Electronic Supplementary Material (ESI) for Nanoscale.

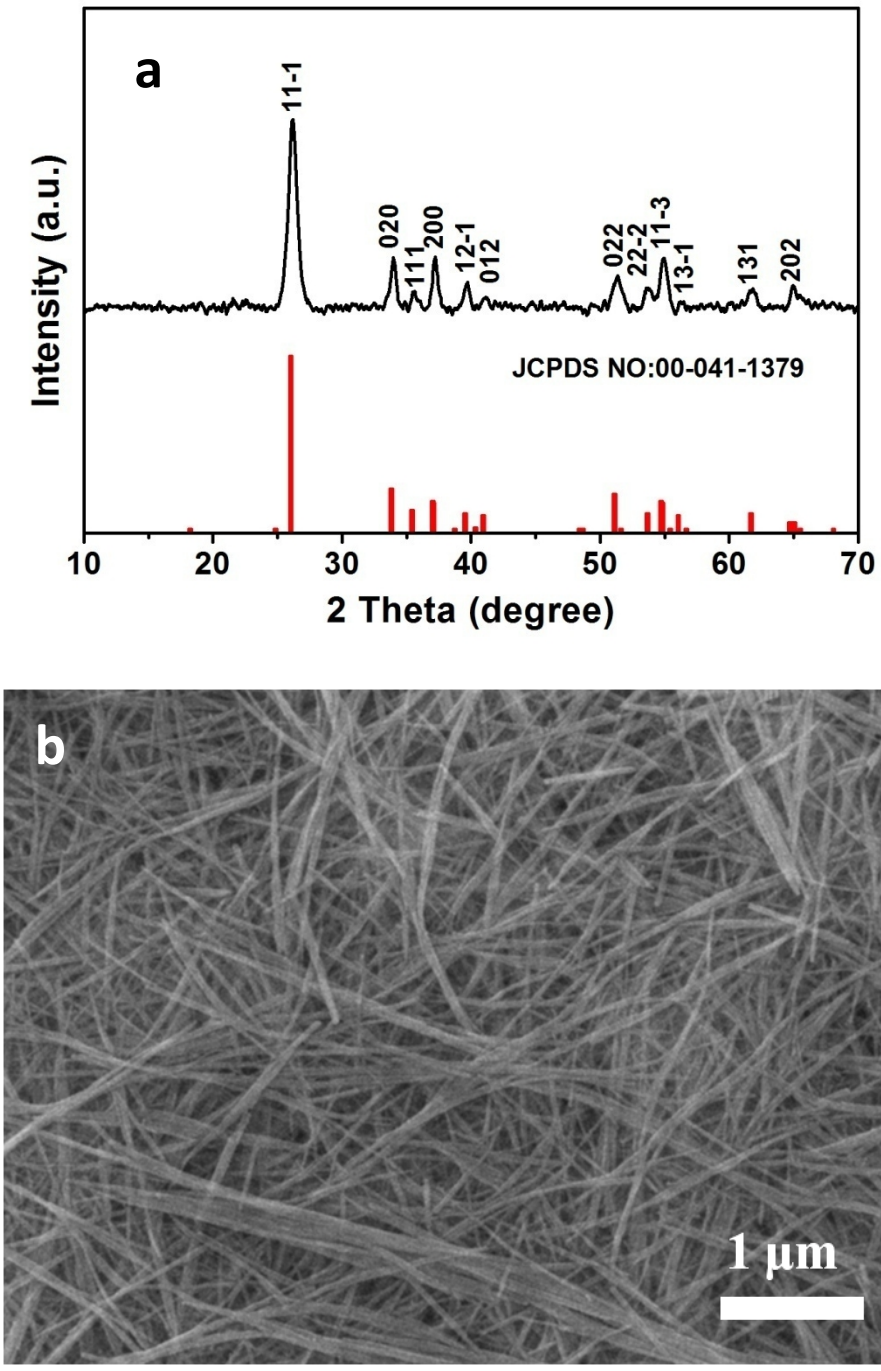

Figure S1. (a) XRD pattern of MnOOH nanowires. (b) SEM image of the MnOOH nanowires.

Figure S1a is the XRD pattern of MnOOH nanowires. All of the diffraction peaks can be indexed to PDF card and no other characteristic peaks from impurities are detected in the spectrum. Figure S1b shows the SEM image of the precursor MnOOH nanowires, which have diameters of 10-60 nm and smooth surfaces. SEM image shows that the morphology of the products is nanowire.

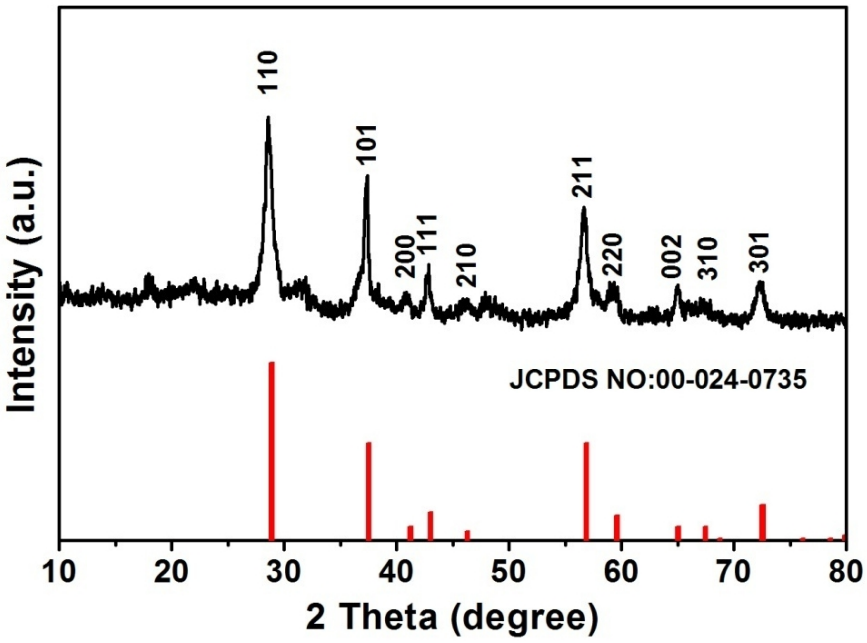

Figure S2. XRD pattern of MnO_2 nanowires.

