Supporting Information

From a novel energetic coordination polymer precursor to diverse Mn_2O_3 nanostructures: the control of pyrolysis products morphology achieved by changing the calcinations atmosphere

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Supporting information

Section1. Description of structures

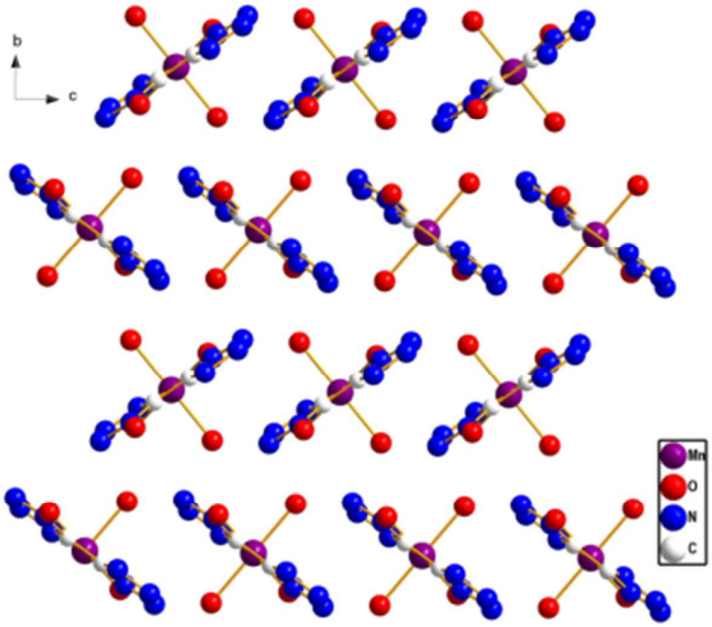


Figure S1.3D structure of compound **1**

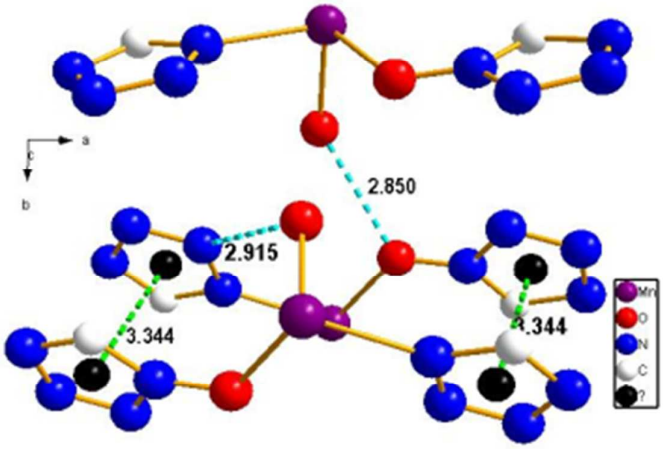


Figure S2.π-π stacking and hydrogen bonds of compound **1**

The π-π stacking between mutually parallel tetrazole ring from adjacent links is found and the distance of tetrazole ring central to another is 3.34Å.Two type hydrogen bonds are found, the one comes from adjacent parallel chains (Oiw-H…N (Oiw-N=2.915 Å) and the other is from unparallel chains (Oiw-H…Oiw(Oiw- Oiw =2.85 Å) .

*Section2. Structures and morphologies of α-Mn_2O_3 transformed from the compound **1** template under different calcinated atmosphere*

