Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary information

Strontium peroxide as a Potential Photocatalyst: Rapid Degradation of Organic and Pharmaceutical Pollutants

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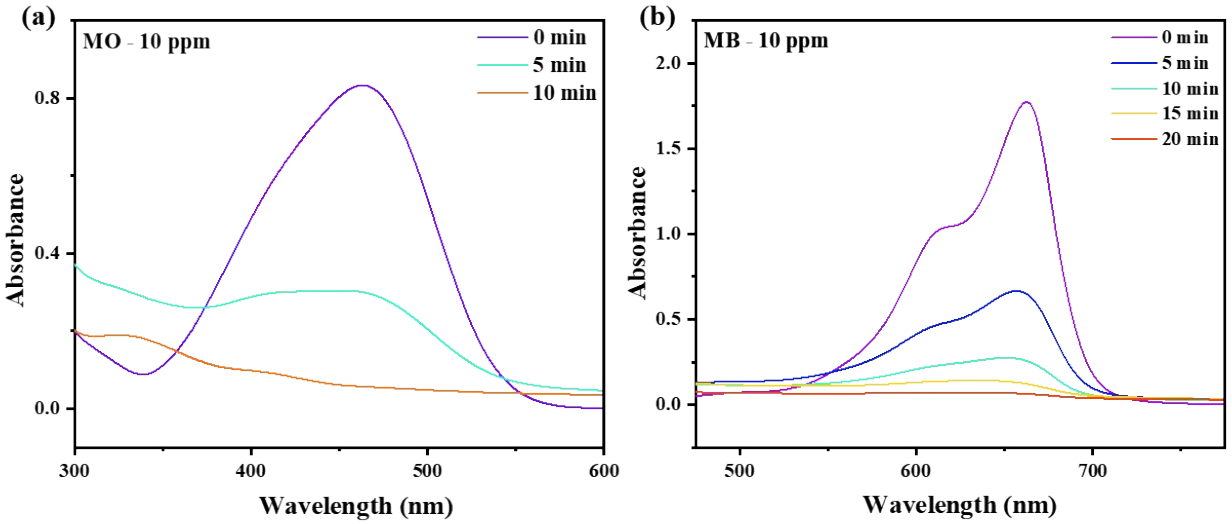


Fig. S1 (a) Degradation studies of Methyl orange (10 ppm) (b) Methylene blue (10 ppm)

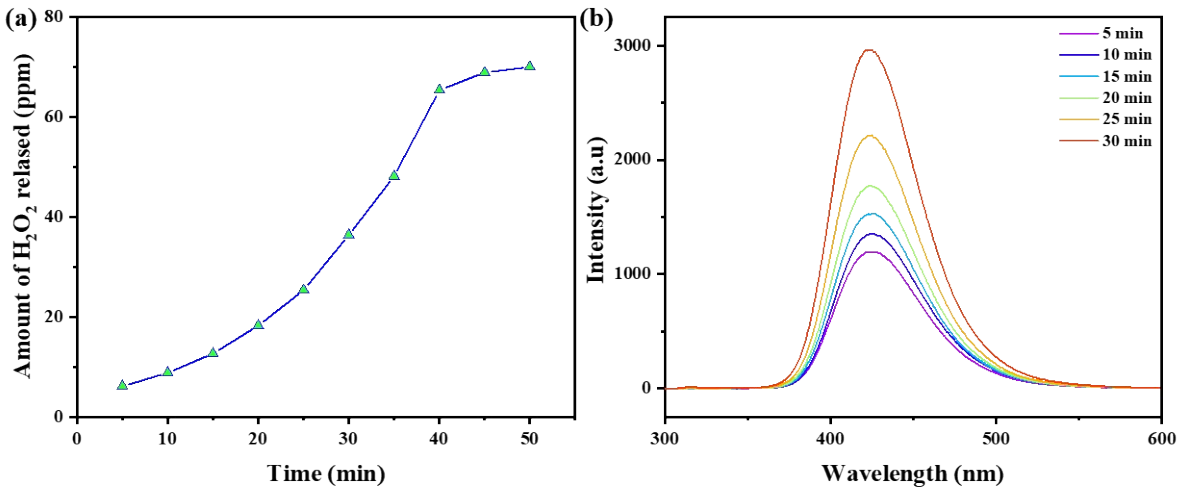


Fig. S2.(a) Hydrogen peroxide (H_2O_2) (b) hydroxyl radicals (•OH) release profile plot

