Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Video S1: The highly stretchable property of the fiber-shaped lithium ion battery.

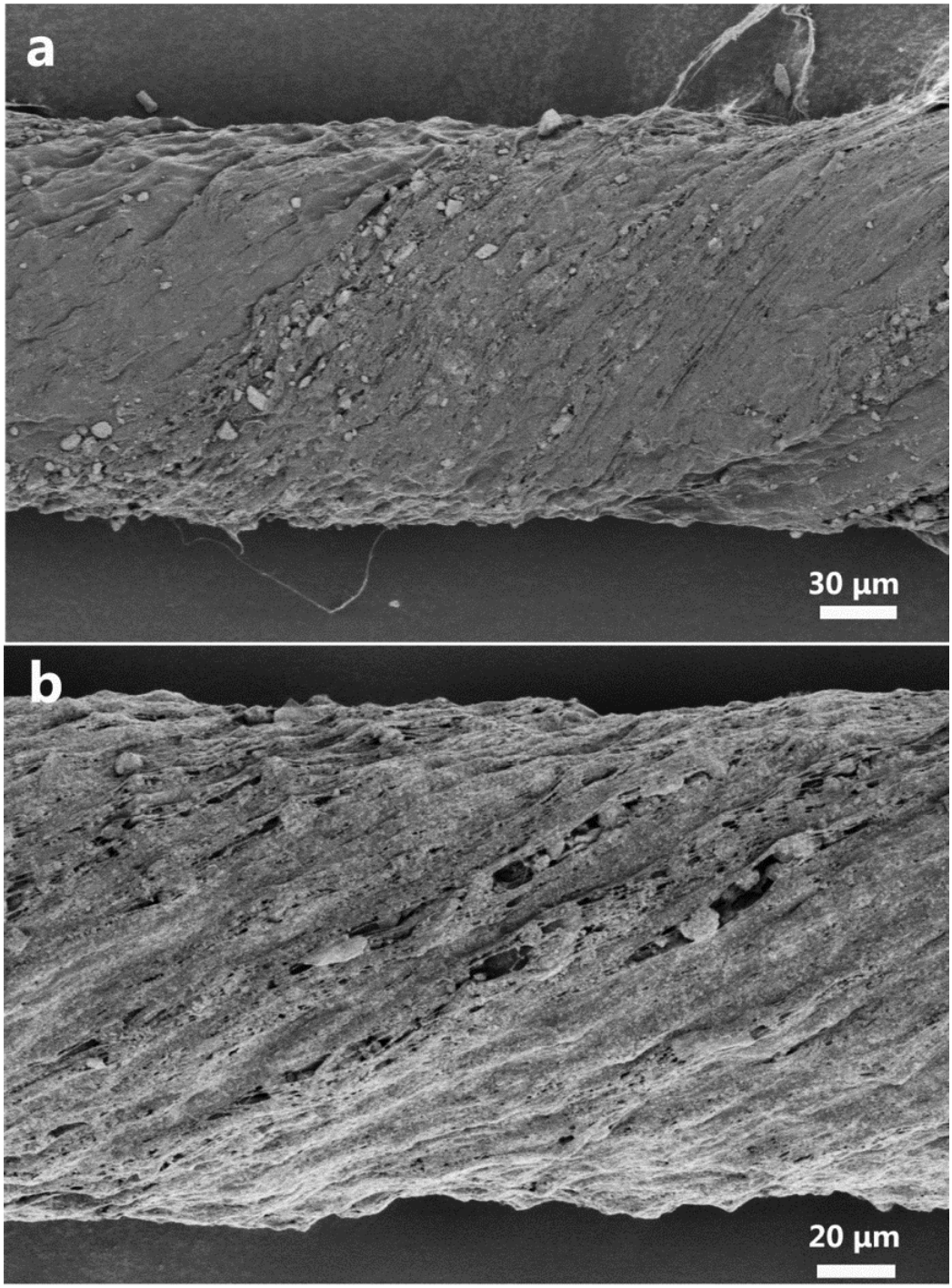

Figure S1. a and **b.** SEM images of MWCNT/$LiMn_2O_4$ and MWCNT/$Li_4Ti_5O_{12}$ composite fibers, respectively.