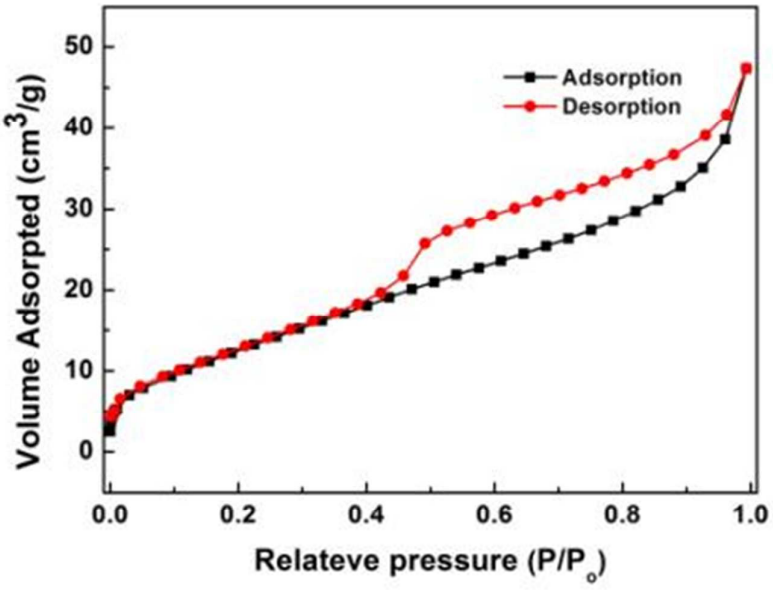


Figure S3.N_2 adsorption-desorption isotherms of the rod-shaped α-Mn_2O_3

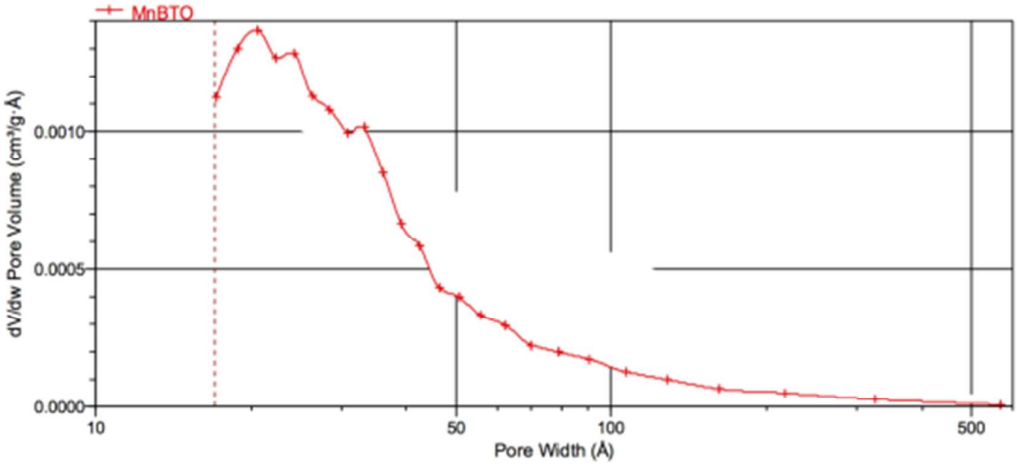


Figure S4. Pore size distribution of the rod-shaped α-Mn_2O_3

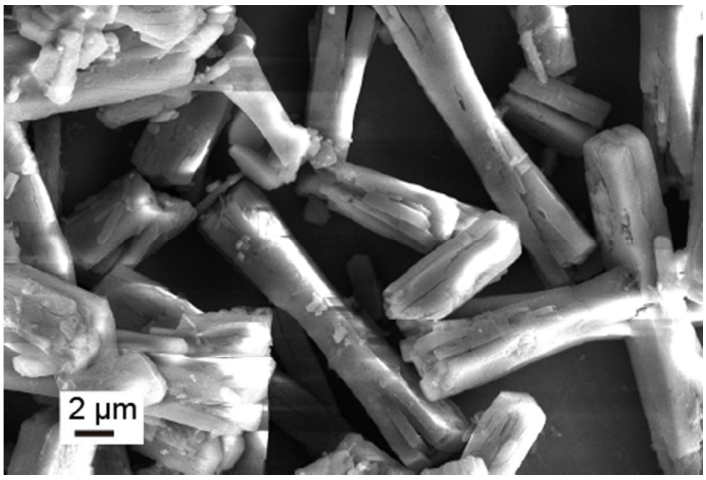


Figure S5. SEM image of the products obtained under N_2 with the heating of 5℃·min^{-1}