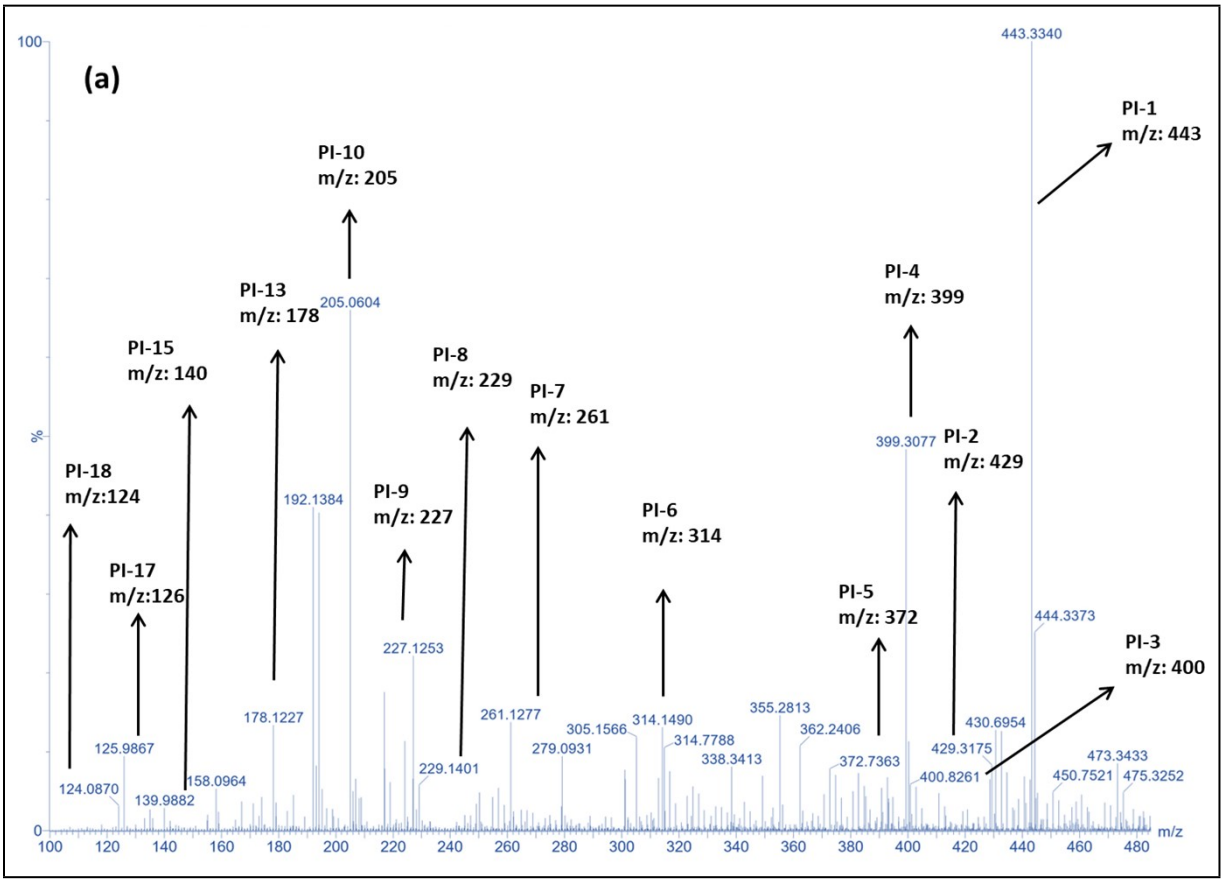
Table S1 Comparison of photocatalytic activity by various photocatalysts for the degradation of RhB.

