

Supporting Information

Self-propelled Janus magnetic micromotors as peroxidase-like nanozyme for colorimetric detection and removal of hydroquinone

Xiaolei Zhang^a, Bin Liu^a, Tao Wei^a, Zongming Liu^a, Jinkai Li^{a,b*}

^a*School of Material Science and Engineering, University of Jinan, Jinan, China*

^b*Infovision Optoelectronics(Kunshan)Co.,Ltd, Kunshan, China*

** This is corresponding author*

* Corresponding author: mse_lijk@ujn.edu.cn (Jinkai Li)

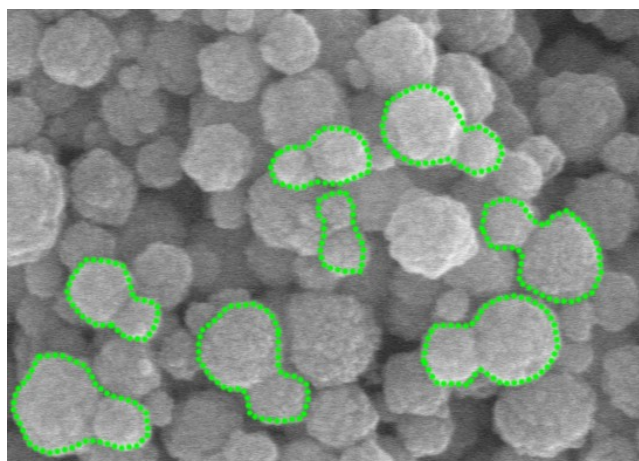


Figure S1. SEM images of P-FM JNRs.

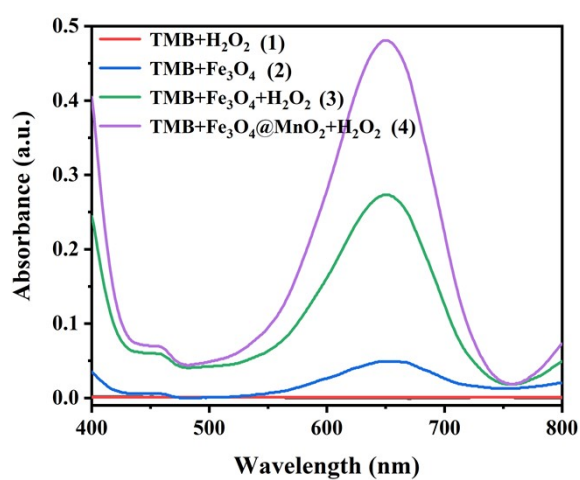


Figure S2. UV-vis absorption spectra of TMB catalyzed by different catalysts.

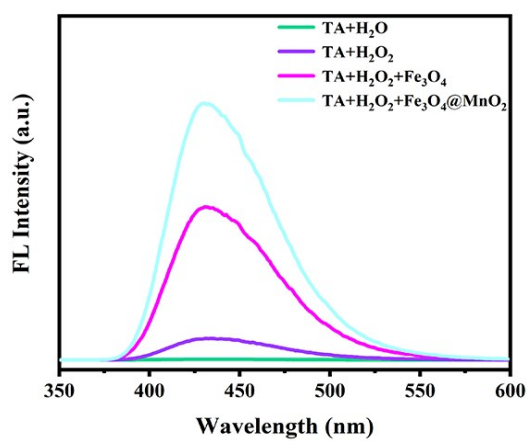


Figure S3. The fluorescence spectra of different samples in TA basic solution.