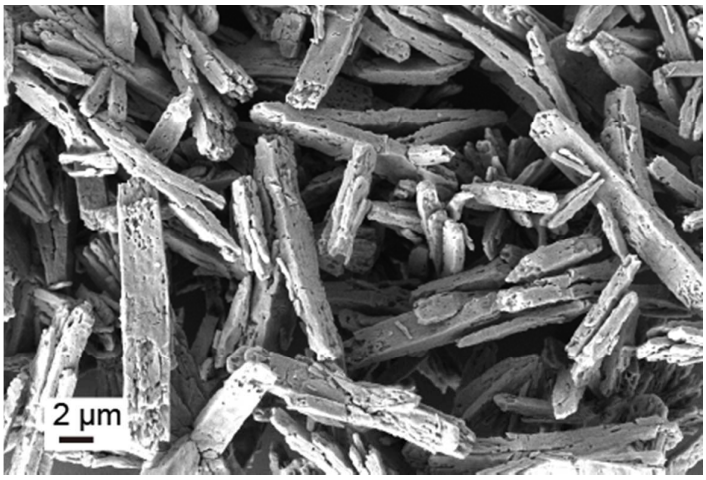


Figure S6. SEM image of the products obtained under N_2 with the heating of 15℃·min^{-1}

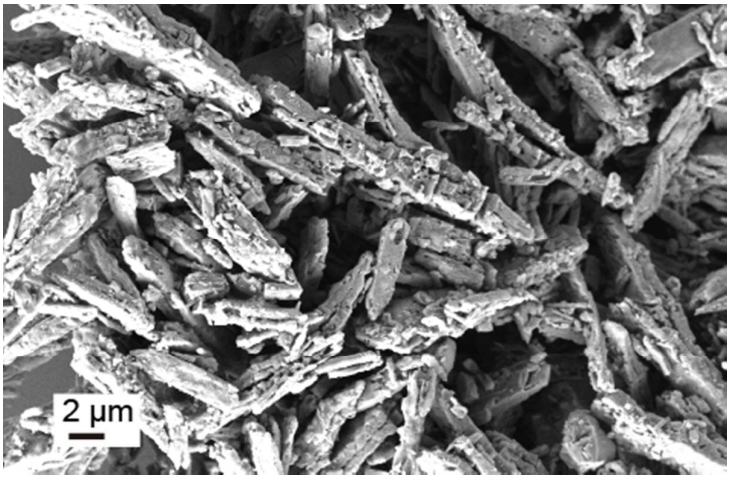


Figure S7. SEM image of the products obtained under N_2 with the heating of 20℃·min^{-1}

