Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

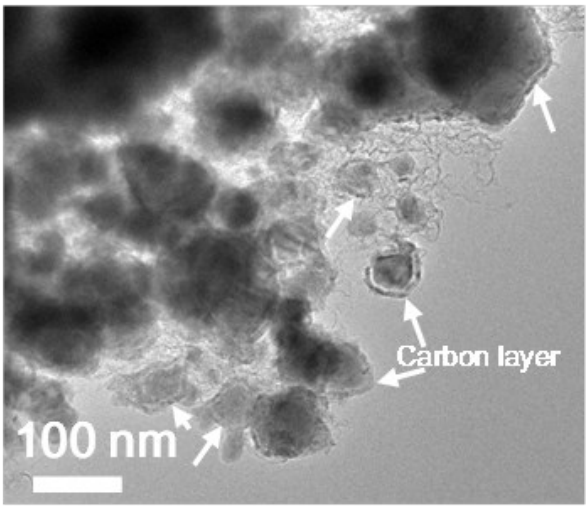

Figure S1. The TEM picture of MnO-$Mn_2N_{0.86}$@C-850 catalyst.

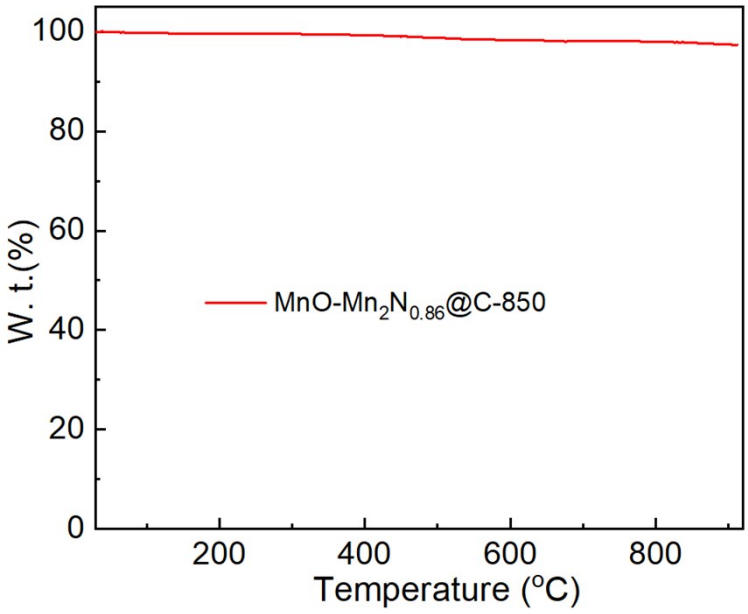

Figure S2. The thermogravimetric analysis of MnO-$Mn_2N_{0.86}$@C catalysts under nitrogen atmosphere.

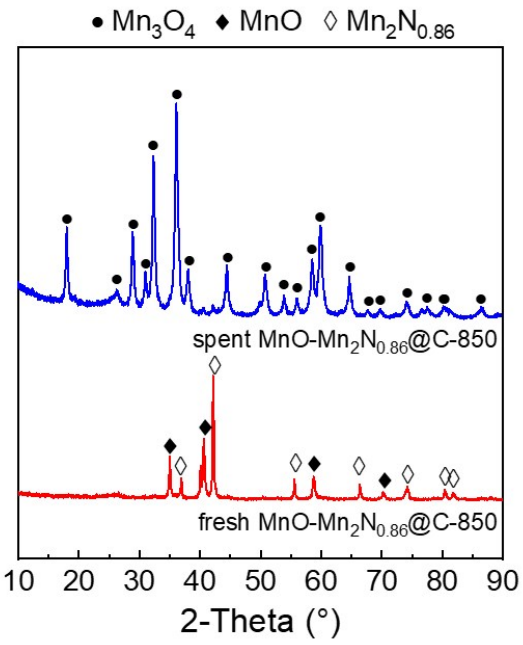

Figure S3. The XRD patterns of fresh MnO-$Mn_2N_{0.86}$@C-850 and spent MnO-$Mn_2N_{0.86}$@C-850 after reaction of 36 hours.

