Supplementary Material
For

Enhanced activation of peroxymonosulfate via sulfate radicals and singlet oxygen by $SrCo_xMn_{1-x}O_3$ perovskites for the degradation of Rhodamine B

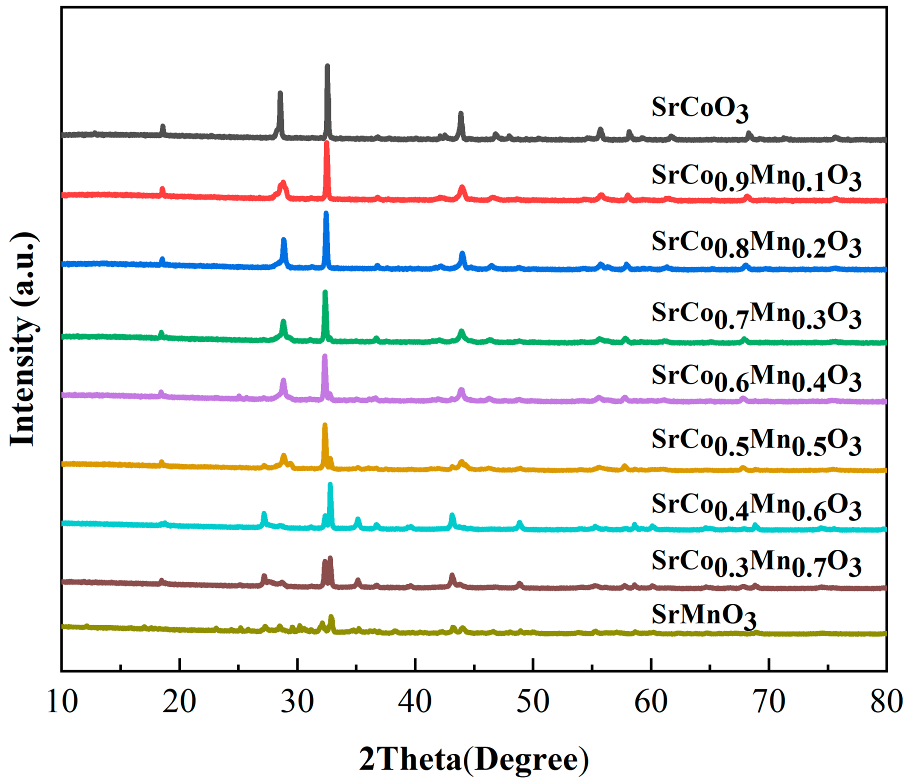


Figure S1. XRD patterens of $SrCo_xMn_{1-x}O_3$ perovskites.

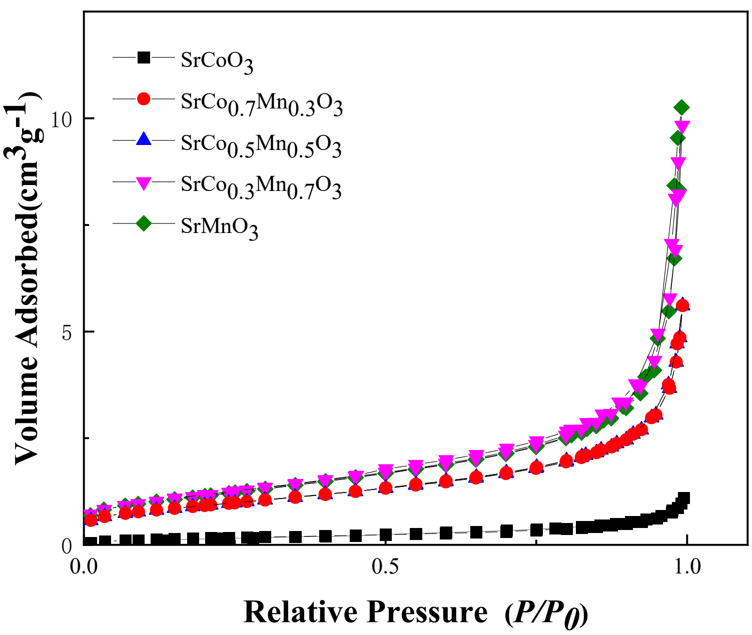
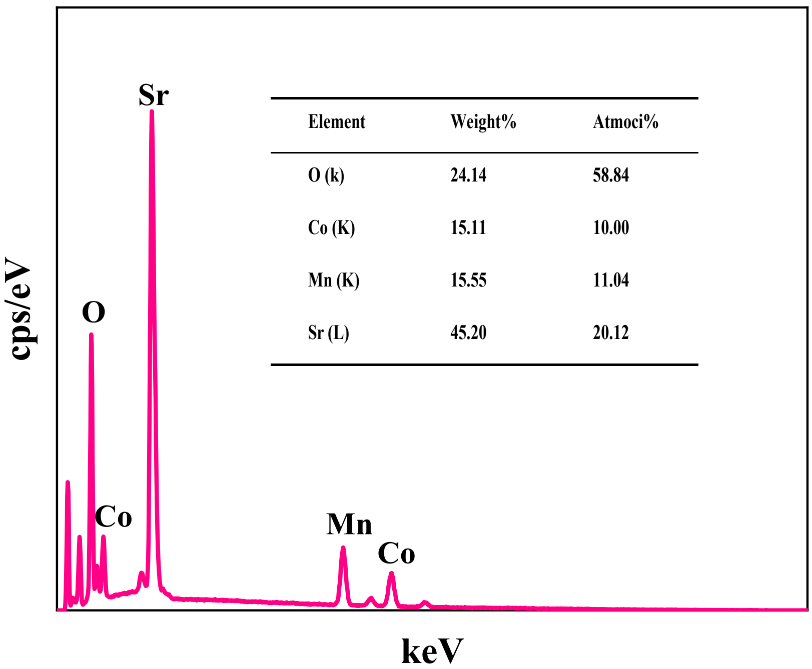