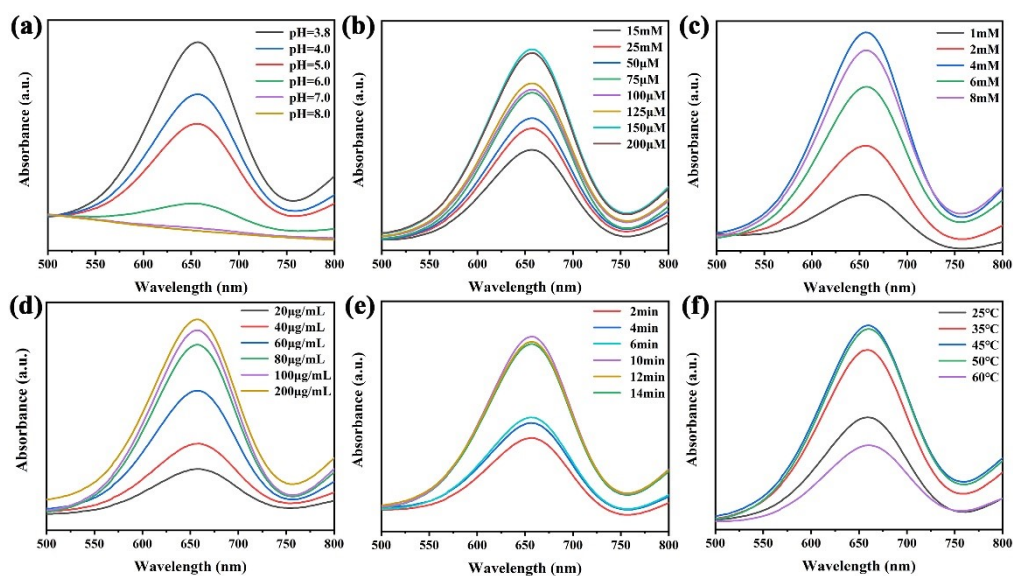


Figure S4. UV-vis absorption spectra of the effects of pH (a), H_2O_2 concentration (b), TMB concentration (c), catalyst concentration (d), incubation time (e) and temperature (f) on the peroxidase-like activity of nanorobots.

Table S1. Comparison of the kinetic parameters of the P-FM JNMs and other catalysts.

Catalysts	Substrates	K_m (mM)	$V_{\max}$ (mM)	Reference
P-FM JNMs	TMB	0.044	0.344	This work
	H_2O_2	0.161	0.589	
HRP	TMB	0.434	1.00	55
	H_2O_2	3.7	0.871	
PMCS	TMB	0.224	1.07	1
	H_2O_2	0.572	1.21	
$\text{Fe}_3\text{O}_4@\text{Pt}$	TMB	0.147	0.711	2
	H_2O_2	702.6	0.713	
Fe doped CeO_2	TMB	0.176	0.86	3
	H_2O_2	47.6	1.66	
Fe SAEs	TMB	3.92	5.88	4
	H_2O_2	0.243	0.825	

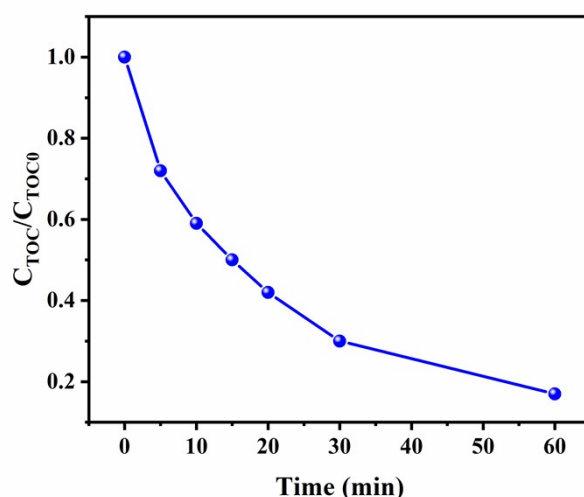


Figure S5. The TOC spectrum of HQ degradation.

Additional References

- 1 B. Xu, H. Wang, W. Wang, L. Gao, S. Li, X. Pan, H. Wang, H. Yang, X. Meng, Q. Wu, L. Zheng, S. Chen, X. Shi, K. Fan, X. Yan and H. Liu, A Single-Atom Nanozyme for Wound Disinfection Applications, *Angew. Chem. Int. Ed.*, 2019, **58**, 4911-4916.
- 2 M. Ma, J. Xie, Y. Zhang, Z. Chen and N. Gu, Fe₃O₄@Pt Nanoparticles with Enhanced Peroxidase-Like Catalytic Activity, *Mater. Lett.*, 2013, **105**, 36-39.
- 3 D. Jampaiah, T. A. Srinivasa Reddy, E. Kandjani, P. R. Selvakannan, Y. M. Sabri, V. E. Coyle, R. S. Shukla and K. Bhargava, Fe-Doped CeO₂ Nanorods for Enhanced Peroxidase-Like Activity and Their Application Towards Glucose Detection, *J. Mater. Chem. B*, 2016, **4**, 3874-3885.
- 4 C. Zhao, C. Xiong, X. Liu, M. Qiao, Z. Li, T. Yuan, J. Wang, Y. Qu, X. Wang, F. Zhou, Q. Xu, S. Wang, M. Chen, W. Wang, Y. Li, T. Y. Wu and Y. Li, Unraveling the Enzyme-Like Activity of Heterogeneous Single Atom Catalyst, *Chem. Commun.*, 2019, **55**, 2285-2288.