Table S1. The chemical states of oxygen and manganese on the surface of MnO-Mn_3O_4@C and MnO-$Mn_2N_{0.86}$@C catalysts.

Catalysts	O species			Mn species	
	O_a(%)	O_b(%)	O_c(%)	Mn^{2+}(%)	Mn^{3+}(%)
MnO-Mn_3O_4@C-550	49.2	31.0	19.8	29.9	70.1
MnO-Mn_3O_4@C-650	57.4	34.8	7.8	26.2	73.8
MnO-$Mn_2N_{0.86}$@C-750	50.7	31.7	17.6	19.6	80.4
MnO-$Mn_2N_{0.86}$@C-850	41.7	39.6	18.7	8.1	91.9

[a] The chemical states were obtained from XPS result.

Table S2. The stability comparison of MnO-$Mn_2N_{0.86}$@C-850 with reported works.

Catalysts	O_3 (ppm)	T (^oC)	RH (%)	Reaction time (h)	O_3 conversion (%)	Ref.
MnO-$Mn_2N_{0.86}$@C-850	23	20	90	6	100	This work
$CeMn_{10}O_x$	40	30	65	6	96	1
MIL-100(Fe)	45	25	90	12	100	2
Cu_2O/rGO	20	25	80	10	98	3
Ag-MnOx-H	40	25	60	6	90	4
OMS-2-Ac	40	30	90	6	80	5
Ce-OMS-2	40	25	90	6	90	6
8%$AgMnO_x$	40	30	65	6	81	7
V-MnO_2	110	25	55	5	50	8
Ni/NiO pH-1	1000	25	90	8	98	9
S-300 (MnOx)	43	25	25	6	80	10
S-300 (MnOx)	43	25	50	6	65	10
S-300 (MnOx)	43	25	75	6	10	10
1.1% MnOx/AC	43-48	25	60	6	83	11

Reference

1. J. Ma, X. Lia, C. Zhang, Q. Ma and H. He, *Appl. Catal. B Environ.*, 2020, **264**, 118498. DOI: 10.1016/j.apcatb.2019.118498.

2. H. Wang, P. Rassu, X. Wang, H. Li, X. Wang, X. Wang, X. Feng, A. Yin, P. Li, X. Jin, S. Chen, X. Ma and B. Wang, *Angew. Chem. Int. Ed. Engl.*, 2018, **50**, 16416-16420.

3. S. Gong, J. Chen, X. Wu, N. Han and Y. Chen, *Catal. Commun.*, 2018, **106**, 25-29.

4. H. Deng, S. Kang, J. Ma, L. Wang, C. Zhang and H. He, *Environ. Sci. Technol*., 2019, **53**, 10871-10879.

5. C. Wang, J. Ma, F. Liu, H. He and R. Zhang, *J. Phys. Chem. C.*, 2015, **119**, 23119-23126.

6. L. Yang, J. Ma, X. Li, C. Zhang and H. He, *Ind. Eng. Chem. Res.*, 2020, **59**, 118-128.

7. X. Li, J. Ma, C. Zhang, R. Zhang and H. He, *J. Environ. Sci.*, 2019, **80**, 159-168.

8. Y. Yang, P. Zhang and J. Jia, *Appl. Surf. Sci.*, 2019, **484**, 45-53.

9. S. Gong, A. Wang, Y. Wang, H. Liu, N. Han and Y. Chen, *ACS Appl. Nano Mater.*,2020, **3**,597-607.

10. Y. Liu, P. Zhang, J. Zhan and L. Liu, *Appl. Surf. Sci.*, 2019, **463**, 374-385.

11. M. Wang, P. Zhang, J. Li and C. Jiang, *Chin. J. Catal.*, 2014, **35**, 335-341.