

Optimizing Silver Incorporation in MnO_x Air Cathodes to Balance Power Density and Cycling Stability in Rechargeable Zn–Air Batteries

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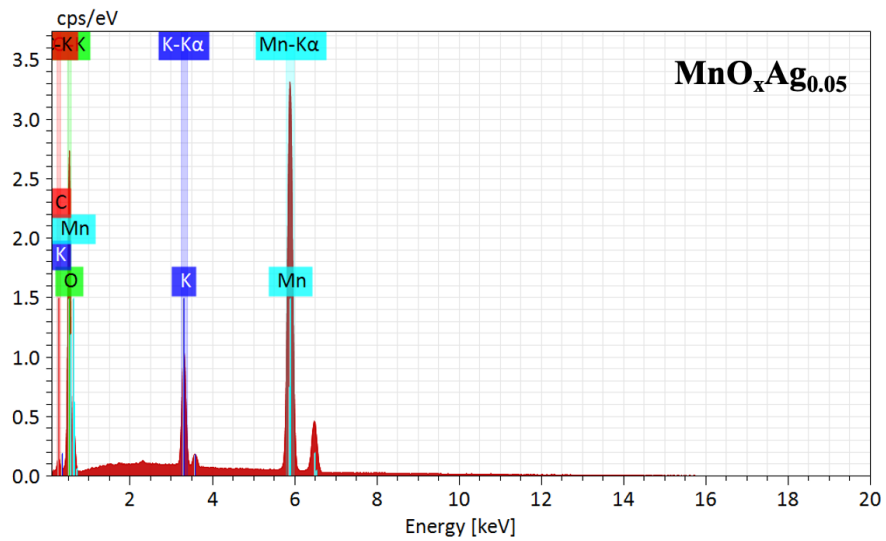
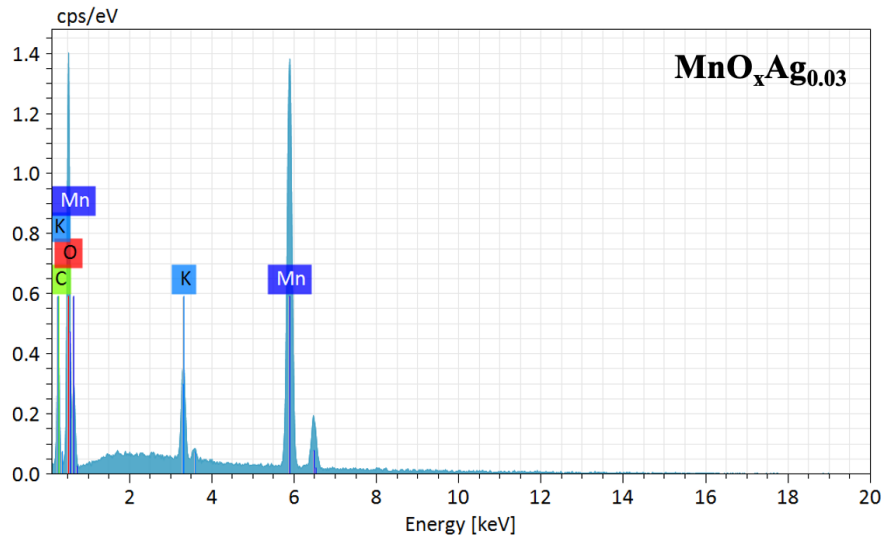


Figure S1 EDS scans of $\text{MnO}_x\text{Ag}_{0.03}$ (top) and $\text{MnO}_x\text{Ag}_{0.05}$ (bottom).