Figure S2 is the XRD pattern of MnO_2 nanowires. All of the diffraction peaks can be indexed to PDF card and no other characteristic peaks from impurities are detected in the spectrum.

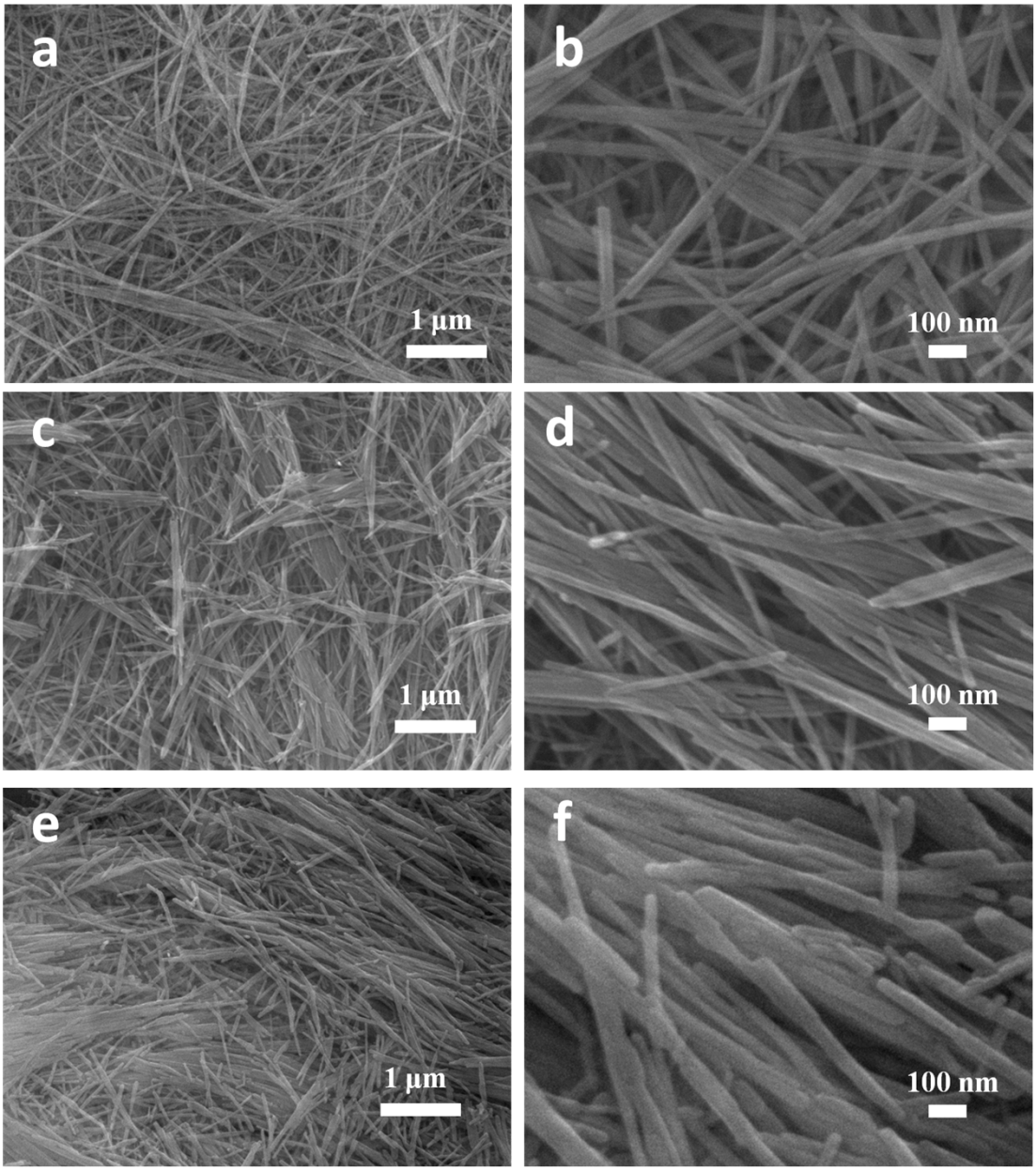

Figure S3. SEM images of (a b) MnOOH, (c d) MnO_2 and (e f) Li_2MnO_3, respectively.

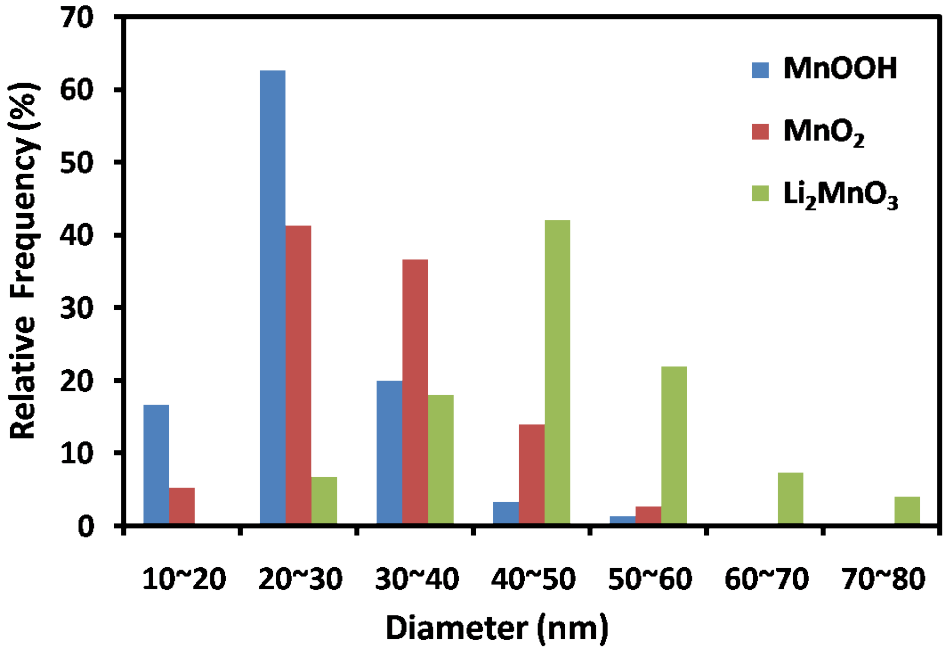

Figure S4. Statistical analysis of diameters of MnOOH, MnO_2 and Li_2MnO_3.

