Electronic Supplementary Material (ESI) for Nanoscale.

SupplementaryInformation

Nanoporous metal recuperated MnO_2 anode for lithium ion batteries

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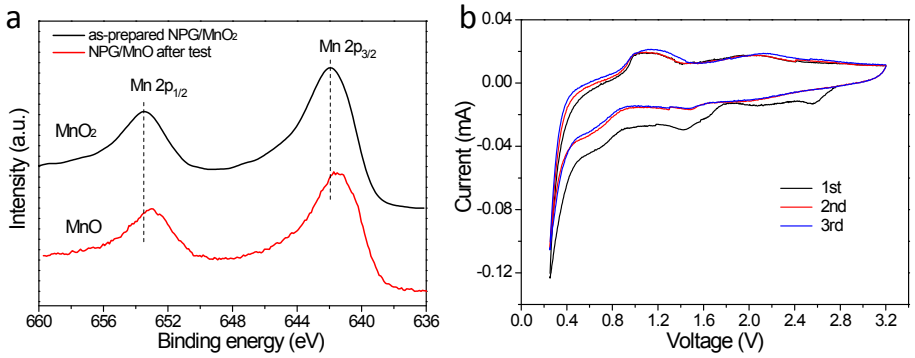

Fig. S1 (a) XPS spectra of Mn 2p of the as prepared NPG/MnO_2 composite and the charge states after 100 cycles. (b) Cyclic voltammetry (CV) curves of the as-prepared NPG/MnO_2 anode for the first three cycles in the potential range of 0.25-3.2 V at the scan rate of 0.1 mV/s.

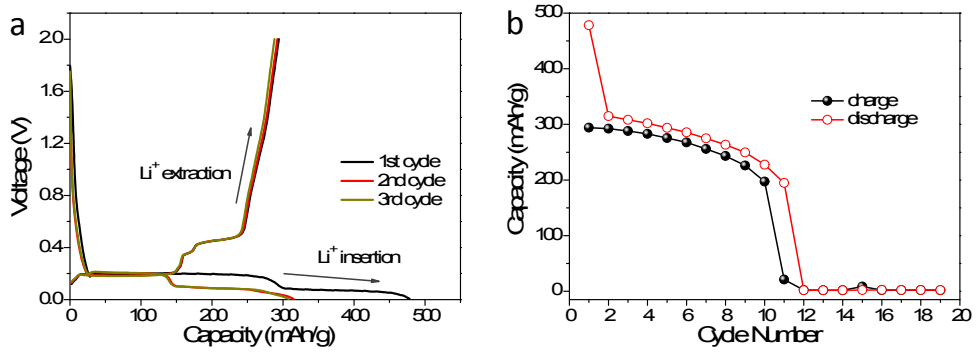

Fig. S2 (a) The galvanostatic discharge/charge curves for the first three cycles and (b) capacity retentionof NPG at a current density of 50 mAg^{-1} in the potential range of 0.005-2.0 V. After more than 10 cycles, the reversible capacity of NPG anode dropped to zero because of the big volume changes that caused by the repeated alloy reactions between gold and lithium ions.

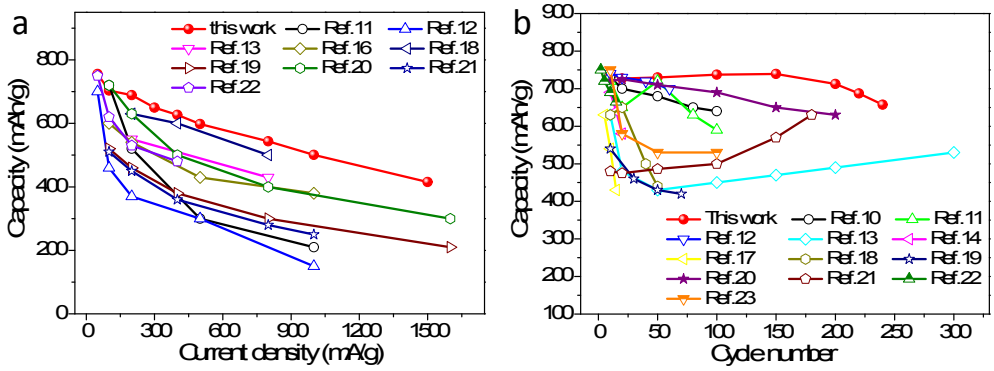

Fig. S3 Comparison of the NPG/MnO_2 and other reported MnO_2-based composites as anodes for Li-ion batteries. (a) Rates performances. (b) Capacity retention. All the capacities are re-calculated by the mass of MnO_2 in the composites eletrodes from the references when the battery discharged to 0.25 V. The capacity that comtributed by the conductive additive was removed.