Photocatalyst	Catalyst Amount (g/L)	RhB concentration (ppm)	Degradation percentage (minutes)	Kinetics (x 10^{-2} min^{-1})	Ref.
SrO_2	0.6	10	97 % (15)	24.8	This work
0.1% Ba/ZnO	0.35	4	98 % (60)	3.6	[1]
5 % Se/ZnO	0.4	10	98 % (150)	-	[2]
Ag/ZnO/AgO/TiO_2	0.3	10	99 % (100)	2.3	[3]
g-C_3N_4 nanosheet	0.8	10	100 % (70)	-	[4]
h-BN/g-C_3N_4	0.5	20	92 % (180)	7.3	[5]
LDH@Bi_2WO_6	2	10	98 % (90)	-	[6]
Au/ZnO	0.05	10	95 % (180)	2.4	[7]
NiO/BiOI	0.08	5	96 % (90)	5.7	[8]
2D/2D $BiMoO_6$/g-C_3N_4	0.1	5	98 % (40)	8.0	[9]

$TiO_2/W_{18}O_{49}$	0.6	10	82 % (60)	2.6	[10]

Table S2 Comparison of various photocatalyst for sun-light degradation of RhB

Photocatalyst	**Catalyst Amount (g/L)**	**RhB concentration (ppm)**	**Degradation percentage (minutes)**	**Kinetics (x 10^{-2} min^{-1})**	**Ref.**
SrO_2	0.6	10	96 % (105)	2.3	This work
g-C_3N_4/Ag@$CoWO_4$	0.1	10	97 % (120)	3	[11]
$Fe_3O_4/Bi_2O_2(OH)(NO_3)$	1	10	98 % (120)	-	[12]
g-C_3N_4/ZrO_2	1	10	94 % (90)	2.9	[13]
TiO_2/Bi_2O_3-gC_3N_4	1	5	99 % (120)	4.0	[14]
α - Bi_2O_3	0.75	10	79 % (180)	1.3	[15]