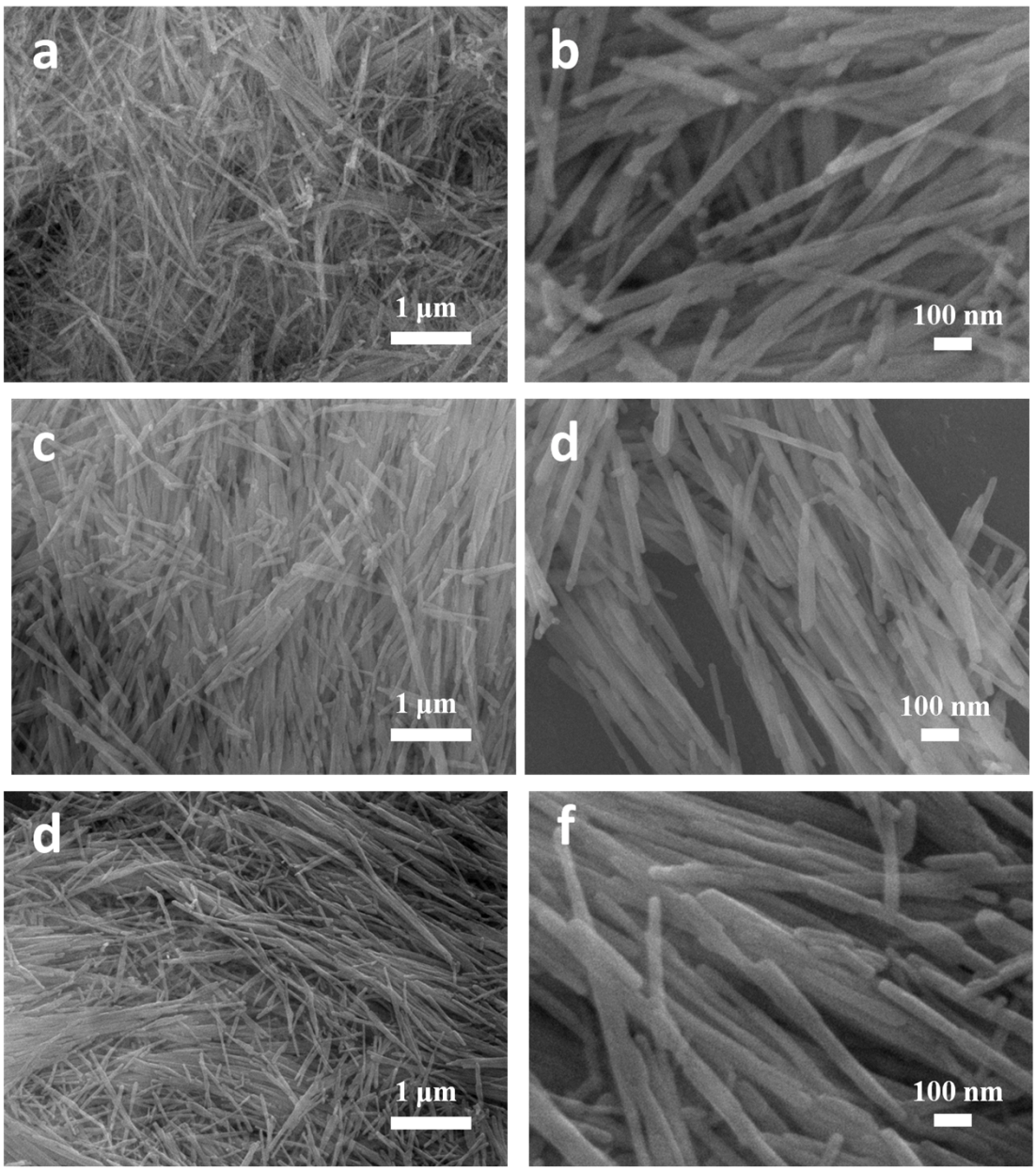

Figure S5. SEM images of the mixture of MnOOH precursors and LiOH annealed at 650°C for (a b) 5 h, (c d) 10 h and (e f) 15 h, respectively.

