

Supporting information

Highly Efficient Peroxymonosulfate Electroactivation on Co(OH)₂ Nanoarray Electrode for Pefloxacin Degradation

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Table S1. Chemicals and materials.

Name	Purity	Manufacturing company
Potassium sulfate	AR	
Ethanol	AR	
Pefloxacin	AR	
Peroxymonosulfate	AR	
Methyl alcohol	AR	
Superoxide dismutase	AR	
Tertiary butyl alcohol	AR	Sinopharm Chemical Reagent Co.
5,5-Dimethyl-1-pyrroline-N-oxide	AR	
Cobalt(II) nitrate Hexahydrate	AR	
2,2,6,6-Tetramethylpiperidine	AR	
Hydrochloric acid	AR	
Acetone	AR	
Ti mesh		Alibaba Group Holding Limited
Carbon paper		

Table S2. Comparison of catalytic performance with other systems.

Catalysts	Catalysts dosage	Organic pollutants	Oxidant concentration	Solution pH	Reaction temperature	Removal efficiency	References
CuFe-S	30 mg/L	Tetracycline 50 mg/L	H ₂ O ₂ 100 mM	2.0	30 °C	30 min: 91.9%	[1]
Electroplating sludge	30 mg/L	Tetracycline 50 mg/L	H ₂ O ₂ 0.3 mM	3.0	30 °C	60 min: 98.8%	[2]
Cr-doped ferrite	0.4 g/L	Total cholesterol 110 mg/L	PS 5 mM	3.0	30 °C	120 min: 96%	[3]
NF/MXene-Co ₃ O ₄	40 mg	1,4-dioxane 0.5 mM	PMS 4.0 mM	2.7	25 °C	20 h: 95%	[4]
CuO-Fe ₂ O ₃ /MXene	0.1 g/L	Atrazine: 10 mg/L	PMS 0.3 mM	6.4	-	60 min: 100%	[5]
Co@Ti _{2-x}	5.0 mg	Sulfamethoxazole: 5 µM	PMS 2.0 mM	6.95	25 °C	40 min: 99.1%	[6]
Cr ₂ O ₃ /BC	0.4 g/L	Tetracycline 40 mg/L	PS 10 mM	7.0	-	30 min: 90%	[7]
Co(OH) ₂	0.12 mg/cm ²	PFX 10 mg/L	PMS 200 ppm	7.0	25 °C	10 min: 100%	This work

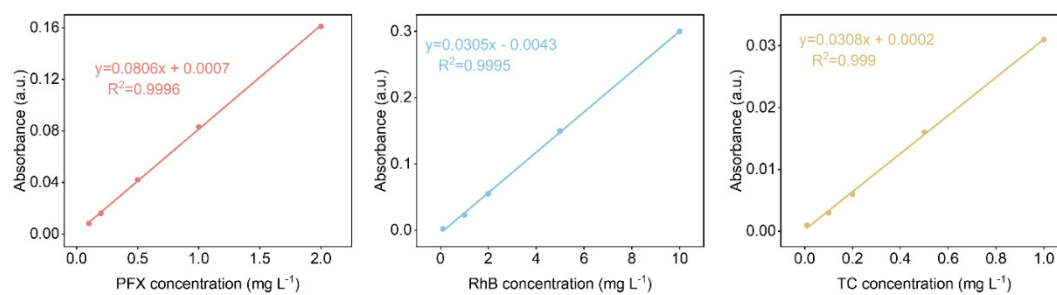


Figure S1. The standard curves of PFX, RhB and TC.