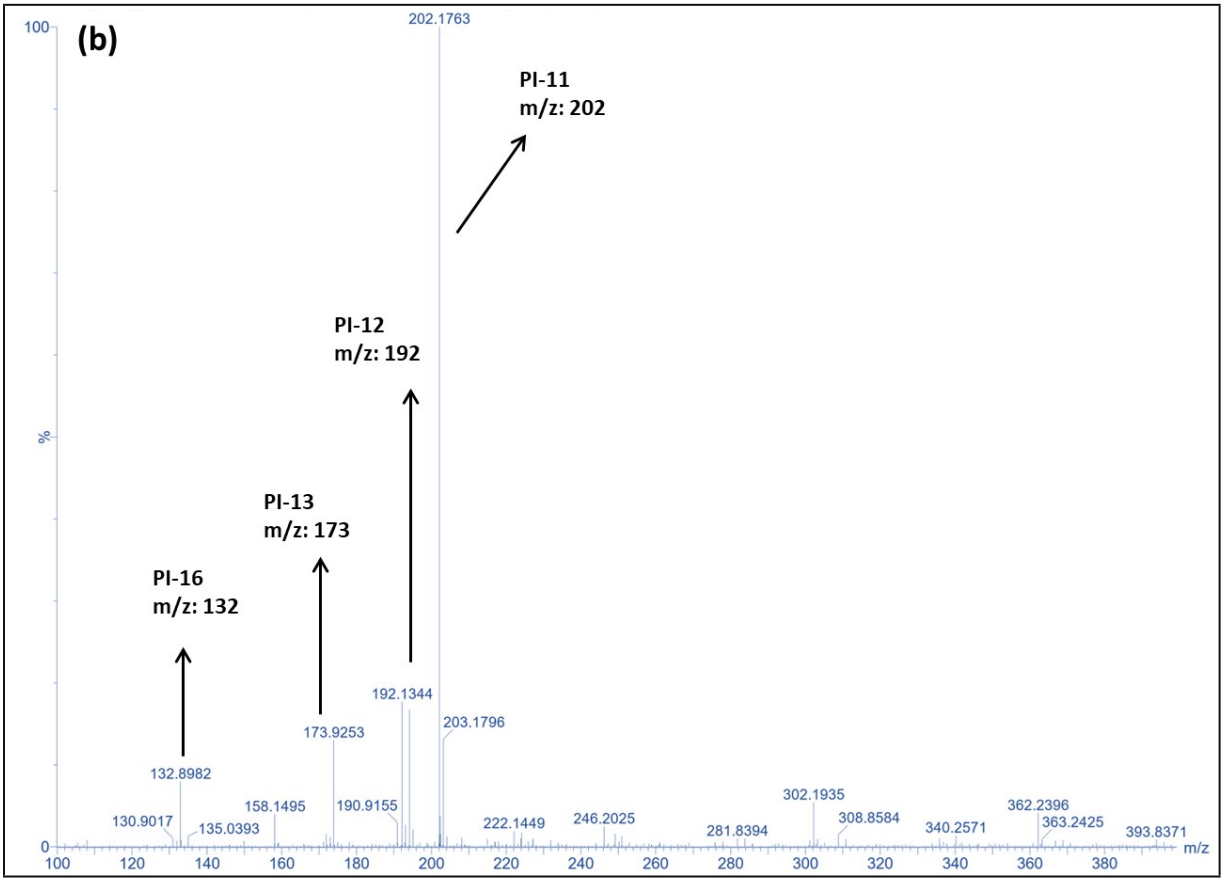
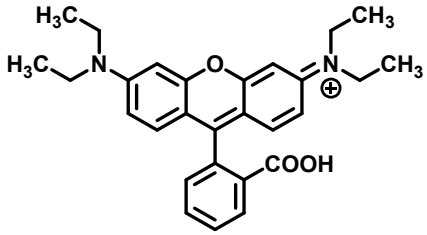
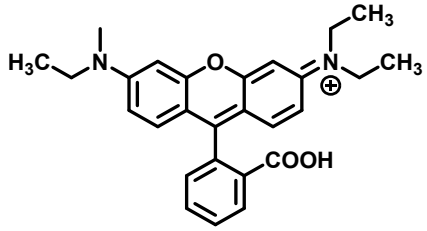
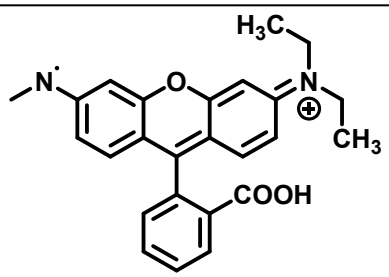
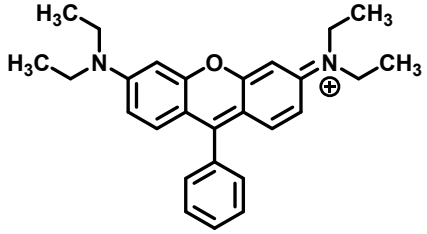
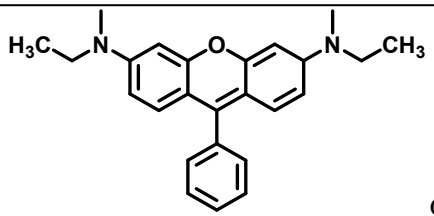
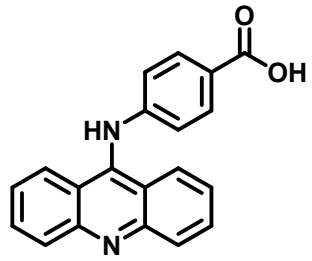
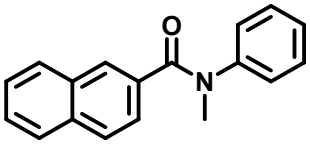
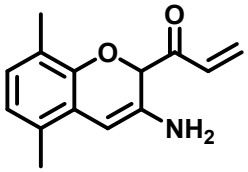
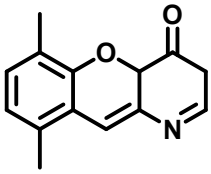
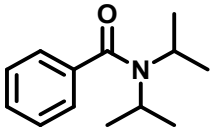
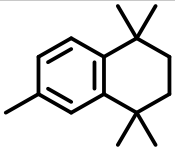
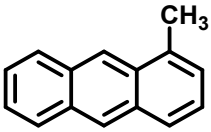
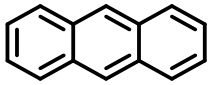
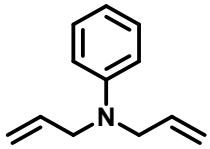
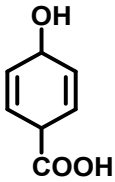
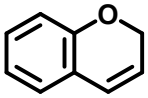
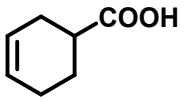
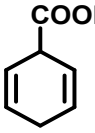