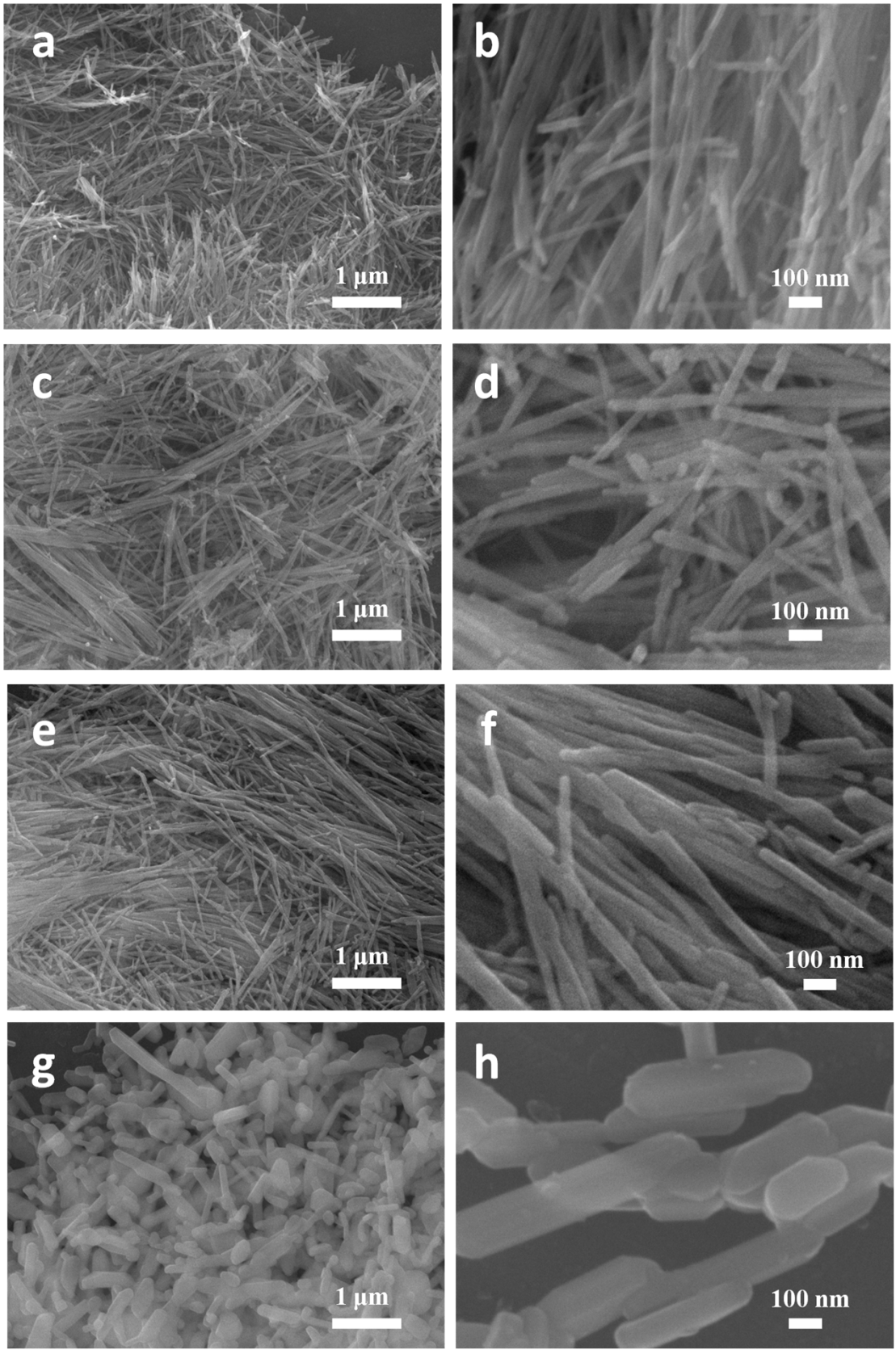

Figure S6. SEM images of the mixture of MnOOH precursors and LiOH annealed at (a b) 300, (c d) 500, (e f) 650 and (g h) 800°C for 15 h, respectively.

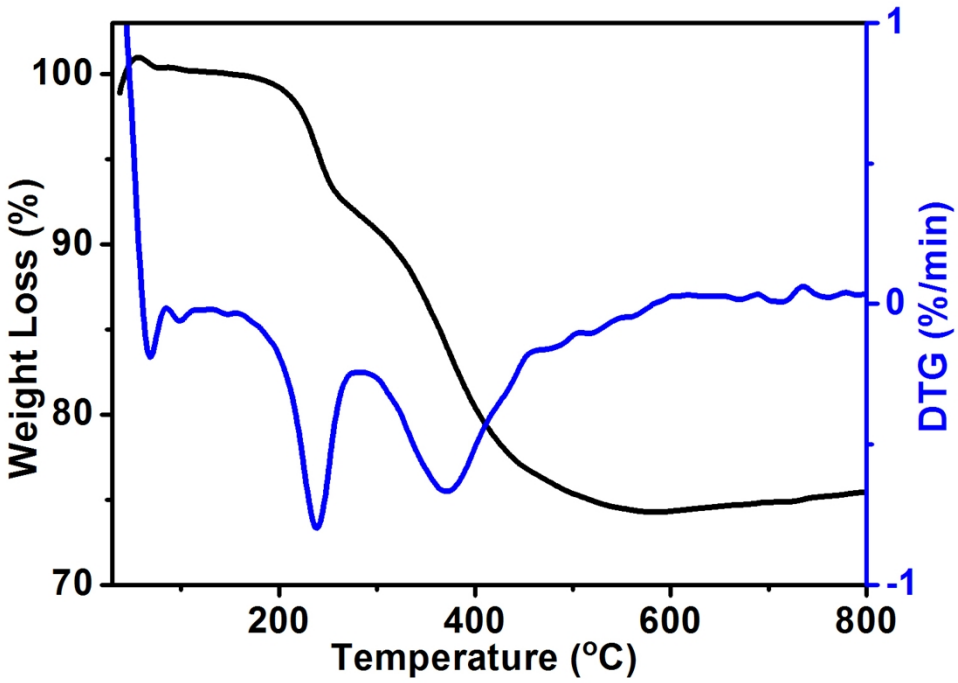

Figure S7. Thermogravimetric (TG) analysis of the mixture of MnOOH precursors and LiOH.

Based on the thermogravimetric (TG) analysis carried out in air by calcining the mixture of MnOOH precursors and LiOH to obtain Li_2MnO_3 (Figure S7), there are three weight losses corresponding to the temperature range of ~200 °C (I), 200-300 °C (II) and 300–600 °C (III), respectively. They are attributed to the removal of water molecules (I), the partial thermal decomposition of MnOOH to MnO_2 (II) and the process from MnOOH or MnO_2 to Li_2MnO_3 (III), respectively. It is clear that the reaction of MnOOH to Li_2MnO_3 is completed after 600 °C. Therefore, we chose the temperature of 650 °C to obtain a pure phase of Li_2MnO_3.