Figure S2. Nitrogen adsorption-desorption isotherms of perovskite catalysts with different Mn substituted amounts.



Element	Weight%	Atmoci%
O (k)	24.14	58.84
Co (K)	15.11	10.00
Mn (K)	15.55	11.04
Sr (L)	45.20	20.12

Figure S3. EDS mapping spectura of $SrCo_{0.5}Mn_{0.5}O_3$ samples.

The catalysts were also characterized by FT-IR spectrometry to investigate the effect of Mn-substitution and other feature functional groups, as shown in Fig. 3a. The absorption band at about 1450 cm^{-1} ascribed to CO_3^{2-} species on $SrCo_xMn_{1-x}O_3$ perovskites[1, 2]. The characteristic absorption bands at about 528 cm^{-1} are attributed to the asymmetrical lengthening of the Co–O bond of the [CoO_6] octahedrons of the $SrCoO_3$ perovskite. However, with the increasing substitution of Mn cation, the peak gradually disappears and new sharper higher peaks were observed at 430 cm^{-1} and 607 cm^{-1}, which was probably caused by a deformation mode of [MnO_6] octahedron[3]. It was further shown that Mn successfully induced the lattice of the perovskites during the synthesis process.

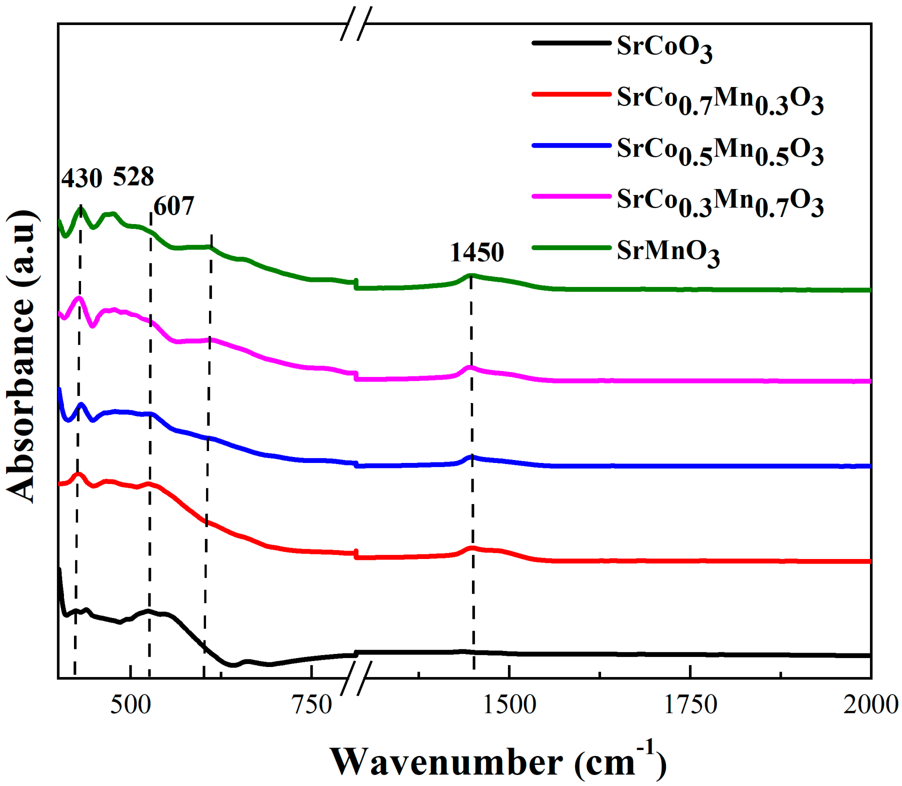


Figure S4 FT-IR of $SrCo_xMn_{1-x}O_3$ perovskites.