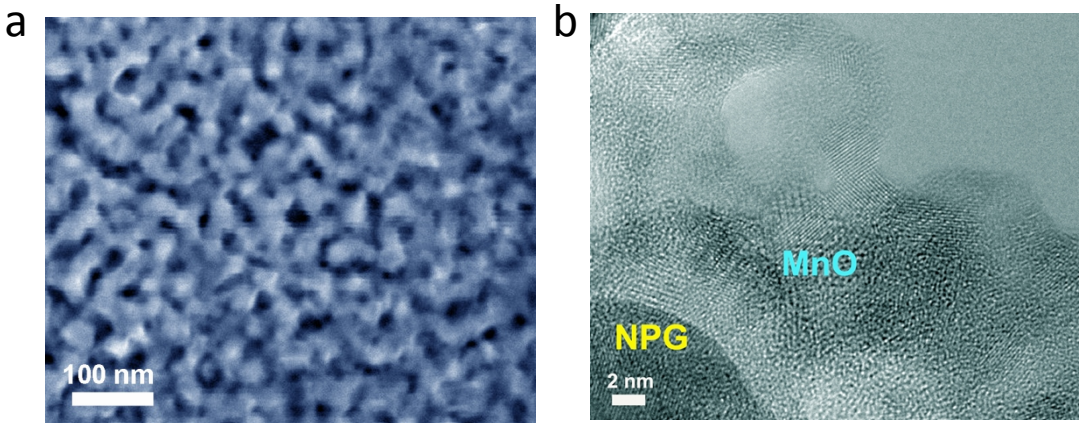

Fig. S4 *Ex-situ* (a) SEM and (b) TEM images of the NPG/MnO anode after100 cycles in the charged states.

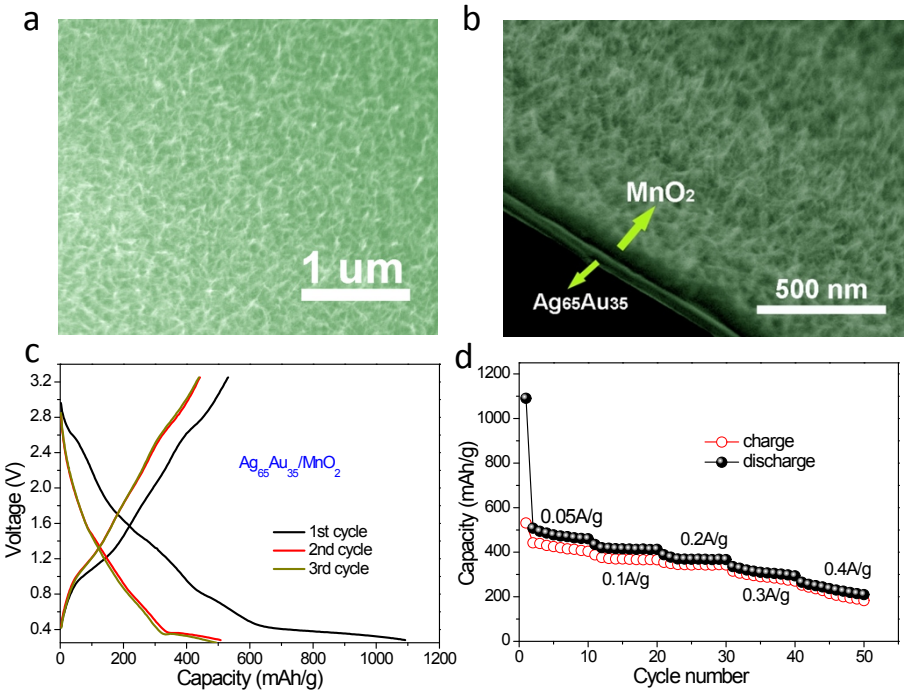

Fig.S5 SEM images of MnO_2 deposited on $Ag_{65}Au_{35}$ films: (a) top-view; and (b) cross-sectional views. (c) The galvanostatic discharge/charge curves of the LIB using the $Ag_{65}Au_{35}/MnO_2$ films as the electrodes. (d) Rates performances of $Ag_{65}Au_{35}/MnO_2$ electrodes. The electrochemical depositing time of MnO_2 in this composite is the same as that of NPG/MnO_2. The discharge/charge curves of this electrode are similar to that of NPG/MnO_2 anode but the cycling stability and rates performances are much worse.