Fig. S3 (a&b) HR-MS spectra of the photo-intermediates for the RhB degradation

Table S3 ECOSAR software results for acute and chronic toxicity of RhB and its photo degradation intermediates towards using three aquatic organisms

PI	Compound Structure	ECOSAR classification	Acute toxicity (mg/L)			Chronic toxicity (mg/L)		
			Fish (LC_{50})	Daphnid (LC_{50})	Green algae (EC_{50})	Fish	Daphnid	Green algae
PI-1	 Chemical formula: $C_{28}H_{31}N_2O_3^+$ m/z: 443	Vinal/ allyl/ propargyl ethers	1090	3550	2720	73.2	353	1640
PI-2	 Chemical formula: $C_{27}H_{29}N_2O_3^+$ m/z: 429	Vinal/ allyl/ propargyl ethers	1990	7810	6290	153	778	3340
PI-3	 Chemical formula: $C_{25}H_{24}N_2O_3^{\cdot+}$ m/z: 400	Vinal/ allyl/ propargyl ethers	7170	41300	36900	724	41300	15000
PI-4	 Chemical formula: $C_{27}H_{31}N_2O^+$ m/z: 399	Vinal/ allyl/ propargyl ethers	53.9	148	109	3.20	14.7	73.9
PI-5	 Chemical	Aliphatic amines	0.539	0.094	0.037	0.010	0.011	0.016

	formula: $C_{25}H_{28}N_2O$ m/z: 372							
PI-6	 Chemical formula: $C_{20}H_{14}N_2O_2$ m/z: 314	Anilines	14.7	10.5	8.92	1.89	1.95	0.274
PI-7	 Chemical formula: $C_{18}H_{15}NO$ m/z: 261	Amides	3.42	2.57	0.773	0.094	0.797	1.05
PI-8	 Chemical formula: $C_{14}H_{15}NO_2$ m/z: 229	Vinyl/ Allyl/ Propargyl ketones	55.2	36.3	65.7	27.0	1.74	4.65
PI-9	 Chemical formula: $C_{14}N_{13}NO_2$ m/z: 227	Vinyl/ Allyl/ Propargyl ketones	22.3	14.4	20.1	5.35	0.558	2.06
PI-10	 Chemical formula: $C_{13}H_{19}NO$ m/z: 205	Amides	21.5	19.3	3.19	0.357	3.90	2.59
PI-11	 Chemical formula: $C_{15}H_{22}$ m/z: 202	Natural organics	0.026	0.021	0.081	0.004	0.006	0.051

PI-12	 Chemical formula: $C_{15}H_{12}$ m/z: 192	Natural organics	0.399	0.269	0.665	0.053	0.061	0.316
PI-13	 Chemical formula: $C_{14}H_{10}$ m/z: 178	Natural organics	1.15	0.809	1.47	0.145	0.144	0.625
PI-14	 Chemical formula: $C_{12}H_{15}N$ m/z: 173	Natural organics	3.03	2.04	3.09	0.362	0.321	1.19
PI-15	 Chemical formula: $C_7H_8O_3$ m/z: 140	Natural organics	32300	15800	6360	2650	1020	1200
PI-16	 Chemical formula: C_9H_8O m/z: 132	Natural organics	21.4	13.1	13.1	2.28	1.56	4.04
PI-17	 Chemical formula: $C_7H_{10}O_2$ m/z: 126	Natural organics	774	445	350	76.8	45.0	94.3
PI-18	 Chemical formula: $C_7H_8O_2$ m/z: 124	Natural organics	1190	670	485	115	64.1	125

Very toxic: $LC_{50}/EC_{50}/ChV \leq 1$;

Toxic: $10 \geq LC_{50}/EC_{50}/ChV > 1$;

Harmful: $100 \geq LC_{50}/EC_{50}/ChV > 10$;

Not harmful: $LC_{50}/EC_{50}/ChV > 100$.