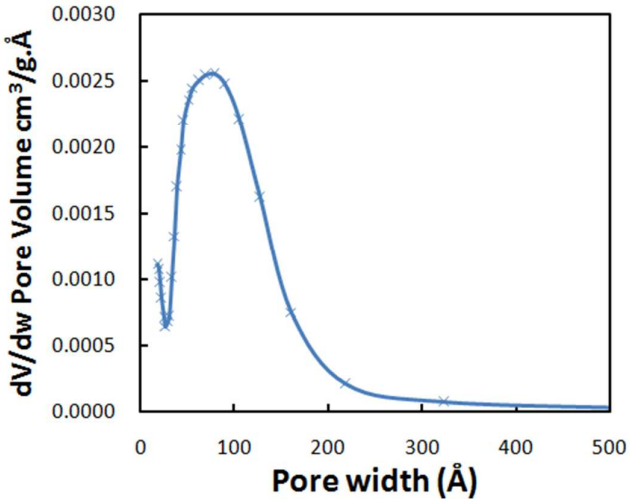


Figure S8. Pore size distribution of the monodispersed α-Mn_2O_3

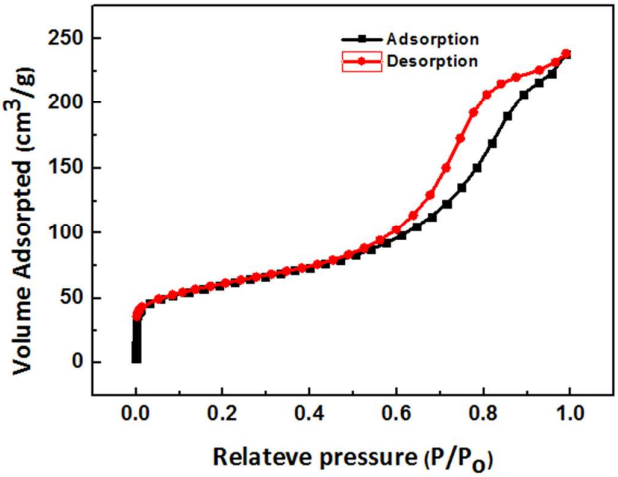


Figure S9. N_2 adsorption-desorption isotherms of the monodispersed α-Mn_2O_3

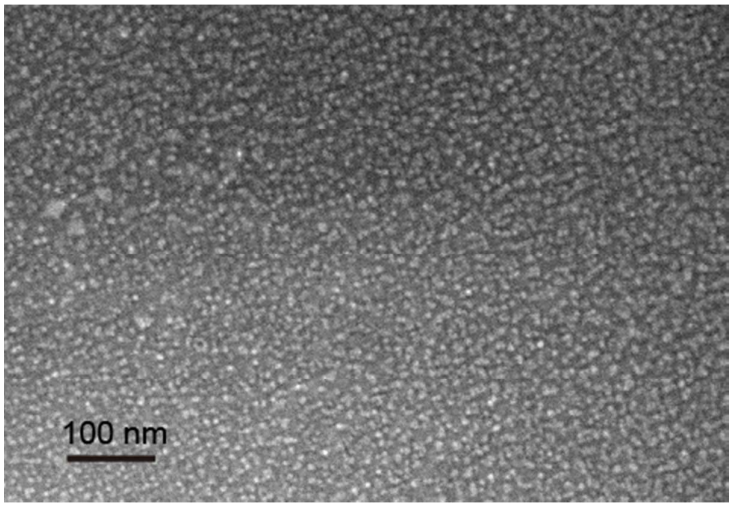


Figure S10. SEM image of the products obtained under O_2 with the heating of 5℃·min^{-1}

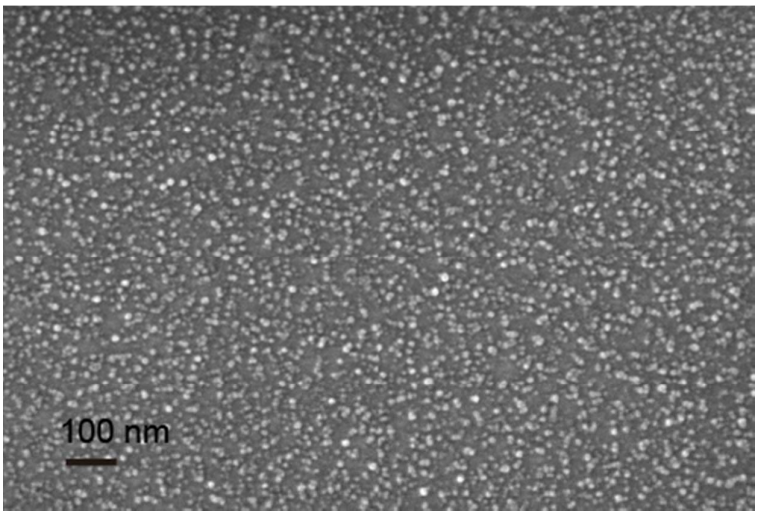


Figure S11. SEM image of the products obtained under O_2 with the heating of 15℃·min^{-1}

