Supporting information

Fe doped α-MnO_2/rGO cathode material for zinc ion battery with long lifespan and High areal capacity

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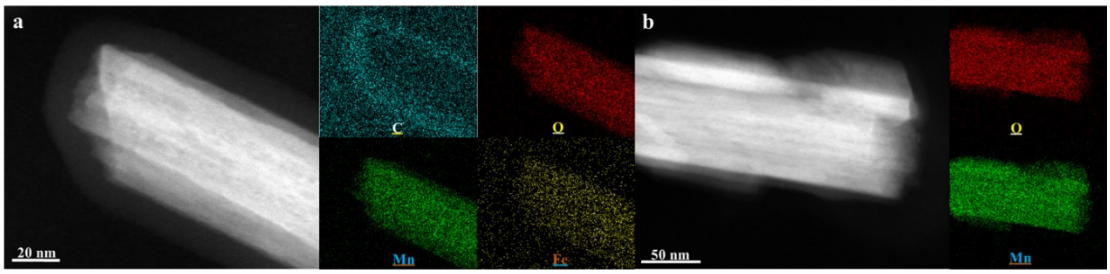

Fig. S1 The HRTEM images of Fe doped α-MnO_2/rGO (a) and α-MnO_2 (b) with their EDS images.

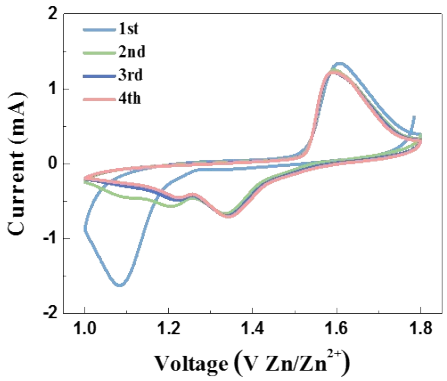

Fig. S2 CV curves of α-MnO_2.

Table S1 The list of performance comparison of MnO_2-based cathode materials for ZIBs.

sample	Current density (A g^{-1})	Specific capacity (mAh g^{-1})	Ref.
β-MnO_2@GO	1.2	129.6 (after 2000 cycles)	14, Nano-Micro Lett. (2021) 13:173
MnO_2@N	0.5 5	160 (after 500 cycles) 102 (after 1000 cycles)	17, J. Energy Chem., 64 (2022) 23–32
A-MnO_2	3	100 (after 600 cycles)	47, Chem. Eng. J., 441 (2022) 136008
S-MnO_2	3	150 (after 1000 cycles)	48, Energy storage mater., 47 (2022) 424-433
α-MnO_2	0.5	130 (after 100 cycles)	49 , Small, 2020, 16, 1905842
CuMO	5	100 (after 700 cycles)	50, Chem. Eng. J., 433 (2022) 133687
Mo-MnO_2	1	159 (after 1000 cycles)	51, ACS Appl. Mater. Interfaces, 15 (2023) 859-869
δ-MnO_2	1	114 (after 1000 cycles)	52 , ACS Appl. Mater. Interfaces, 2022, 14, 21159−21172
α-MnO_2/Mn_2O_3	3	183 (after 1000 cycles)	53, J. Energy Chem., 54 (2021) 475–481
MnO_2/GO	2	160 (after 2000 cycles)	54, Adv. Funct. Mater., 2021, 31, 2007397
N-MnO_{2-x}	1	170 (after 1000 cycles)	55, Small 2019, 15, 1905452
This Work	1 10 15	172 (after 2000 cycles) 72.1 (after 10000 cycles) 62.5	--

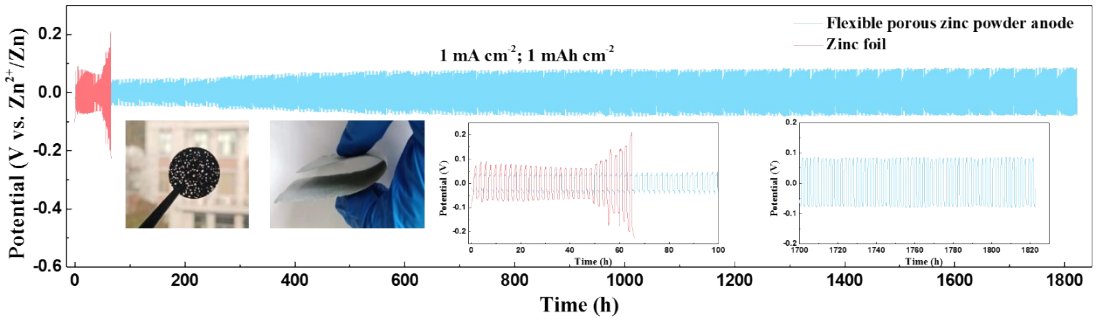

Fig. S3 The long-term cycle performances and images (embedded on the left) of the flexible porous zinc powder anode and bare Zn foil anode tested by Zn||Zn symmetric cell at 1 mA cm^{-2} and 1 mAh cm^{-2}.

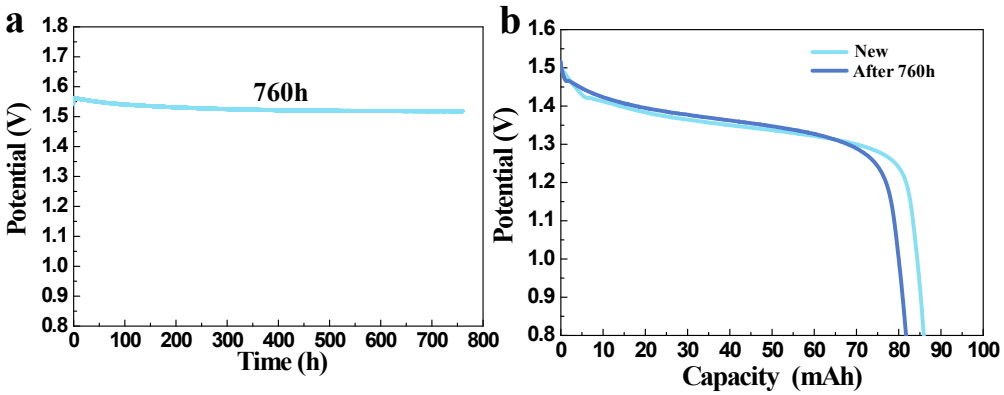

Fig. S4 The curves of (a) open circuit voltage (OCP) and (b) discharge performance after storage for 760 h as well as without storage for the assembled pouch battery with Fe doped α-MnO_2/rGO and flexible porous zinc powder anode as cathode and anode (theoretical capacity 100 mAh).