Table S4 Comparison of adsorption studies using various pollutants

Time	Adsorption of pollutants (%)			
	MB	**MO**	**MOX**	**RhB**
0	0	0	0	0
30	9.1	4.5	5.5	8.5
60	10.2	4.4	6.5	9.5
90	10.9	4.6	7.0	10.3
120	10.9	5.0	7.5	10.3

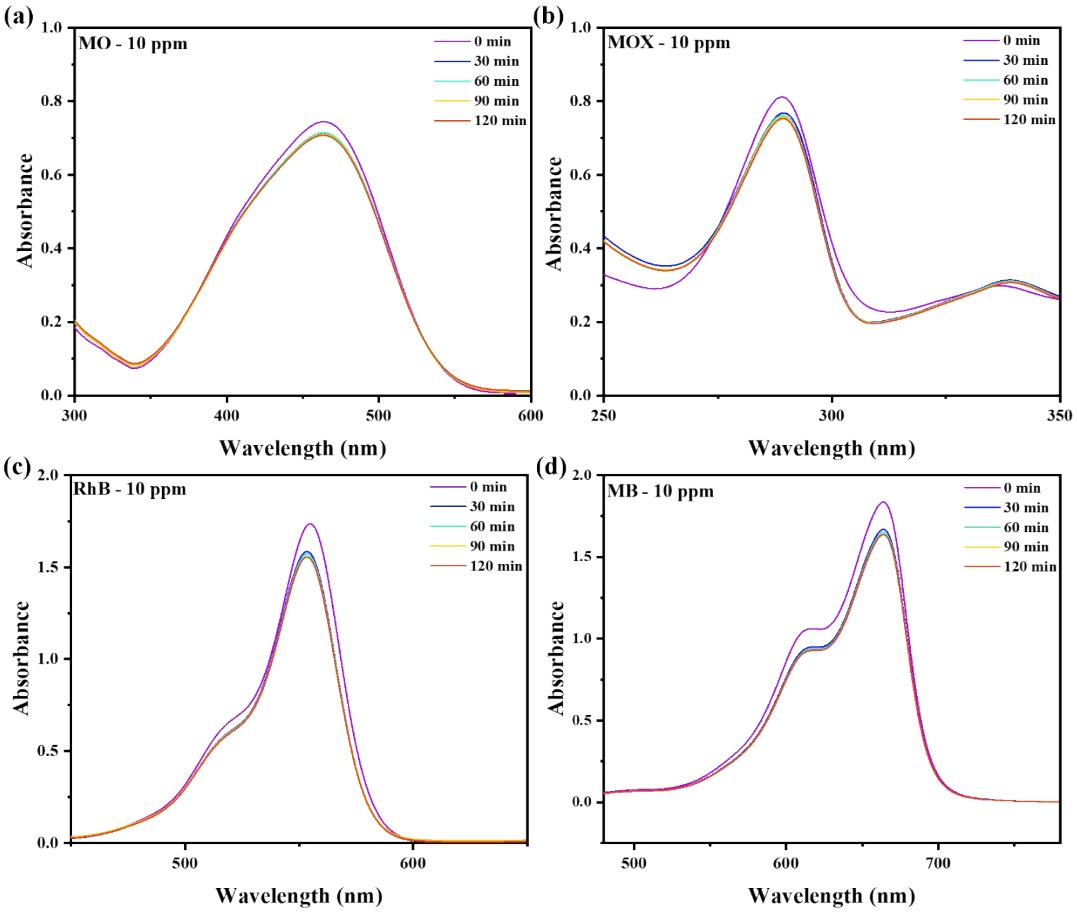


Fig. S4 Adsorption-desorption studies of (a) methyl orange (b) moxifloxacin (c) rhodamine B and (d) methylene blue