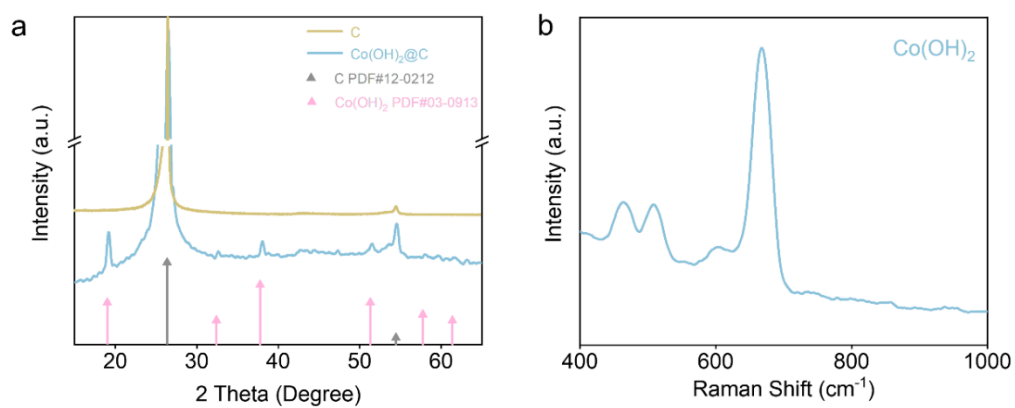


Figure S2. Structural characterization and electrochemical performance of the Co(OH)₂ catalysts. (a) XPS spectrum and (b) Raman image of Co(OH)₂ catalysts.

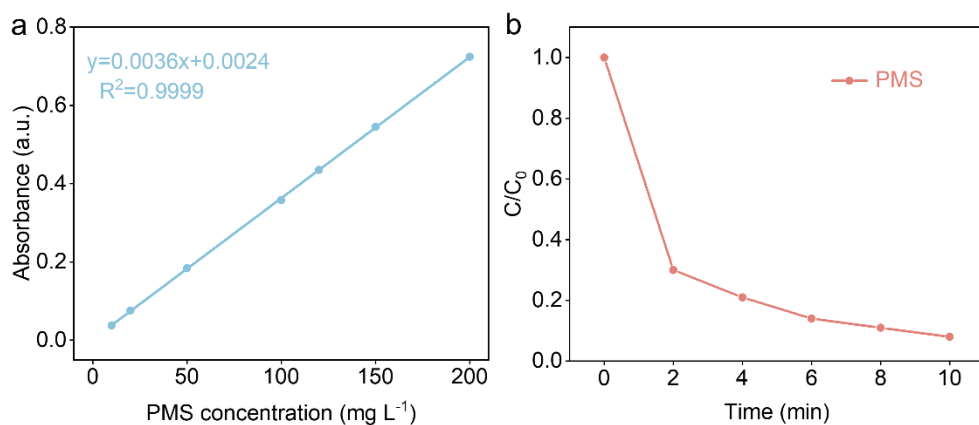


Figure S3. Activating PMS on Co(OH)₂ nanoarray electrode. (a) the standard curve of PMS (b) the degradation curve of PMS.

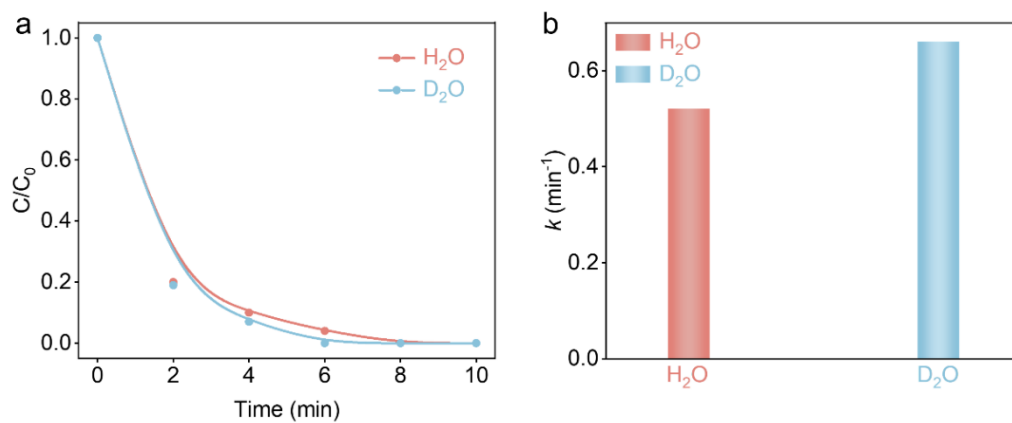


Figure S4. Degradation of PFX under H₂O and D₂O solutions: (a) degradation curves (b) degradation kinetics.