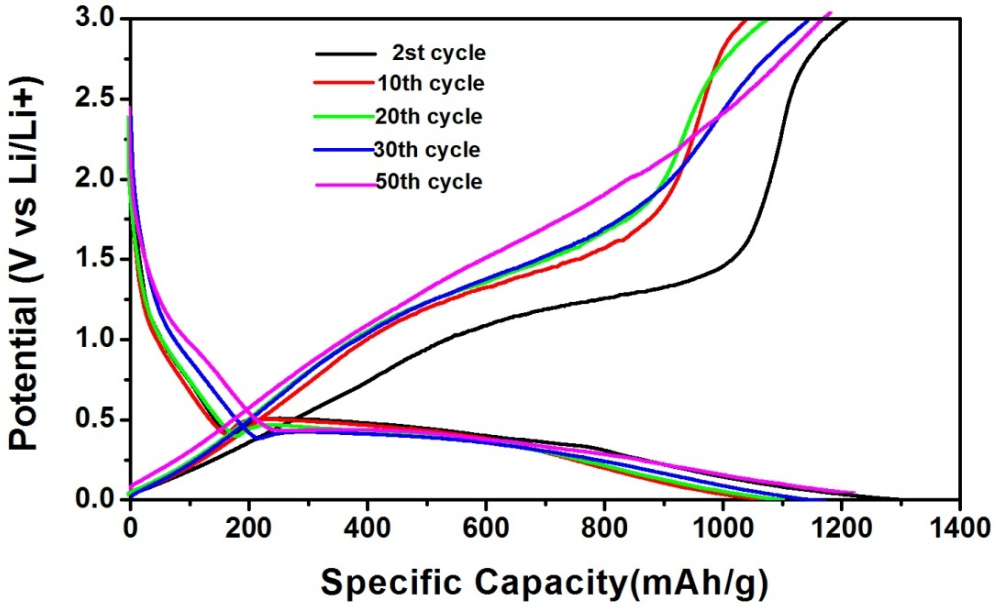

Figure S8. The charge–discharge curves at the current density of 100 mA g^{-1}.

Figure S8 depicts the charge/discharge potential profiles of the electrode tested at 100mAh g^{-1} at different cycles. The well-defined potential plateau is in the range of 0.25-0.5 V for lithiation and 1.25-1.5 V for delithiation. The increase in cell polarization was not observed in the case of Li_2MnO_3 nanowires, not even after 50 cycles.

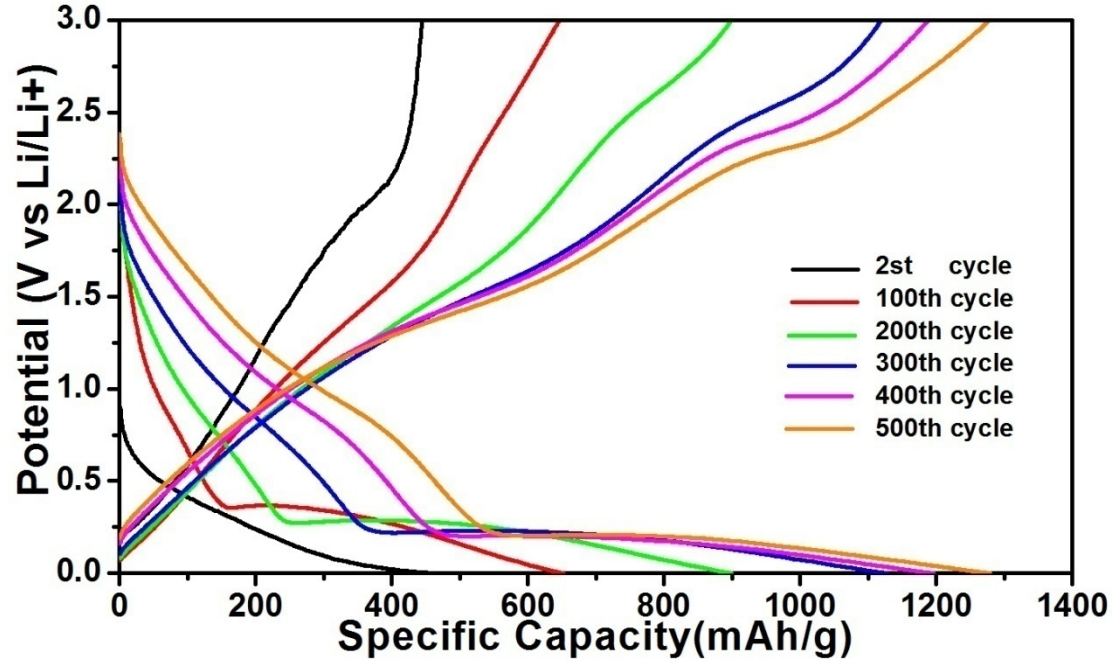

Figure S9. The charge–discharge curves of Li_2MnO_3 nanowires at the current density of 500 mA g^{-1}.

