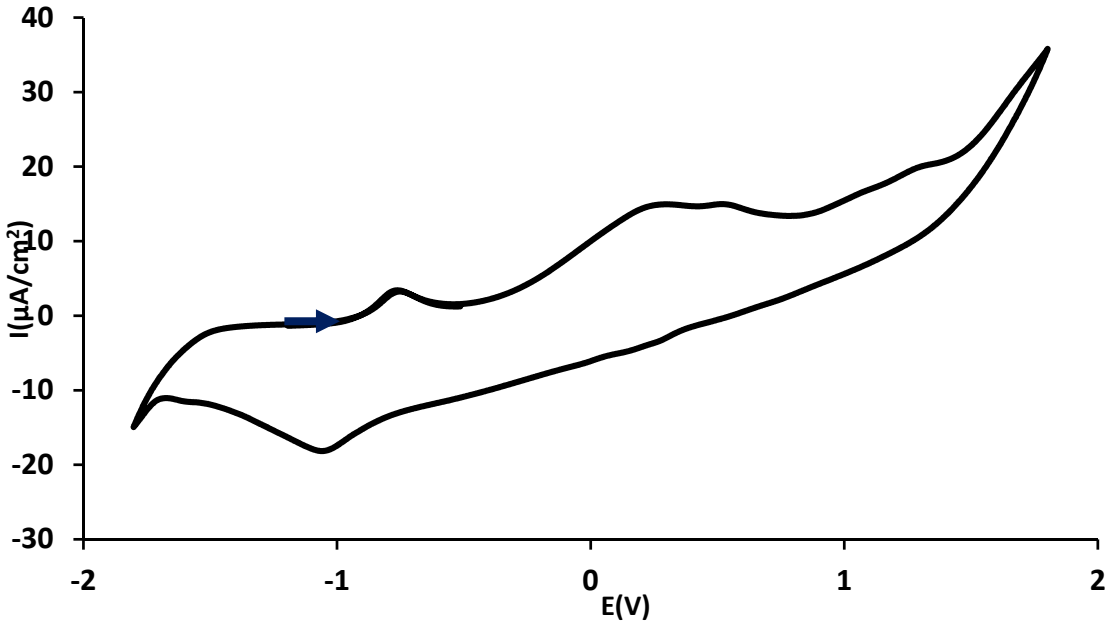


Figure S7. Plot of conversion as a function of time for the photoredox catalysis of styrene. Conditions: **4** (0.01 mM), styrene (20 mM), $Na_2S_2O_8$ (26 mM), 5 ml aqueous solution at pH=7, light irradiation (2.2 W, λ ~300 nm).

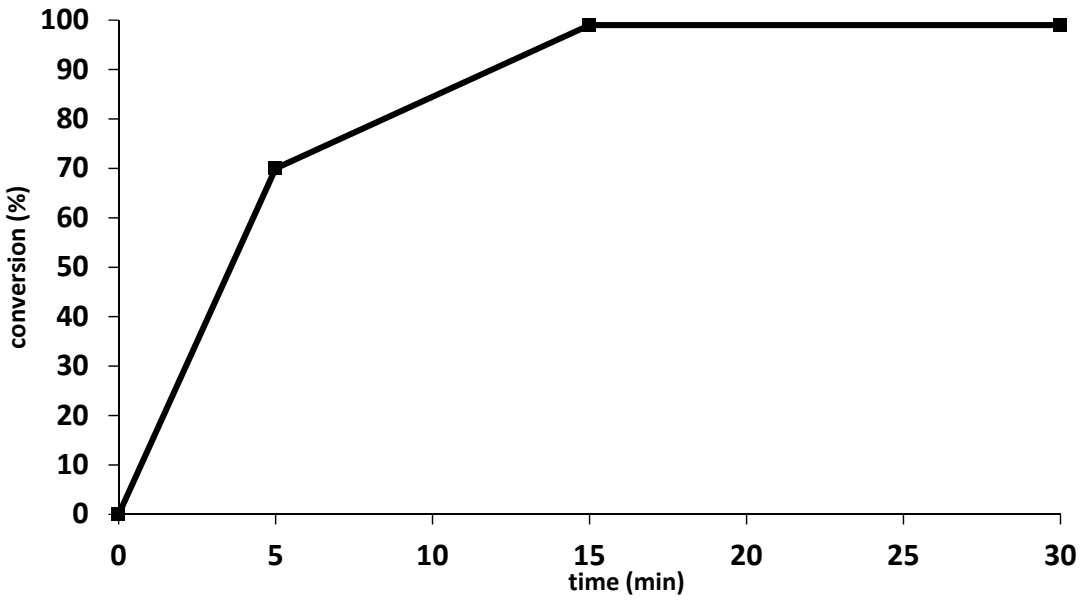


Figure S8. ESI-MS spectra of **5**.

