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## Electronic Supplementary Information (ESI)

# $MnO_2$ aerogels for highly efficient oxidative degradation of Rhodamine B

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**Table S1.** The oxidation ability of various materials measured by oxidative degradation of RhB

| Material | Mass of the material | pH | Degradation rate | Reference |
|---|---|---|---|---|
| $H_2O_2$ | 1.6 g $L^{-1}$ | neutral | 8 % in 280 min | 1 |
| $H_2O_2$ - $LaFeO_3$/SBA-15 | 2 g $L^{-1}$ | 2.28 | 80 % in 60 min | 2 |
| $H_2O_2$ - CuO nanoparticles | 1.8 g $L^{-1}$ | neutral | 61 % in 280 min | 2 |
| $H_2O_2$ - CuO nanorods | 1.8 g $L^{-1}$ | neutral | 86 % in 280 min | 2 |
| $H_2O_2$ - CuO nanowires | 1.8 g $L^{-1}$ | neutral | 92 % in 280 min | 2 |
| $H_2O_2$ - $MnO_2$ nanoplates | 2.1 g $L^{-1}$ | 6.2 | 75 % in 30 min | 3 |
| raw $MnO_2$ | 2.5 g $L^{-1}$ | 2.0 | 10.35 % in 60 min | 4 |
| acid-activated $MnO_2$ | 2.5 g $L^{-1}$ | 6.7 | 78.7 % in 240 min | 4 |
| Ultrathin $MnO_2$ nanosheets | 0.8 g $L^{-1}$ | 2.0 | 97.9% in 30 min | 5 |
| $MnO_2$ aerogels | 0.5 g $L^{-1}$ | 2.5 | 97.6% in 10 min | Our work |

**Ref.**

[1] H. Li, J. Y. Liao and T. Zeng, *Catal. Commun.* , 2014, **46**, 169-173.

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[3] Z. H. Ai, L. Z. Zhang, F. H. Kong, H. Liu, W. T. Xing and J. R. Qiu, *Mater. Chem. Phys.* , 2008, **111**, 162-167.

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[5] H. Sun, K. Xu, M. Huang, Y. Shang, P. She, S. Yin and Z. Liu, *Appl. Surf. Sci.* , 2015, **357**, 69-73.

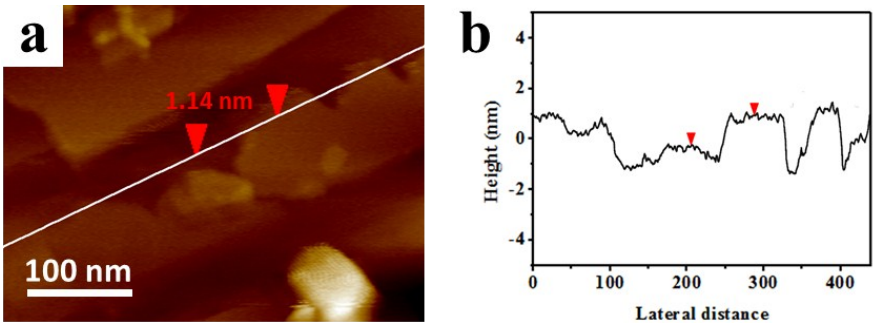


**Figure S1.** (a) AFM image of the $MnO_2$ nanosheets on a mica substrate; (b) the height profile along the white line of AFM image in (a).

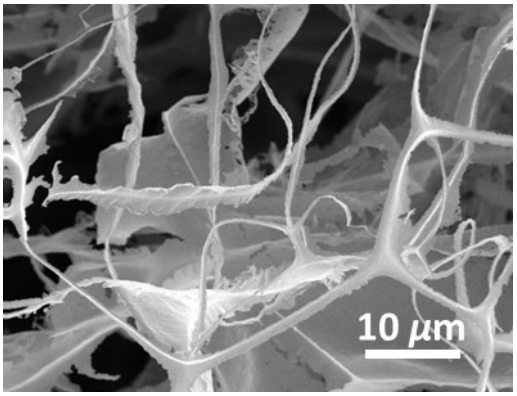


**Figure S2.** SEM image of the structure of 1D rods in the $MnO_2$ aerogels

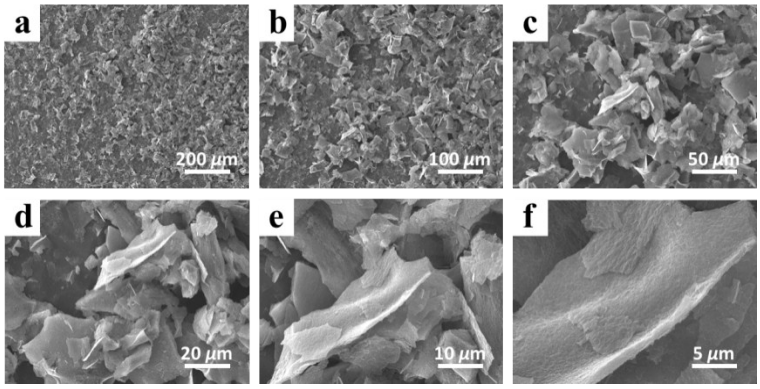


**Figure S3.** (a-f) SEM images of the post-reaction $MnO_2$ aerogels at the same observation location but of different magnifications, which increases from low (a) to high (f). The post-reaction $MnO_2$ aerogels have degraded RhB (pH 2.5) with magnetic stirring for 40 min.

**Table S2.** The TOC measurement for RhB and Mb degradation

| No. Name | Average TOC | Decomposition rate |
|---|---|---|
| a) RhB at 0 min | 82.61 | $D = \frac{T_0 - T}{T_0} \times 100\% = \frac{82.61 - 6.60}{82.61} \times 100\% = 92.1\%$ |
| B) RhB 40min | 6.60 | |
| c) Mb 0min | 16.65 | $D = \frac{T_0 - T}{T_0} \times 100\% = \frac{16.65 - 6.75}{16.65} \times 100\% = 59.5\%$ |
| d) Mb 70min | 6.75 | |

(a) TOC of pure RhB aqueous solution (5 mg $L^{-1}$, pH = 2.5).

(b) TOC of RhB aqueous solution (5 mg $L^{-1}$, pH = 2.5) after degradation with $MnO_2$ aerogel (0.5 g $L^{-1}$).

(c) TOC of pure MB aqueous solution (5 mg $L^{-1}$, pH = 2.5).

(d) TOC of MB aqueous solution (5 mg $L^{-1}$, pH = 2.5) after degradation with $MnO_2$ aerogel (0.5 g $L^{-1}$).

TOC were measured at 5.8x (a) and 50x (b, c, d) dilution and calculated back.