Supplementary Materials

Sodium Borohydride Treatment to Prepare Manganese Oxides with Oxygen Vacancy Defects for Efficient Oxygen Reduction

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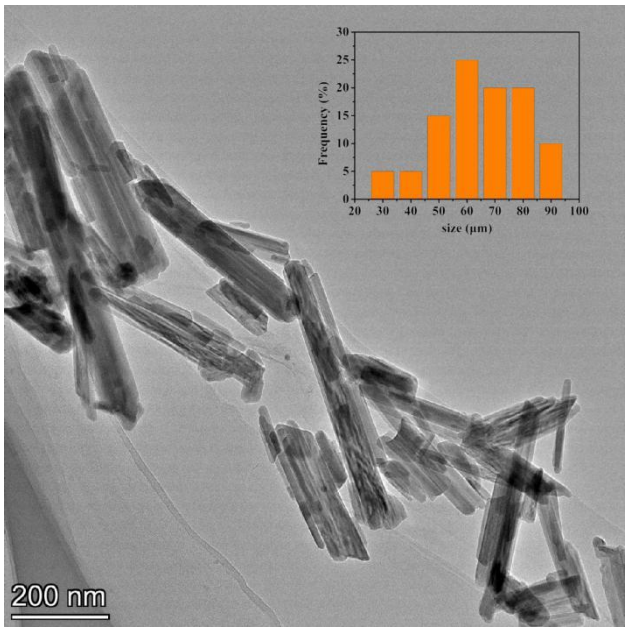


Figure S1. TEM spectrum and particle size distribution of 2NaBH4-OMS-2.

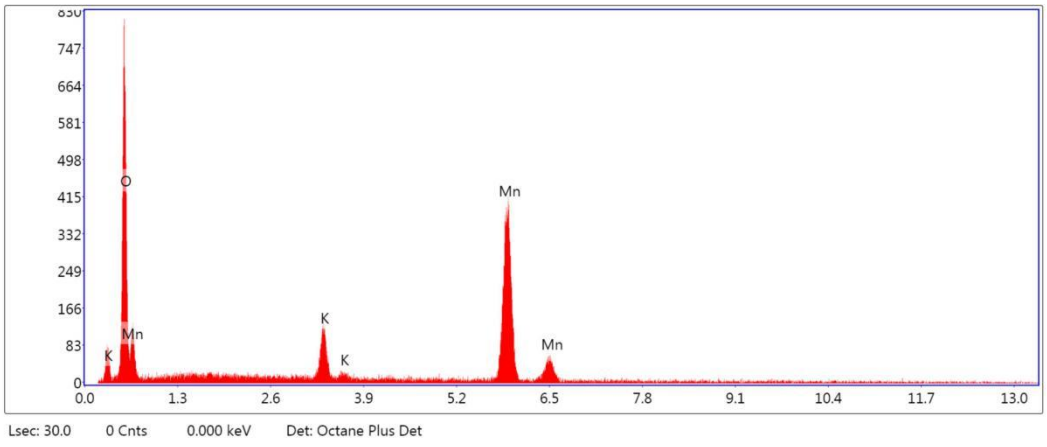


Figure S2. EDS spectra of 2NaBH4-OMS-2.