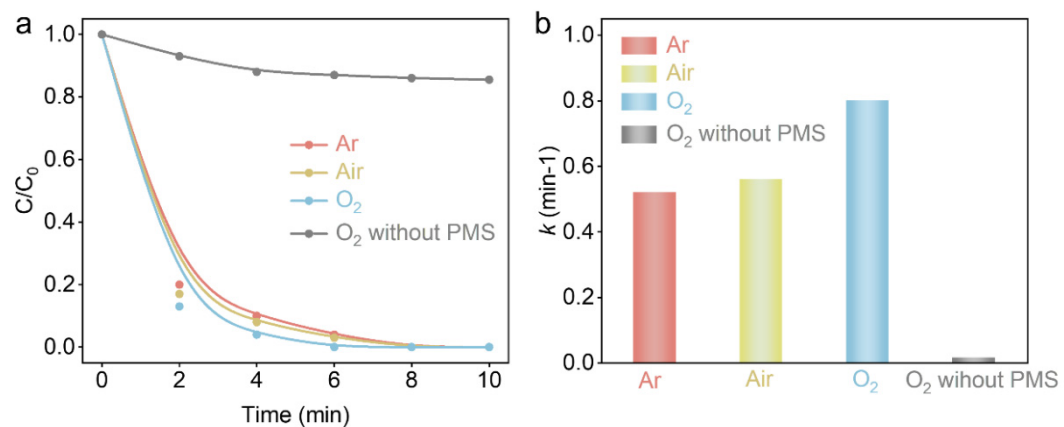


Figure S5. Degradation of PFX under different conditions: (a) degradation curves (b) degradation kinetics.

References

1. Zhou, Z.; Liu, T.; Wu, J.; Li, H.; Chu, S.; Zhu, X.; Zhang, L.; Lu, J.; Ivanets, A.; Davronbek, B.; et al. Preparation of copper-based catalysts from electroplating sludge by ultrasound treatment and their antibiotic degradation performance. *Environ. Res.* **2023**, *216*, 114567, doi:<https://doi.org/10.1016/j.envres.2022.114567>.
2. Zhou, Z.; Zhang, L.; Yan, B.; Wu, J.; Kong, D.; Romanovski, V.; Ivanets, A.; Li, H.; Chu, S.; Su, X. Removal of chromium from electroplating sludge by roasting-acid leaching and catalytic degradation of antibiotics by its residue. *J. Environ. Chem. Eng.* **2024**, *12*, 111754, doi:<https://doi.org/10.1016/j.jece.2023.111754>.
3. Xie, D.; Chu, S.; Zhang, S.; Ivanets, A.; Zhang, L.; Su, X. Facile synthesis of Cr-doped ferrite catalyst from Cr-containing electroplating sludge with activated persulfate for efficient degradation of tetracycline. *J. Environ. Chem. Eng.* **2022**, *10*, 108805, doi:<https://doi.org/10.1016/j.jece.2022.108805>.
4. Li, W.; Li, W.; He, K.; Tang, L.; Liu, Q.; Yang, K.; Chen, Y.-D.; Zhao, X.; Wang, K.; Lin, H.; et al. Peroxymonosulfate activation by oxygen vacancies-enriched MXene nano-Co₃O₄ co-catalyst for efficient degradation of refractory organic matter: Efficiency, mechanism, and stability. *J. Hazard. Mater.* **2022**, *432*, 128719, doi:<https://doi.org/10.1016/j.jhazmat.2022.128719>.
5. Xu, P.; Wang, P.; Li, X.; Wei, R.; Wang, X.; Yang, C.; Shen, T.; Zheng, T.; Zhang, G. Efficient peroxymonosulfate activation by CuO-Fe₂O₃/MXene composite for atrazine degradation: Performance, coexisting matter influence and mechanism. *Chem. Eng. J.* **2022**, *440*, 135863, doi:<https://doi.org/10.1016/j.cej.2022.135863>.
6. Song, H.; Du, R.; Wang, Y.; Zu, D.; Zhou, R.; Cai, Y.; Wang, F.; Li, Z.; Shen, Y.; Li, C. Anchoring single atom cobalt on two-dimensional MXene for activation of peroxymonosulfate. *Appl. Catal., B* **2021**, *286*, 119898, doi:<https://doi.org/10.1016/j.apcatb.2021.119898>.
7. Guo, L.; Zhao, J.; Zhao, L.; Tang, Y.; Zhou, J.; Shi, B. Persulfate activation by Cr₂O₃/BC derived from chrome shavings for antibiotics degradation. *Chem. Eng. J.* **2021**, *420*, 127698, doi:<https://doi.org/10.1016/j.cej.2020.127698>.