Supporting Information

Effective photocatalytic degradation of Rhodamine-B over Zn-doped BaO_2 and SrO_2 composites under UV and Sunlight Irradiation

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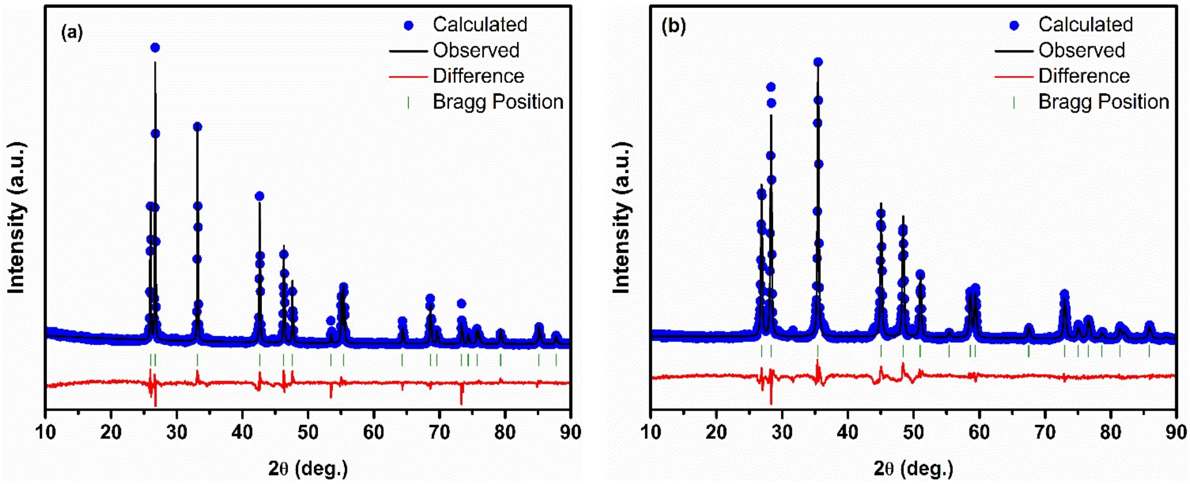

Fig. S1. Rietveld refinement results of (a) BaO_2 and (b) SrO_2 nanoparticles.

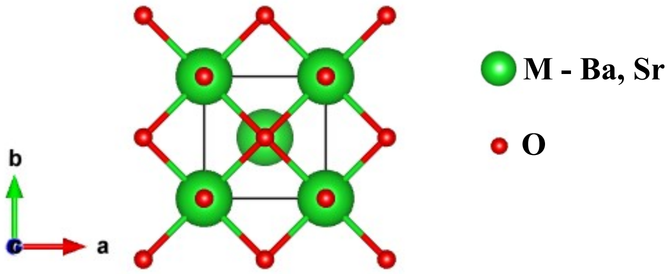

Fig. S2. Crystal structure of BaO_2 and SrO_2 nanoparticles.