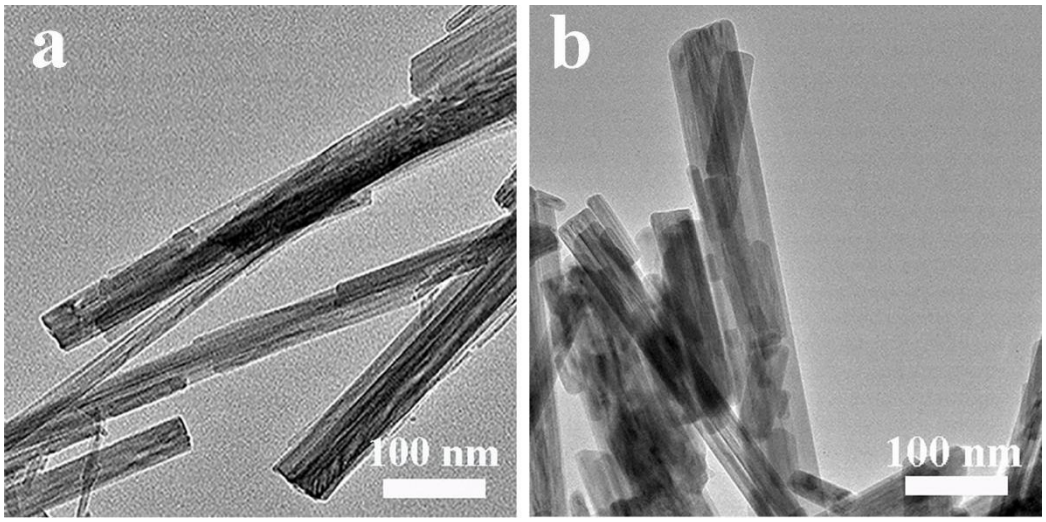


Figure S3. (**a**) TEM images of OMS-2 and (**b**) 2NaBH4-OMS-2.

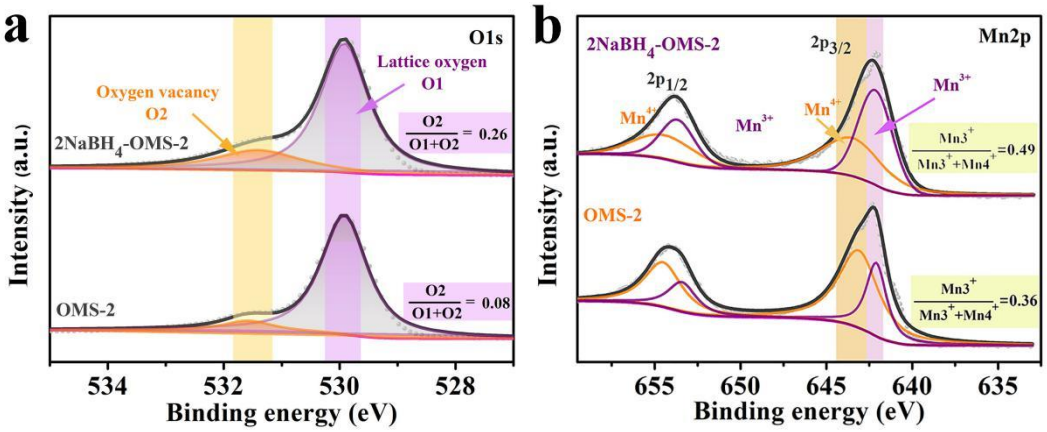


Figure S4. XPS images of (**a**) O 1s and (**b**) Mn 2p of OMS-2 and 2NaBH4-OMS-2.

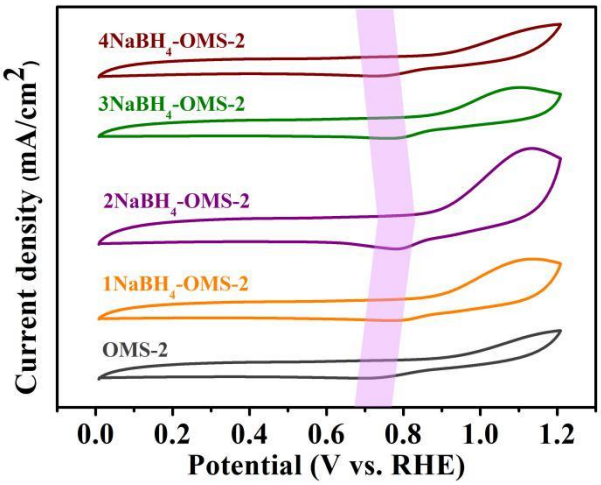


Figure S5. Cyclic voltammetry curves of OMS-2 and OMS-2 treated with different concentrations of NaBH4.