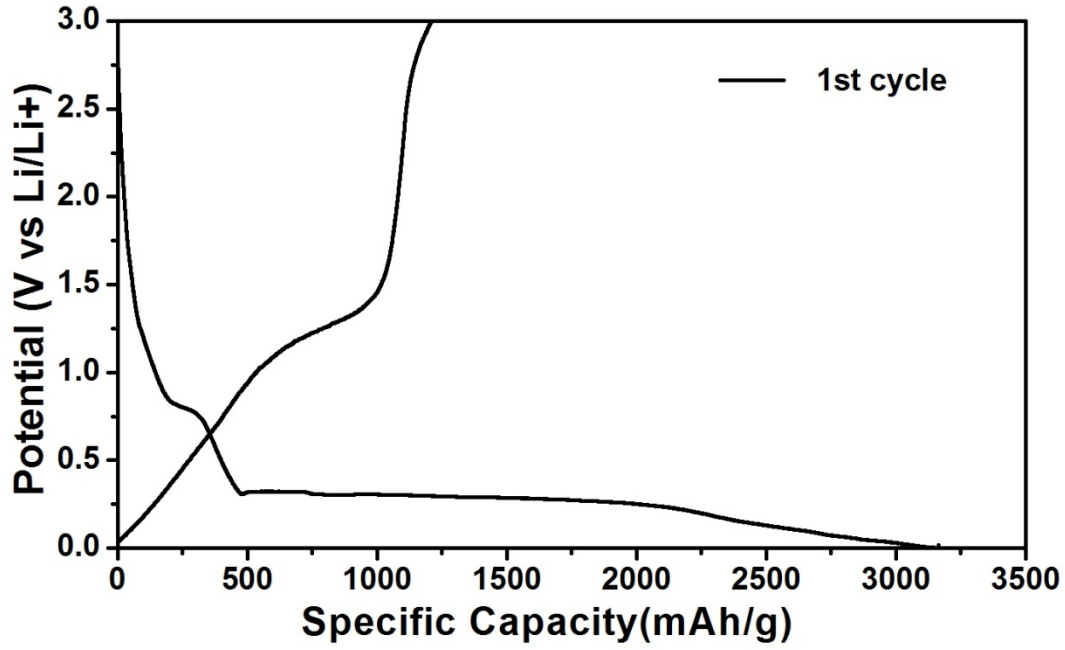

Figure S10. The initial charge/discharge curves of Li_2MnO_3 nanowires at the current density of 100 mA g^{-1}.

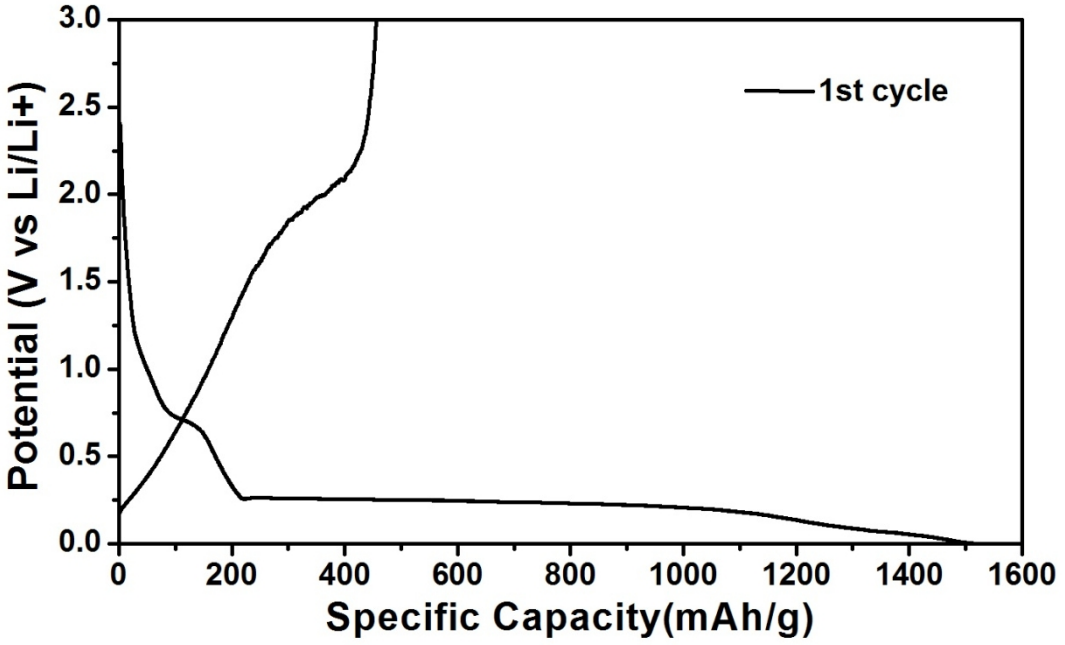

Figure S11. The initial charge/discharge curves of Li_2MnO_3 nanowires at the current density of 500 mA g^{-1}.

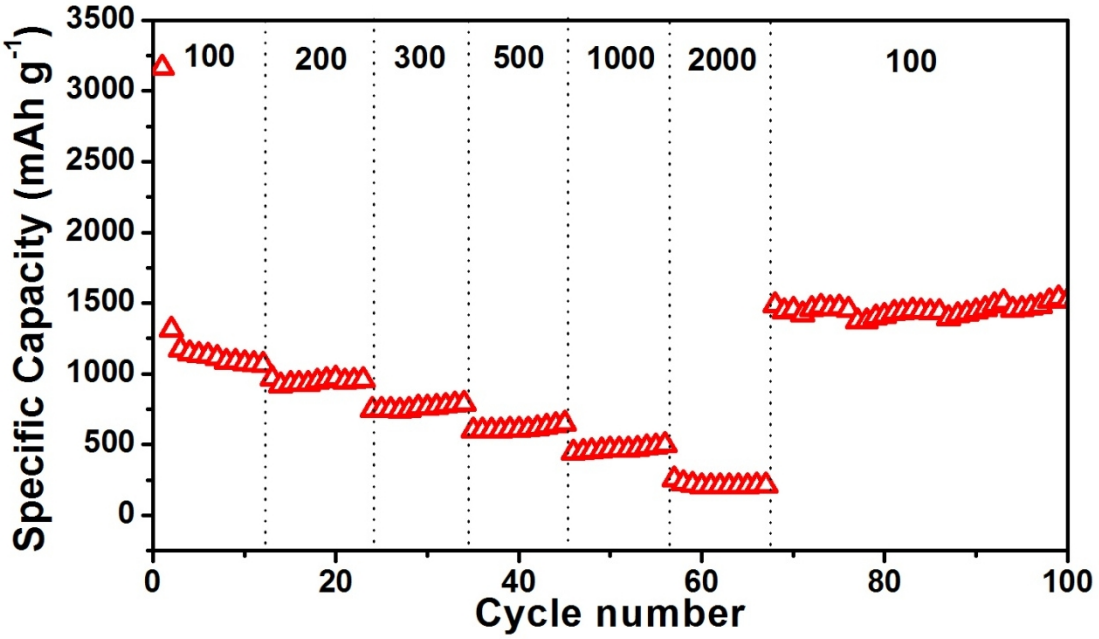

Figure S12 The rate performance of Li_2MnO_3 nanowires.