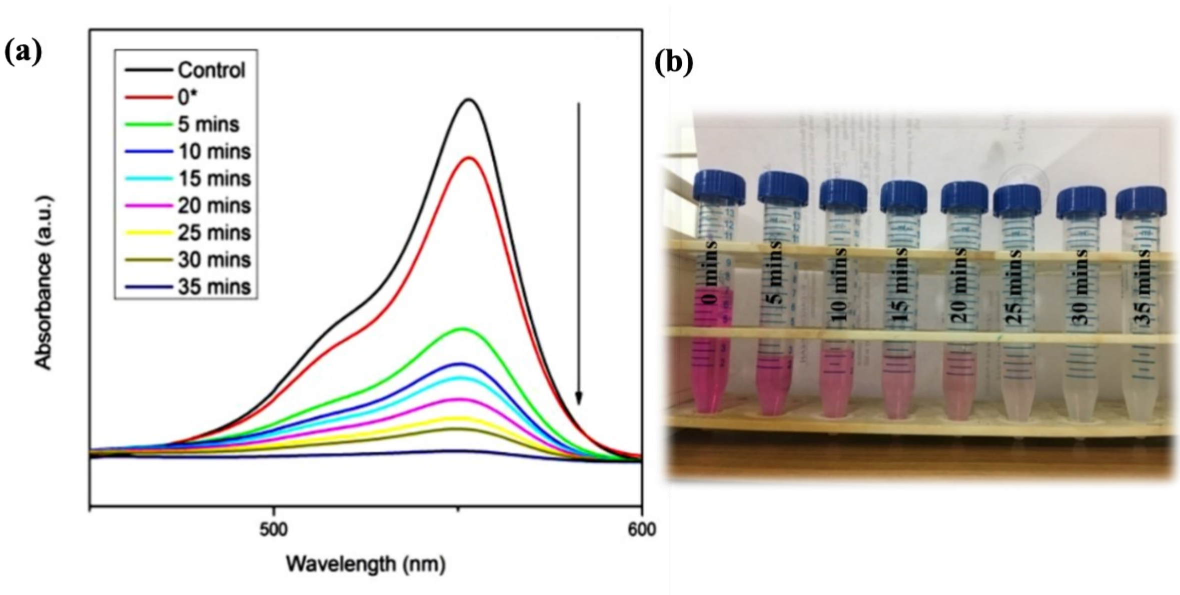

Fig. S3. (a) photocatalytic degradation of RhB and (b) photographs of RhB photodegradation at different times using BaO_2 photocatalysts under UV-light irradiation.

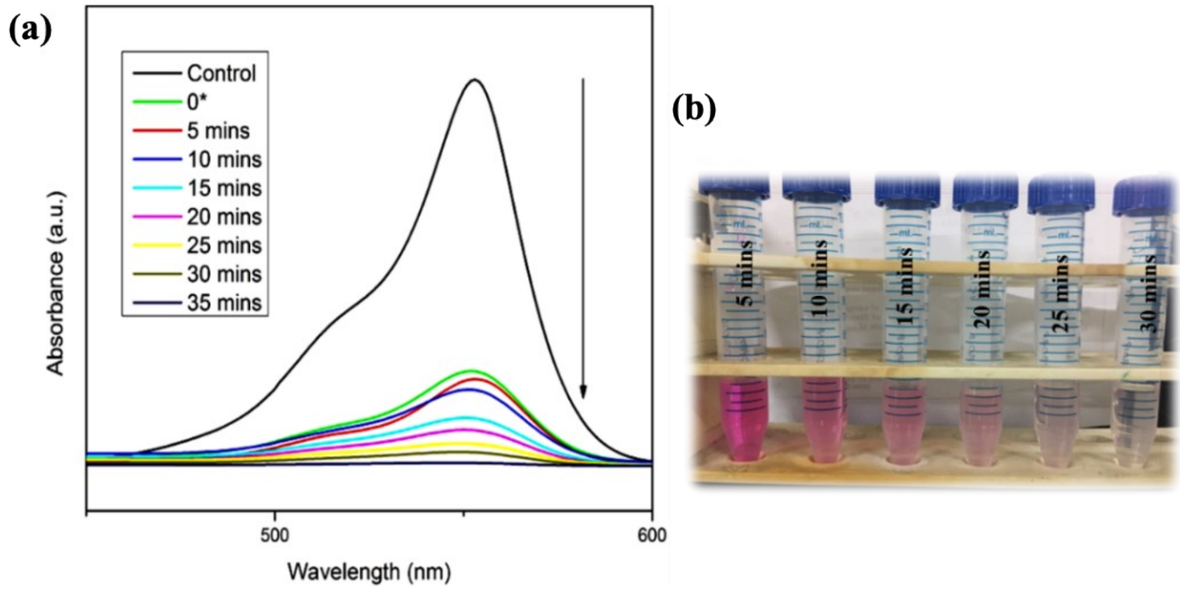

Fig. S4. (a) photocatalytic degradation of RhB and (b) photographs of RhB photodegradation at different times using SrO_2 photocatalysts under UV-light irradiation.