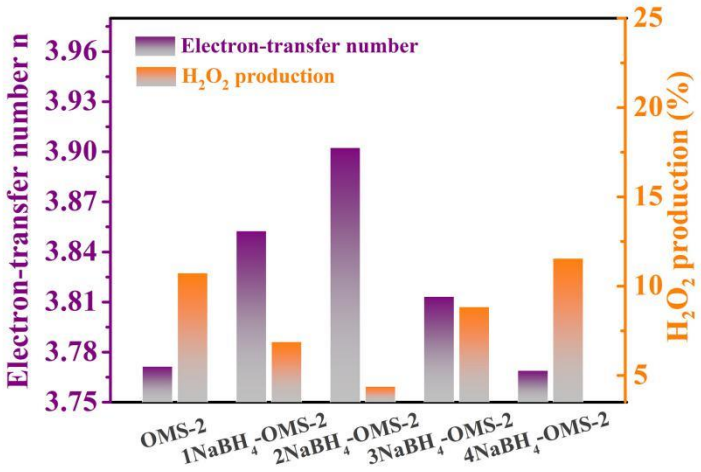


Figure S6. Histogram of average electron transfer number and hydrogen peroxide yield at 0.4 V-0.9 V potential.

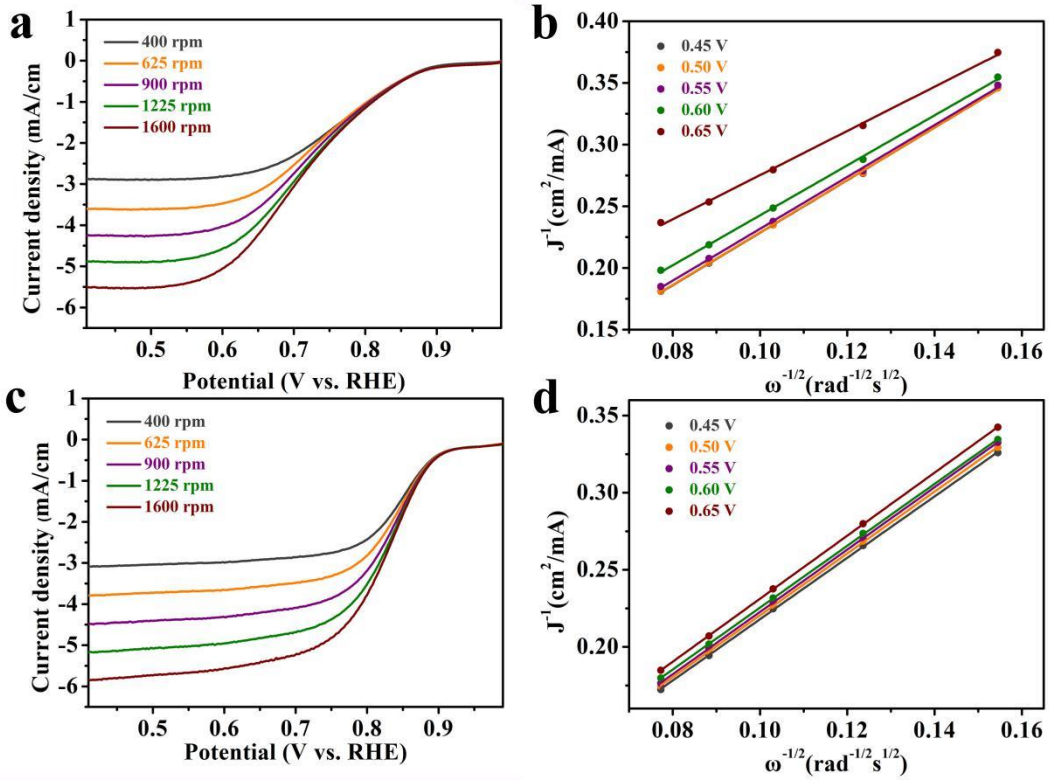


Figure S7. LSV curves of (**a**,**b**) OMS-2 and (**c**,**d**) 2NaBH4-OMS-2 at different rotational speeds and linear plots at different potentials.