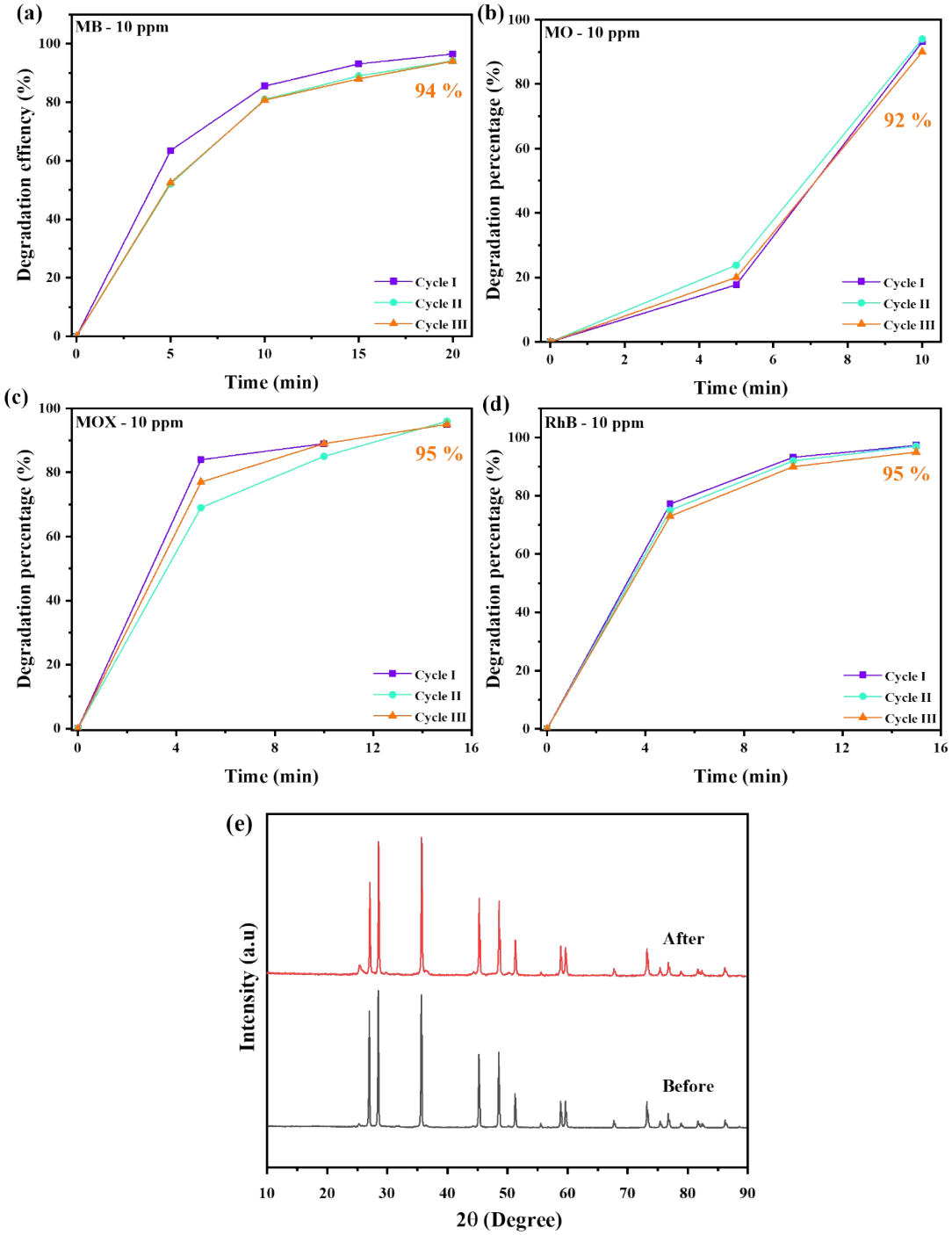


Fig. S5 Degradation efficiency for recyclability test of (a) methyl orange (b) moxifloxacin (c) rhodamine B and (d) methylene blue and (e) XRD pattern of SrO_2 photocatalyst before and after treatment

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