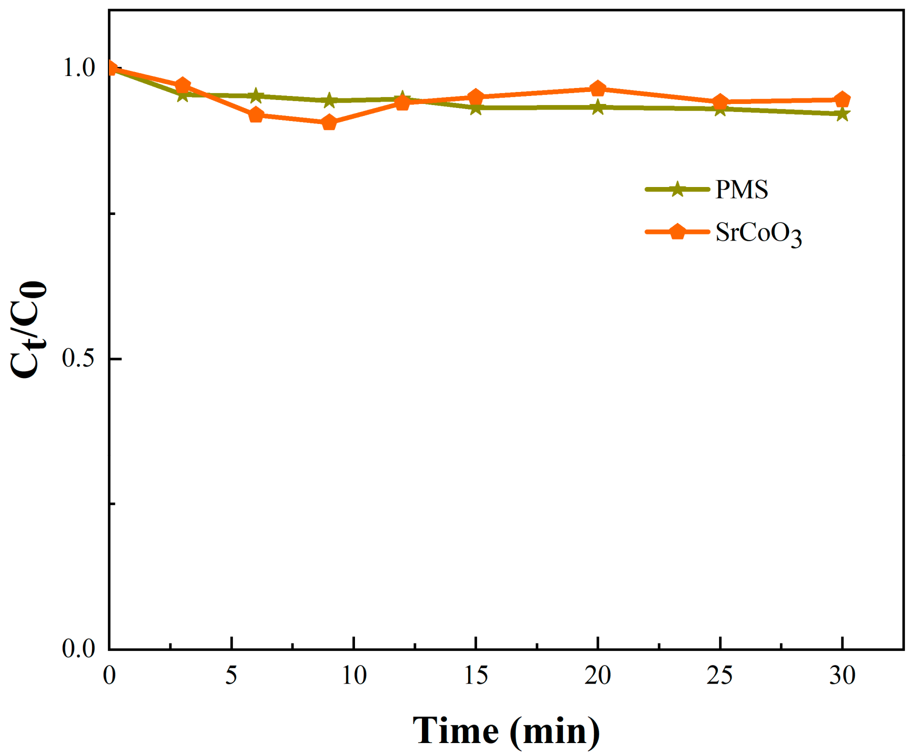


Figure S5. Degradation efficience of RhB in the presence of $SrCoO_3$ and PMS alone. Reaction conditions: PMS:0.06mM, $SrCoO_3$:0.03g L^{-1}, T=298k,pH=7.

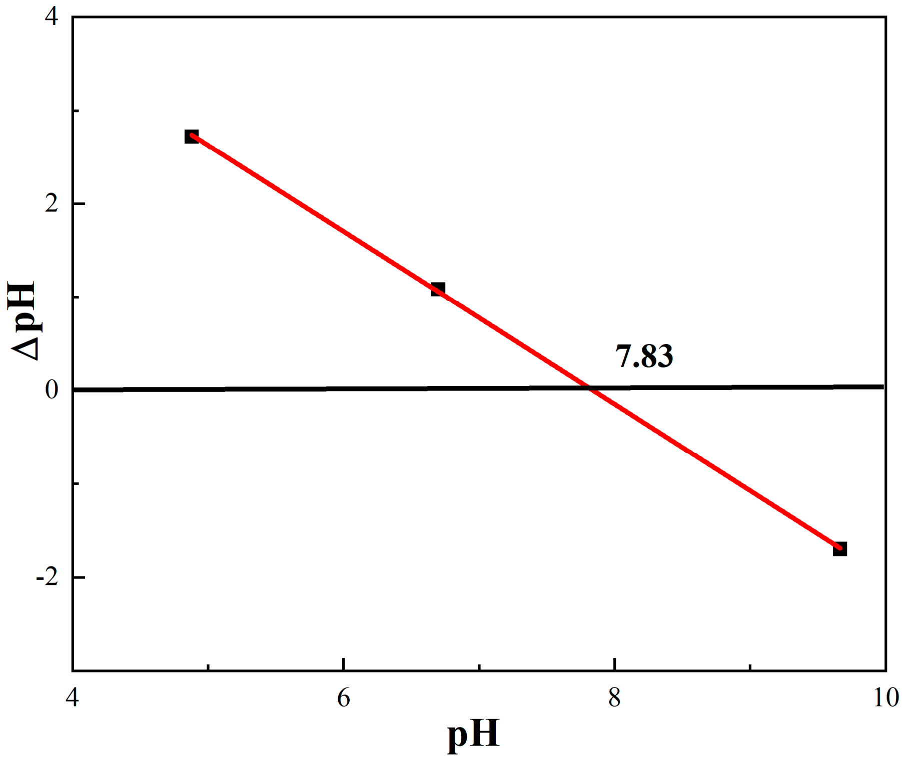


Figure S6. pH_{pzc} of $SrCo_{0.5}Mn_{0.5}O_3$ perovskite.