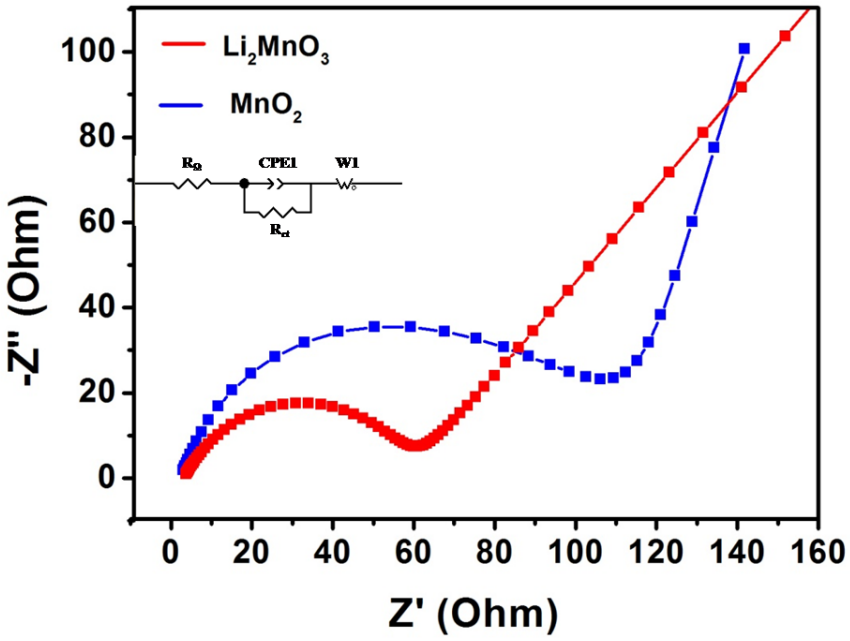

Figure S13. Nyquist plots of the AC impedance spectra for the electrodes based on the Li_2MnO_3 and MnO_2 nanowires.

Electrochemical impedance spectra (EIS) are measured to support the performance of the Li_2MnO_3 nanowires. As shown in Figure S13, all the AC impedance spectra of the electrodes based on the Li_2MnO_3 nanowires and MnO_2 nanowires exhibit the typical Nyquist plots composed by a semicircle at the high-to-medium frequency region and a

slope line at the low frequency region. This semicircle is attributed to the charge transfer resistance (R_{ct}) between the electrolyte and the electrode. The slope line might be related with the Warburg impedance (Z_w) induced by lithium diffusion in the electrodes. The R_{ct} of Li_2MnO_3 nanowires is 52 Ω，lower than the 107 Ω of MnO_2 nanowires.

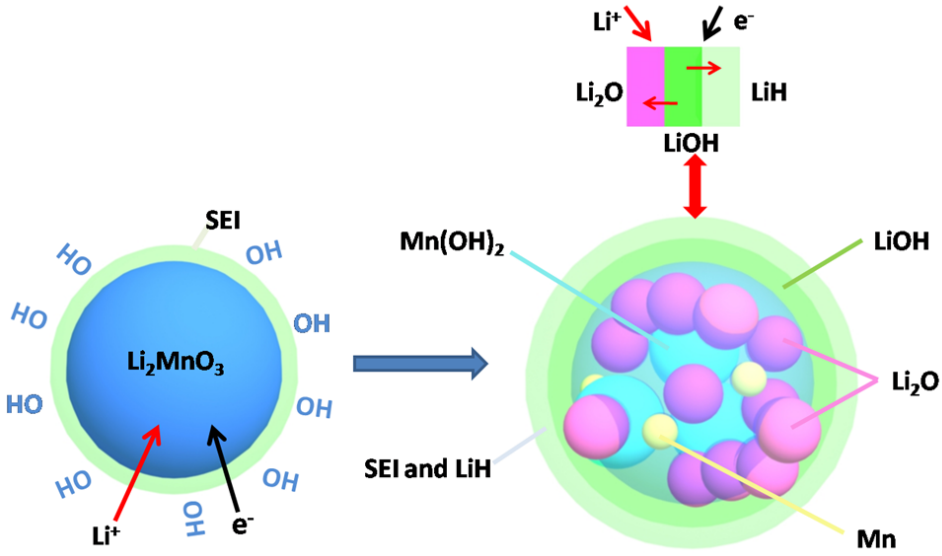

Figure S14. Summary of the reaction pathway at various states of discharge for Li_2MnO_3 nanowires.

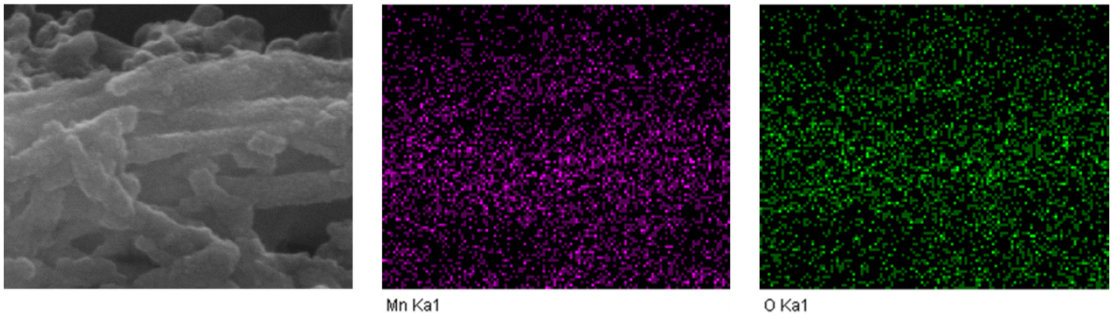

Figure S15. EDX elemental mappings of the cycled Li_2MnO_3 nanowires.