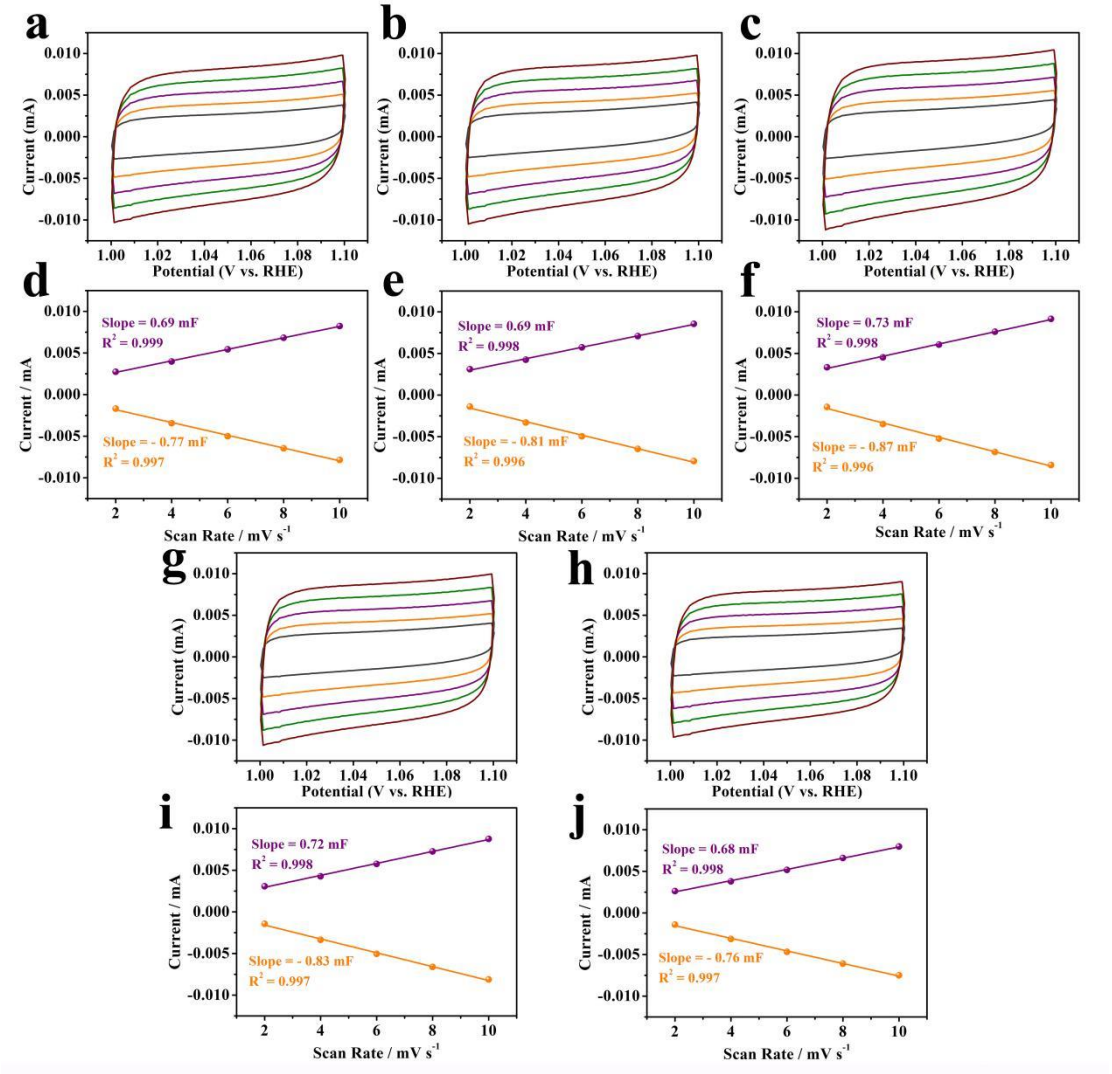


Figure S8. CV plots at different scan rates and C_{dl} slope plots of electric double layer capacitance of (**a**,**d**) OMS-2, (**b**,**e**) 1NaBH$_4$-OMS-2, (**c**,**f**) 2NaBH$_4$-OMS-2, (**g**,**i**) 3NaBH$_4$-OMS-2,(**h**,**j**) 4NaBH$_4$-OMS-2.