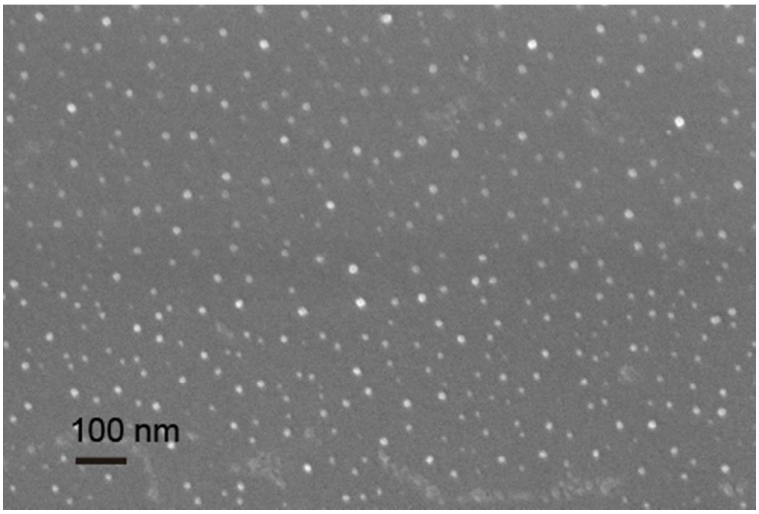


Figure S12. SEM image of the products obtained under O_2 with the heating of 20℃·min^{-1}

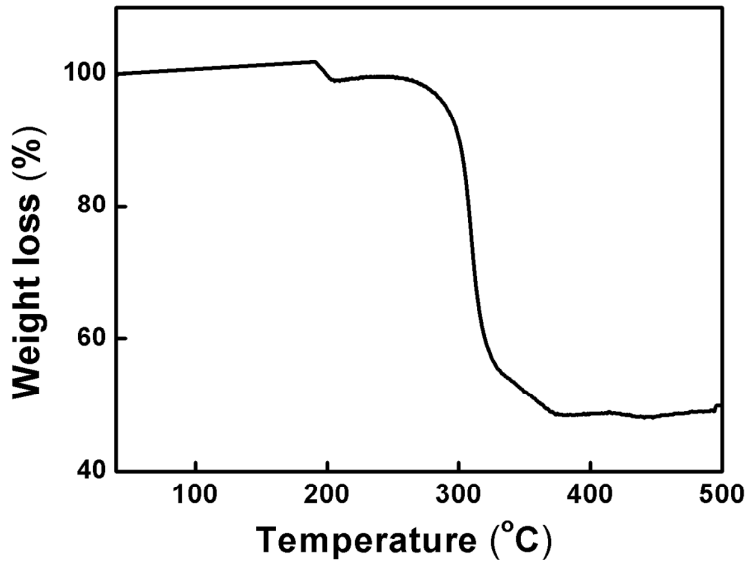


Figure S13. TG curve of compound **1** under N_2 atmosphere

A total sample mass of 0.98 mg was used for TGA measurement under N_2 atmosphere.

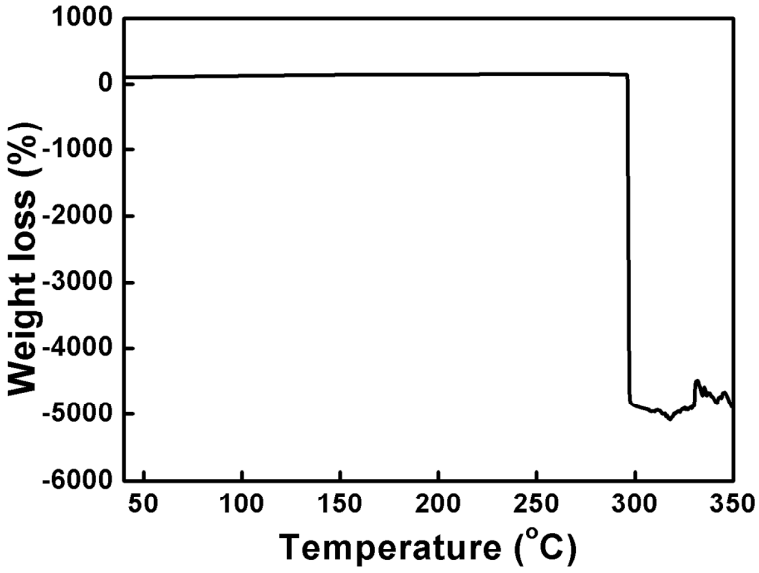


Figure S14. TG curve of compound **1** under O_2 atmosphere

A total sample mass of 0.34 mg was used for TGA measurement under O_2 atmosphere. Actually, the crucible is fall from the sample holder owing to the violent gas liberation of nitrogen-rich ligand. Therefore, the weight loss is much higher than 100%.