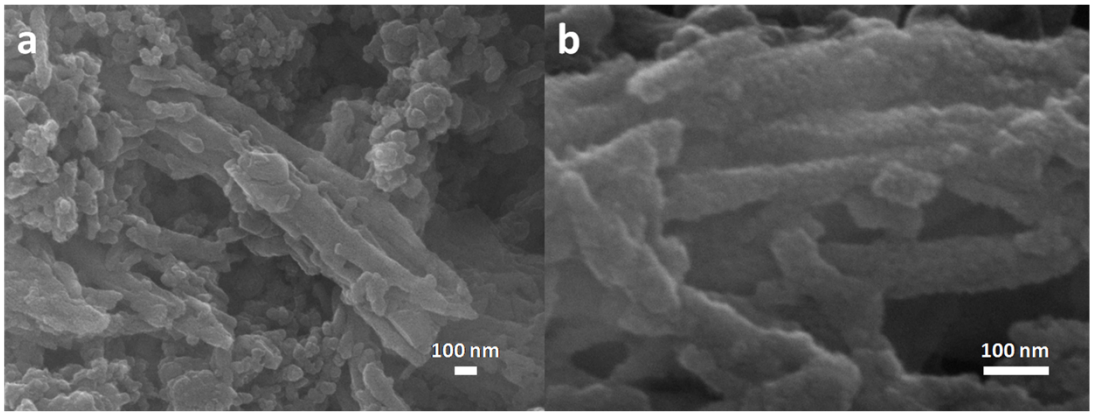

Figure S16. SEM images of the cycled Li_2MnO_3 nanowires after 500 cycles.

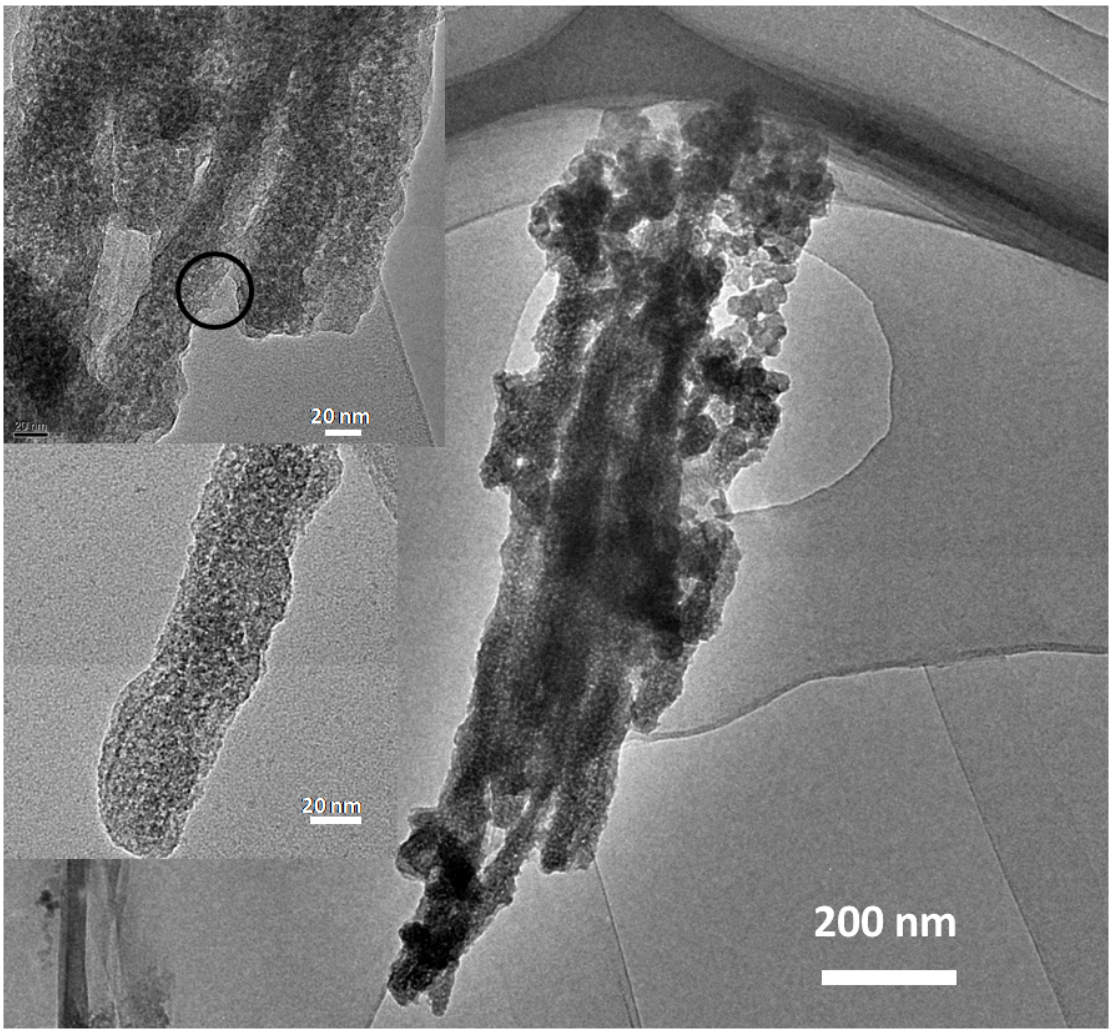

Figure S17. TEM images of the cycled Li_2MnO_3 nanowires after 500 cycles.