Table S1. C_{dl} and ECSA of OMS-2 and OMS-2 treated with different concentrations of NaBH$_4$.

Catalyst	C_{dl} (mF)	ECSA (cm^2)
OMS-2	0.73	18.25
1NaBH$_4$-OMS-2	0.75	18.75
2NaBH$_4$-OMS-2	0.80	20.00
3NaBH$_4$-OMS-2	0.78	19.50
4NaBH$_4$-OMS-2	0.72	18.00

Table S2. Summary table of performance test of OMS-2 and OMS-2 treated with different concentrations of NaBH4.

Catalyst	BET ($m^2 \cdot g^{-1}$)	E_{half} (V vs. RHE)	I_m ($mA \cdot mg^{-1}$)	$I_{s\ BET}$ ($mA \cdot cm^{-2}$)	$I_{s\ ECSA}$ ($mA \cdot cm^{-2}$)
OMS-2	33.74	0.750	18.78	5.56	10.28
1$NaBH_4$-OMS-2	39.35	0.794	28.98	7.43	15.59
2$NaBH_4$-OMS-2	40.69	0.821	81.36	20.34	41.38
3$NaBH_4$-OMS-2	41.56	0.805	40.82	9.95	21.20
4$NaBH_4$-OMS-2	45.32	0.742	15.44	3.43	8.64

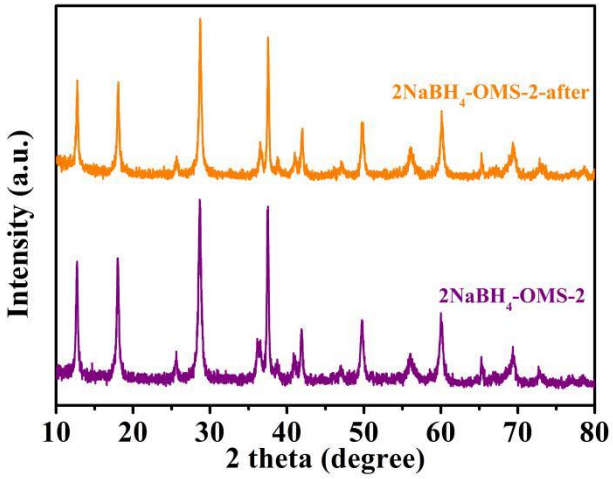


Figure S9. XRD patterns before and after testing.

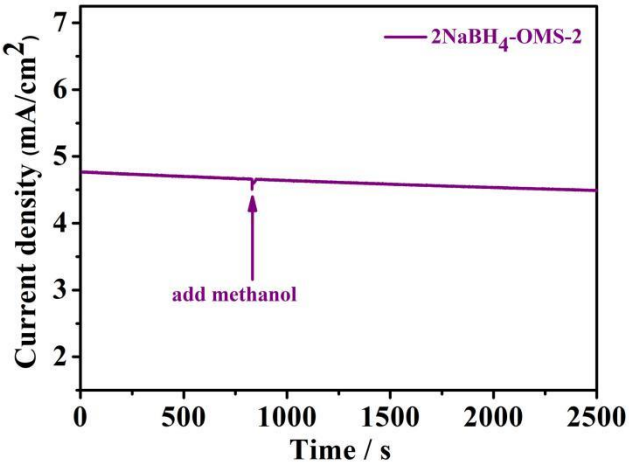


Figure S10. i-t with methanol added of 2$NaBH_4$-OMS-2.