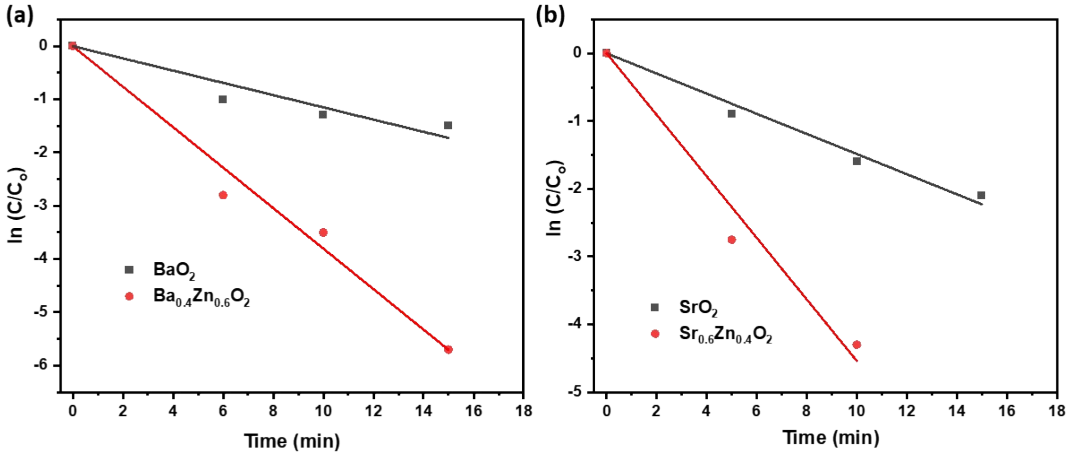

Fig. S5. First-order kinetic plots of RhB photodegradation using (a) BaO_2 and $Ba_{0.4}Zn_{0.6}O_2$ (b) SrO_2 and $Sr_{0.6}Zn_{0.4}O_2$ photocatalysts under UV-light illumination.

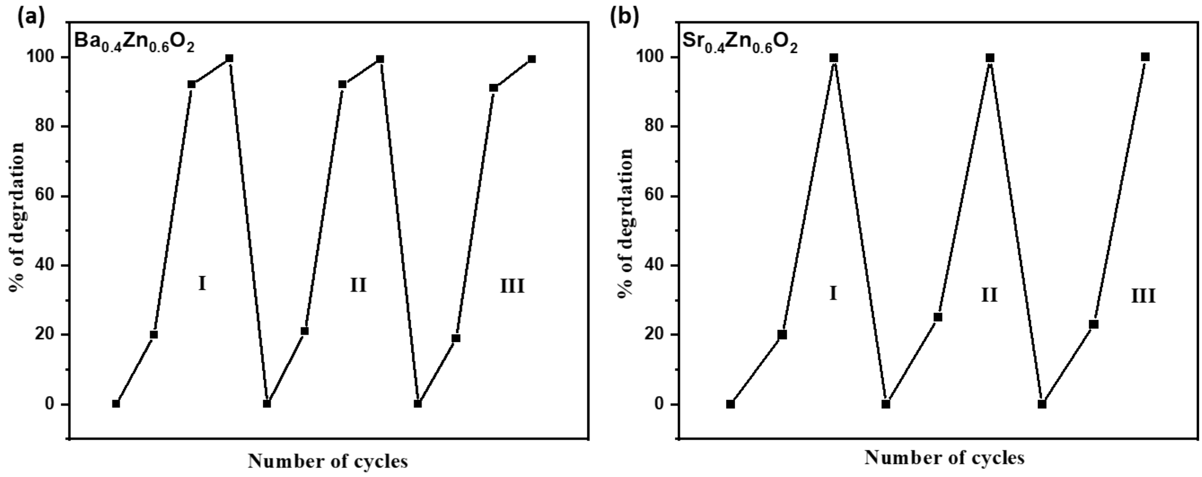

Fig. S6. Reusability of $Ba_{0.4}Zn_{0.6}O_2$ (a) and $Sr_{0.6}Zn_{0.4}O_2$ (b) for dye degradation under UV irradiation