Section 3. Catalytic decomposition of ammonium perchlorate (AP)

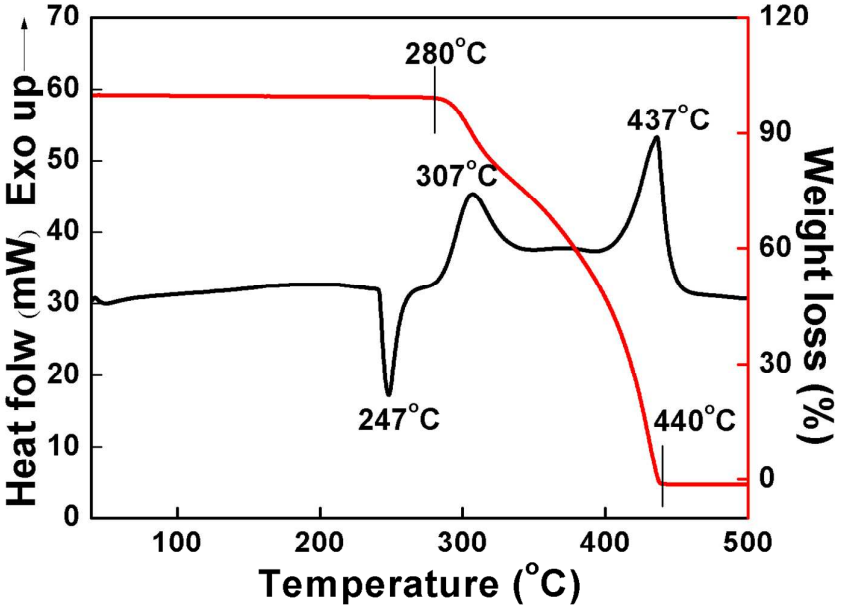


Figure S15. TG and DSC curves of pure AP

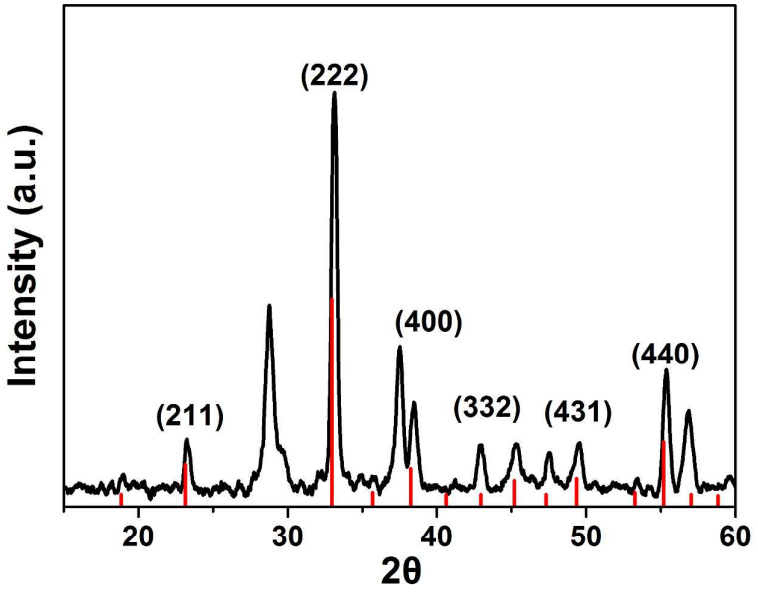
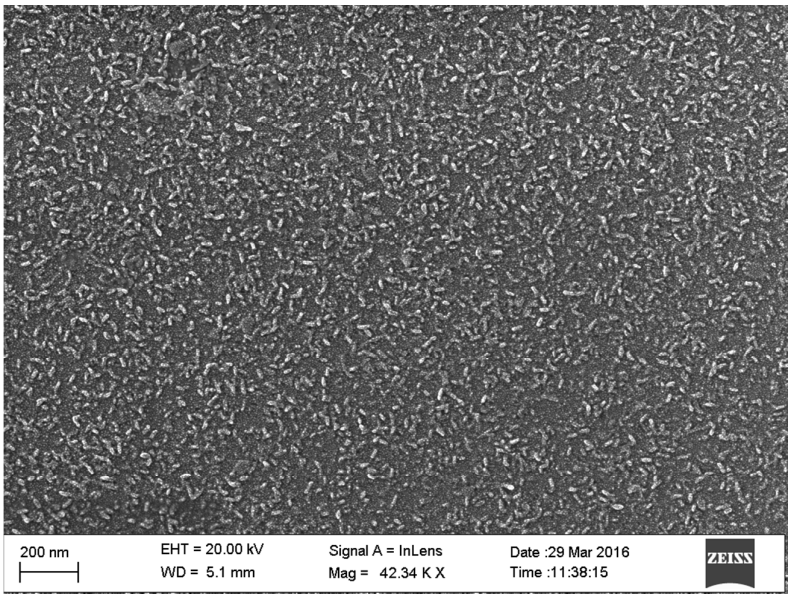