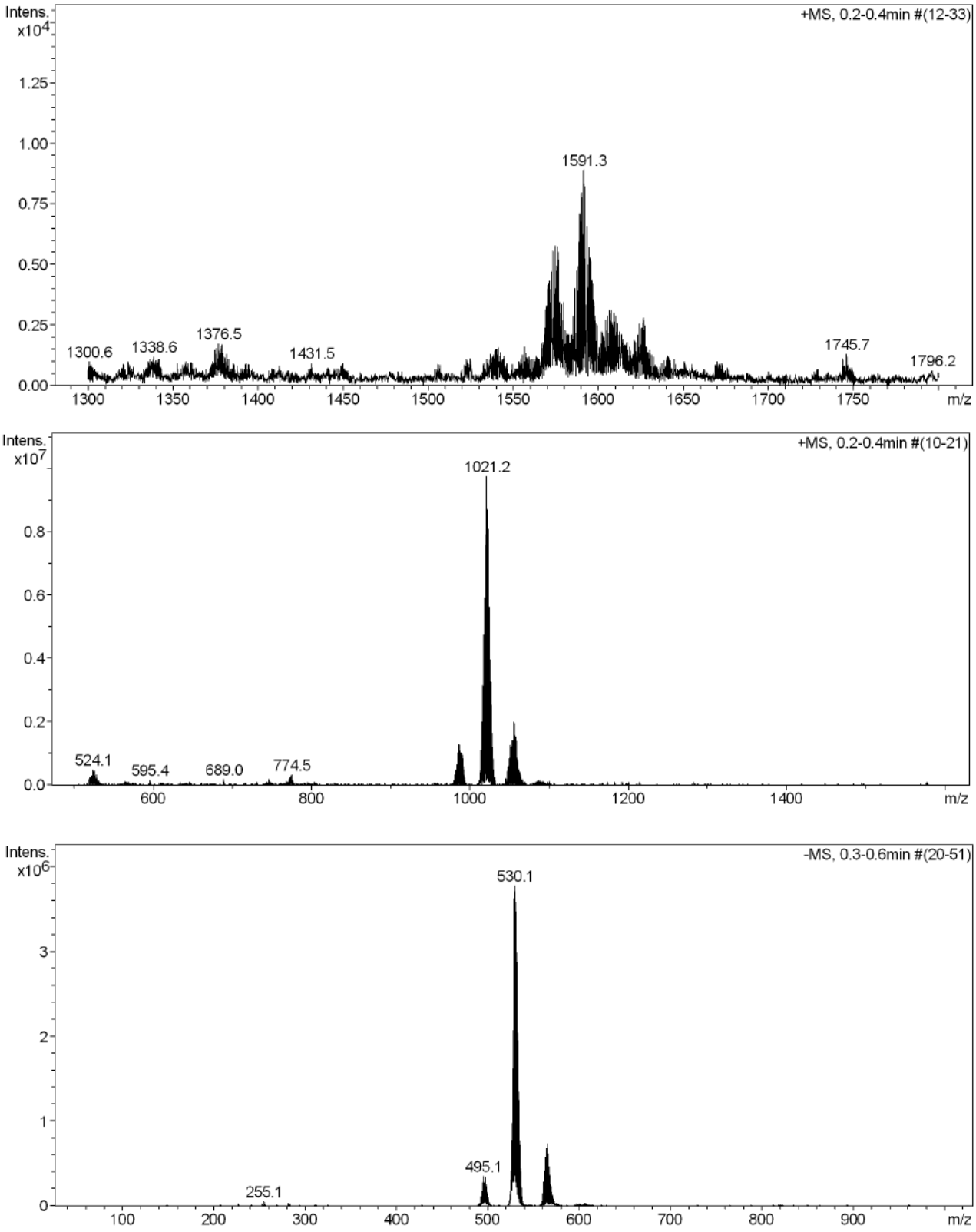
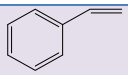
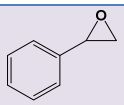
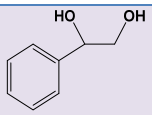
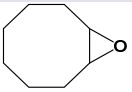
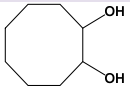
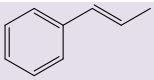
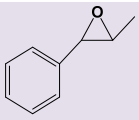
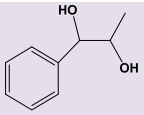
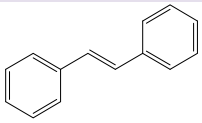
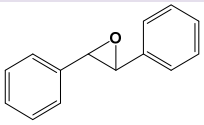
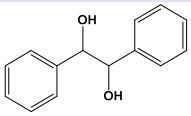
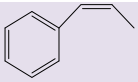
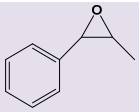
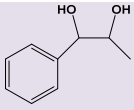
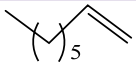
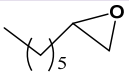
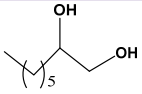
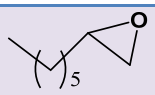
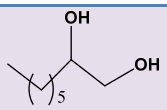
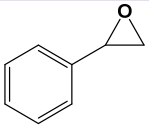
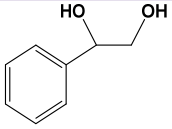
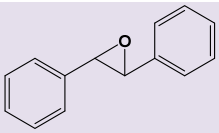
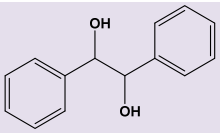