Table S1. Rietveld refinement results for BaO_2 and SrO_2

Chemical formula	**BaO_2**	**SrO_2**
Crystal system	Tetragonal	Tetragonal
Space group	I4/mmm	I4/mmm
a, Å	3.81(4)	3.57(3)
c, Å	6.85(2)	6.62(4)
V, Å^3	99.82(4)	84.82(2)
Z	2	2
Radiation	Cu Kα_1	Cu Kα_1
Wavelength, Å	1.5406	1.5406
2θ range, °	10-90	10-70
R_{wp}, %	15.31	12.61
R_{bragg}, %	11.83	9.62
χ^2	1.	

Table S2. Composition by ICP-OES

Composition	**Ba (wt%)**		**Sr (wt%)**		**Zn (wt%)**	
	Theoretical	**Experimental**	**Theoretical**	**Experimental**	**Theoretical**	**Experimental**
$Ba_{0.4}Zn_{0.6}O_2$	43.5	43.2			31.1	30.8
$Sr_{0.6}Zn_{0.4}O_2$			47.5	47.2	23.6	23.2

Table S3. Amount of H_2O_2 released in aquoes suspension

x	**H_2O_2 amount (±2 ppm)**	
	$Ba_{1-x}Zn_xO_2$	**$Sr_{1-x}Zn_xO_2$**
0	10	9
0.2	15	15
0.4	19	28
0.6	25	22
0.8	20	18

Table S4 Comparison results of photocatalytic degradation of RhB with different photocatalysts under UV light irradiation (N.S Not studied).

Compound	Catalyst quantity (mg)	RhB concentration (ppm)	Degradation efficiency (%)	Rate constant k (min^{-1})	Time (min)	References
Zn_2SnO_4	40	5	99.0	0.0124	90	[1]
Pt/TiO_2	100	10	97.5	0.0172	120	[2]
$Pt\text{-}TiO_2$	300	10	63.0	0.0053	180	[3]
Ag-ZnO	25	5	99.0	N.S	60	[4]
$CeO_2\text{-}Y_2O_3$	40	10	99.0	N.S	120	[5]
Zn doped CdS	20	5	85.0	N.S	135	[6]
SnO_2/TiO_2	100	10	92.0	0.0084	180	[7]
$Ba_{0.4}Zn_{0.6}O_2$	**25**	**10**	**99.90**	**0.344**	**15**	**Present work**
$Sr_{0.6}Zn_{0.4}O_2$	**25**	**10**	**99.80**	**0.394**	**10**	**Present work**

Table S5 Comparison studies of the photodegradation of RhB using various photocatalysts under direct sunlight illumination (N.S: not studied).

Compound	Catalyst quantity (mg)	RhB dye (ppm)	Degradation efficiency (%)	Rate constant k (min^{-1})	Time (min)	References
MoF	20	2	96.7	N.S	30	[8]
Zn doped CdS	20	5	65.0	N.S	135	[6]
$S\text{-}TiO_2$	50	10	97.0	0.280	120	[9]
Au-ZnO	100	10	85.0	0.291	90	[10]
$BiVO_4$	100	5	97.0	N.S	600	[11]
$RGO/BiVO_4$	100	5	98.50	N.S	600	[12]
AgI/ZnO	15	5	98.50	N.S	150	[13]
$H_3PW_{12}O_{40}/TiO_2$	4.5	12	89.80	0.180	240	[14]

MWCNT/WO_3	50	10	92.0	0.230	150	[15]
$Ba_{0.4}Zn_{0.6}O_2$	**25**	**10**	**99.80**	**2.480**	**90**	**Present work**
$Sr_{0.6}Zn_{0.4}O_2$	**25**	**10**	**99.50**	**2.340**	**90**	**Present work**

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