Figure S16. The XRD patterns of the solid residual of the AP+3wt% compound **1**.Sticks are the reported values of the cubic phase of Mn_2O_3.



FigureS17. Low-magnification SEM image of the solid residual of the AP+3wt% compound **1**

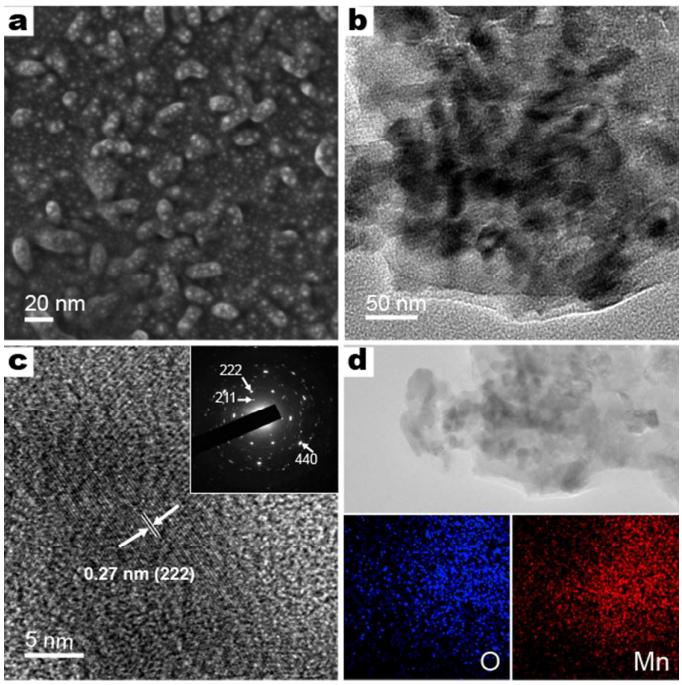


Figure S18. (a) High-magnification SEM image of decomposition solid residual. (b) TEM image of decomposition solid residual. (c) HRTEM image of decomposition solid residual (inset is the SAED pattern of obtained decomposition solid residual). (d) EDS mapping images of obtained decomposition solid residual

*Section 4. Main structure data of compound **1***

Table S1. Crystal data and structure refinement for compound **1**

Empirical formula	$C_2 H_4 Mn N_8 O_4$
Formula weight	259.07 g/mol
Crystal system	monoclinic
Space group	P 21/c
a/°A	6.5782(4)
b/°A	10.7299(7)
c/°A	5.5290(3)
α(°)	90
β(°)	93.119(5)
γ(°)	90
V ($Å^3$)	389.68(4) $Å^3$
Z	2
Dc/g cm^{-3}	2.20783 g/cm^3
F(000)	258
R1 (all data)	0.0550
wR2 (all data)	0.0923

Table S2. Main bond length (Å) and angle (°) for compound **1**

Bond length		Angle	
Mn-N8	2.26(38)	N8-Mn-N8’	180
Mn-N8’	2.26(38)	N8-Mn-O1’	95.27(122)
Mn-Ow	2.15(33)	N8-Mn-O1	84.73(122)
Mn-Ow’	2.15(33)	N8-Mn-Ow	89.78(138)
Mn-O1	2.16(31)	N8-Mn-Ow’	90.22(138)
Mn-O1’	2.16(31)	O1-Mn-O1’	180