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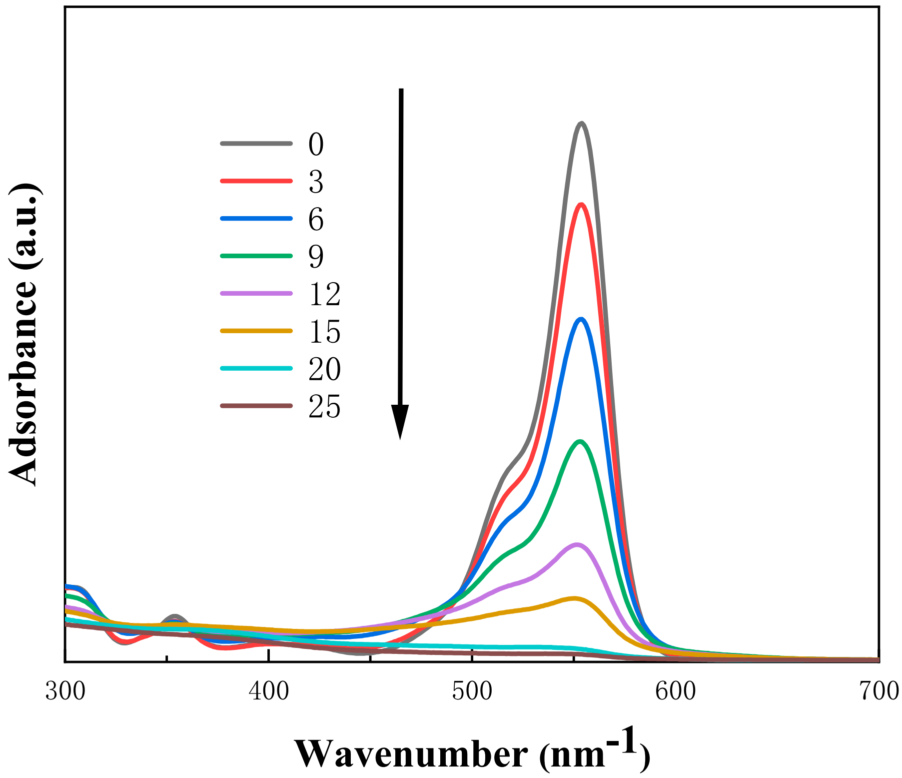

Figure S7. UV-VIS spectura of RHB in different time.

Table S1.

Lattice parameters of $SrCoO_3$ and $SrCo_{0.5}Mn_{0.5}O_3$ samples.

Sample	Lattice constant (Å)		
	a	*b*	*c*
$SrCoO_3$	5.5883	5.5883	5.5296
$SrCo_{0.5}Mn_{0.5}O3$	5.5333	5.5333	5.4533

Table S2.

the proportion of Co and Mn in fresh and used $SrCo_{0.5}Mn_{0.5}O_3$ perovskite from XPS spectura.

Element	Co			Mn		
	Co^{2+}	Co^{3+}	Co^{2+}/Co^{3+}	Mn^{3+}	Mn^{4+}	Mn^{4+}/Mn^{3+}
Fresh	44.77	55.23	81.01	68.26	31.74	46.50
Used	42.44	57.56	73.73	71.91	28.09	39.06

Table S3.

the proportion of O species in fresh and used $SrCo_{0.5}Mn_{0.5}O_3$ perovskite from XPS spectura.

	O_{latt}	O_L^-	-OH	H_2O
Fresh	24.77	16.39	49.33	9.50
Used	15.05	49.48	18.24	17.22

Reference

[1] P. Zhao, F. Fang, N. Feng, C. Chen, G. Liu, L. Chen, Z. Zhu, J. Meng, H. Wan, G. Guan, Self-templating construction of mesopores on three dimensionally ordered macroporous $La_{0.5}Sr_{0.5}MnO_3$ perovskite with enhanced performance for soot combustion, Catalysis Science & Technology, 9 (2019) 1835-1846.

[2] S. Zhao, L. Wang, Y. Wang, X. Li, Hierarchically porous $LaFeO_3$ perovskite prepared from the pomelo peel bio-template for catalytic oxidation of NO, Journal of Physics and Chemistry of Solids, 116 (2018) 43-49.

[3] S. Demirel, E. Oz, S. Altin, A. Bayri, O. Baglayan, E. Altin, S. Avci, Structural, magnetic, electrical and electrochemical properties of $SrCoO_{2.5}$, $Sr_9Co_2Mn_5O_{21}$ and $SrMnO_3$ compounds, Ceramics International, 43 (2017) 14818-14826.