Table S1. Photooxidation tests performed with **4** complex.

Entry	substrate	Conv.%	Yield.(selec.)%	Yield(selec.)%	
1		70 [a]1 ≥99[b]1		67(96)[a] 57(57)[b]	 1(1)[a] 35(35)[b]	
2		≥99[b] ≥99[c]		67(67)[b] 55(55)[c]	 33(33)[b] 45(43)[c]	
3		96[b] ≥99[c]		76(79)[b] 69(69)[c]	 20(21)[b] 31(31)[c]	
4		89[b] 97[c]		85(96)[b] 52(54)[c]	 4(5)[b] 45(46)[c]	
5		≥99[b] ≥99 [c]		91[59/32, cis/trans](91[2])[b] 60[36/24, cis/trans](60[2])[c]		9(9)[b] 40(40)[c]
7		≥99[b] ≥99 [c]		65(65)[b] 39(39)[c]	 15(15)[b] 24(24)[c]	Other products 20[4] (20)[b] 37[4] (37)[c]

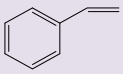
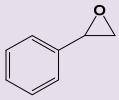
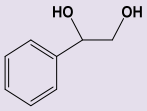
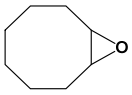
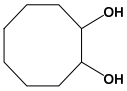
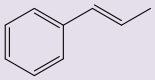
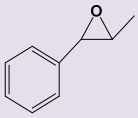
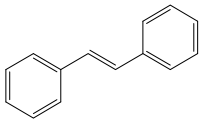
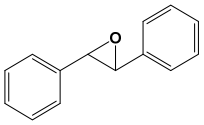
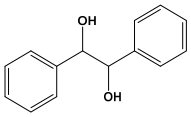
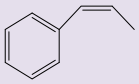
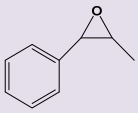
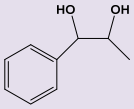
Conditions: **4** (0.01 mM), substrate (20 mM), $Na_2S_2O_8$ (26 mM), 5 mL aqueous solution at pH=7. [a] 5 min of reaction [b] 15 min of reaction. [c] 30 min of reaction.[1] benzaldehyde and benzoic acid produced as another byproducts. [2]selectivity with respect the overall epoxide produced.[3]yield with diol and benzoic acid from vinyl produced. [4]octanal and octanoic produced.

Table S2. Photooxidation of epoxides performed with complex **4**.

Entry	substrate	Conv.%	Product	Yield(selec.)%
1		≥99[a] ≥99[b]		90(90)[a] 60(60)[b]
2		≥99[a] ≥99[b]		55(55)[b] 65(65)*[c]
3		97[a] ≥99[b]		97(≥99)[b] ≥99(≥99)[c]

Conditions: **4** (0.01 mM), substrate (20 mM), $Na_2S_2O_8$ (26 mM), 5 mL aqueous solution at pH=7. [a]15 min of reaction [b]30 min of reaction. Yield and selectivity with respect the overall diol produced.* [[yield (selectivity)] with respect the obtention of benzaldehyde and benzoic acid.

Table S3. Photooxidation tests performed with **5** complex.

Entry	substrate	Conv.%		Yield.(selec.)%		Yield(selec.)%	
1		75 [a]1		23(31)[a]		38(51)[a]	
2		92[a] 96[b]		92(>99)[a] 53(55)[b]		43(45)[b]	
3		87[b]		87(>99)[b]			
4		>99[a] >99[b]		86(86)[a] 83(83)[b]		14(14)[a] 17(17)[b]	
5		88[a] 89 [b]		50[50, trans](57)[a] 50[51, trans](57)[b]		38(43)[a] 37 (42)[b]	

Conditions: **5** (0.001 mM), substrate (20 mM), $Na_2S_2O_8$ (26 mM), 5 mL aqueous solution at pH=7. [a] 15 min of reaction. [b] 30 min of reaction. [1] benzaldehyde and benzoic acid produced as another byproducts.