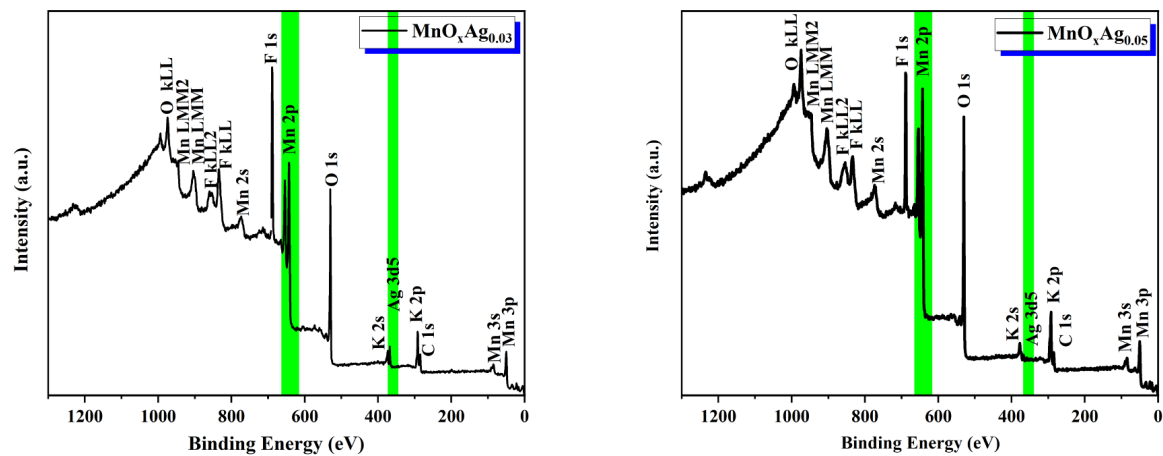


Figure S2 XPS survey scans of $\text{MnO}_x\text{Ag}_{0.03}$ (left) and $\text{MnO}_x\text{Ag}_{0.05}$ (right).

Table S1. Fitted electrochemical impedance parameters for CP/MnOx, CP/ MnOxAg_{0.03}, and CP/ MnOxAg_{0.05} before and after cycling

Sample	State	Circuit	R _s (Ω)	R ₁ (Ω)	Q ₁ (S·s ⁿ¹)	n1	R ₂ (Ω)	Q ₂ (S·s ⁿ²)	n2
MnOx	Before	R _s (R ₁ Q ₁)(R ₂ Q ₂)	5.81	3.50	1.72×10 ⁻⁵	0.907	308	5.30×10 ⁻²	0.22
MnOx	After	R _s (R ₁ Q ₁)(R ₂ Q ₂)	10.7	4.56	1.08×10 ⁻⁴	0.764	138	2.38×10 ⁻²	0.378
MnOxAg _{0.03}	Before	R _s (R ₁ Q ₁)	11.9	932	5.09×10 ⁻³	0.661	—	—	—
MnOxAg _{0.03}	After	R _s (R ₁ Q ₁)	15.8	971	5.0×10 ⁻³	0.628	—	—	—
MnOxAg _{0.05}	Before	R _s (R ₁ Q ₁)(R ₂ Q ₂)	6.34	27	1.67×10 ⁻⁴	0.810	0.93	3.8×10 ⁻³	0.651
MnOxAg _{0.05}	After	R _s (R ₁ Q ₁)(R ₂ Q ₂)	4.49	3.31	6.21×10 ⁻⁴	1.0	132	3.43×10 ⁻⁴	0.266

Table S2 Electrochemical Zn-air battery performance comparison with literature reports.

Catalyst	Electrode structure	Voltage gap (V)	RTE (%)	Cycles	Power density (mW cm ⁻²)	Ref
CP/MnO _x Ag _{0.03}	Binderless	1.09	50.6	300	18.9	This work
CPMnO _x Ag _{0.05}	Binderless	1.32	40.3	300	39.1	This work
CP/MnO ₂	Binderless	1.5	37.5	300	21.9	This work
CNT/MnO ₂	Binderless	1.0	52.2	100	15	1
CSC/MnO ₂	Binderless	1.18	42.4	100	14.8	2
Ag/Ag ₂ O@MCOF(Co)	Composite	1.02 (1 st cycle)	NA	100	170.8	3
1.5FeNi@NCNT	Composite	1.1	NA	100	114	4
Co/N/S-CNPs	Composite	0.9	60	40 hours	96.6	5
Co ₃ O ₄ -NC&Ag	Composite	0.9	NA	NA	198	6
Ag ₅₀ Cu ₅₀	Binderless	0.9	56.4	100	86.5	7
Pt/C+IrO ₂	Composite	1.28	31.9	60	46.6	8
NiCo ₂ O ₄ /MC-HTO ₂	Composite	1.18	45.6	100	36.9	9
Pt-Ru/C	Composite	0.73	62.81	100	84.73	9

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