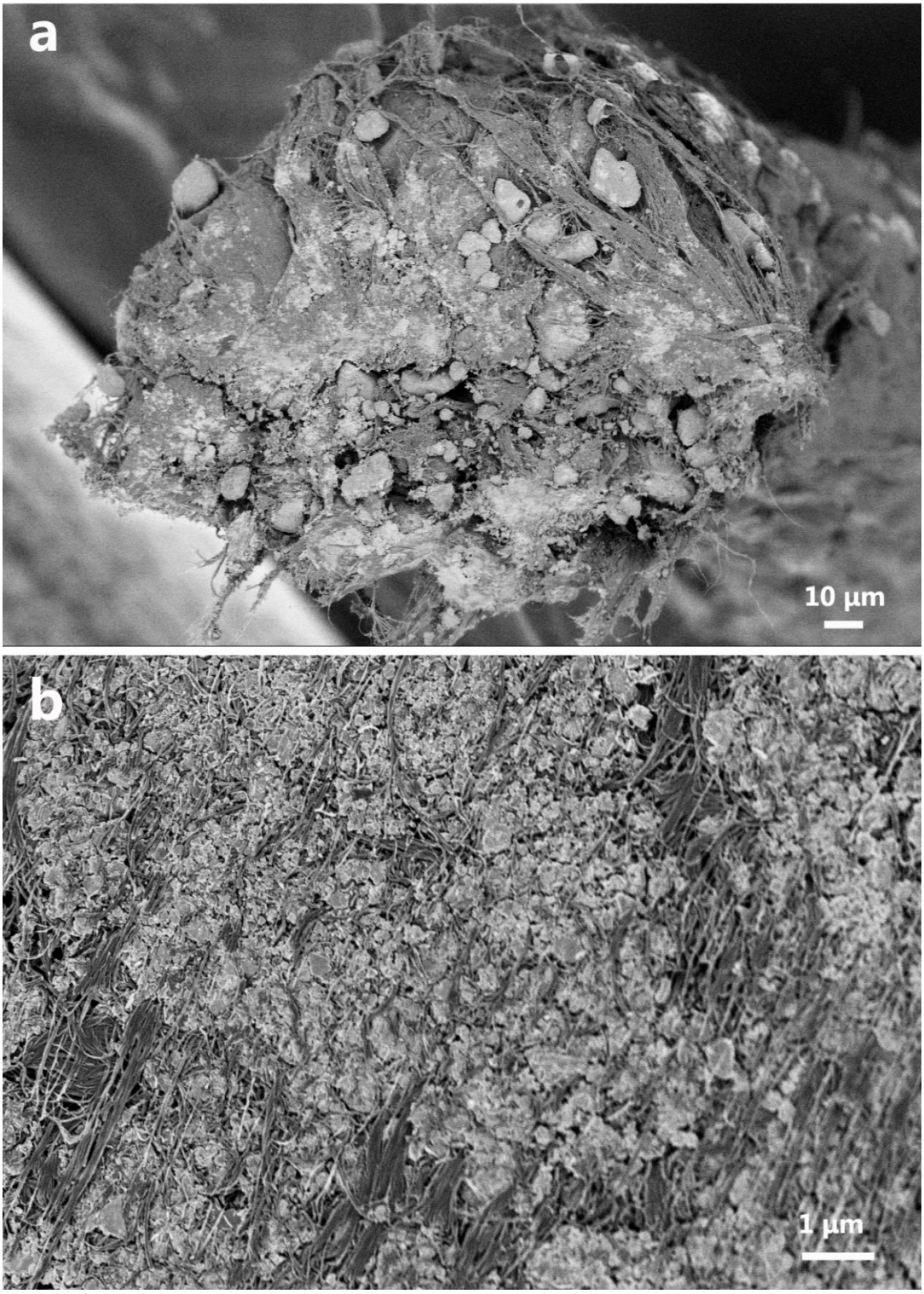

Figure S2. a and **b.** Cross-sectional SEM images of an MWCNT/$LiMn_2O_4$ composite fiber at low and high magnifications, respectively.

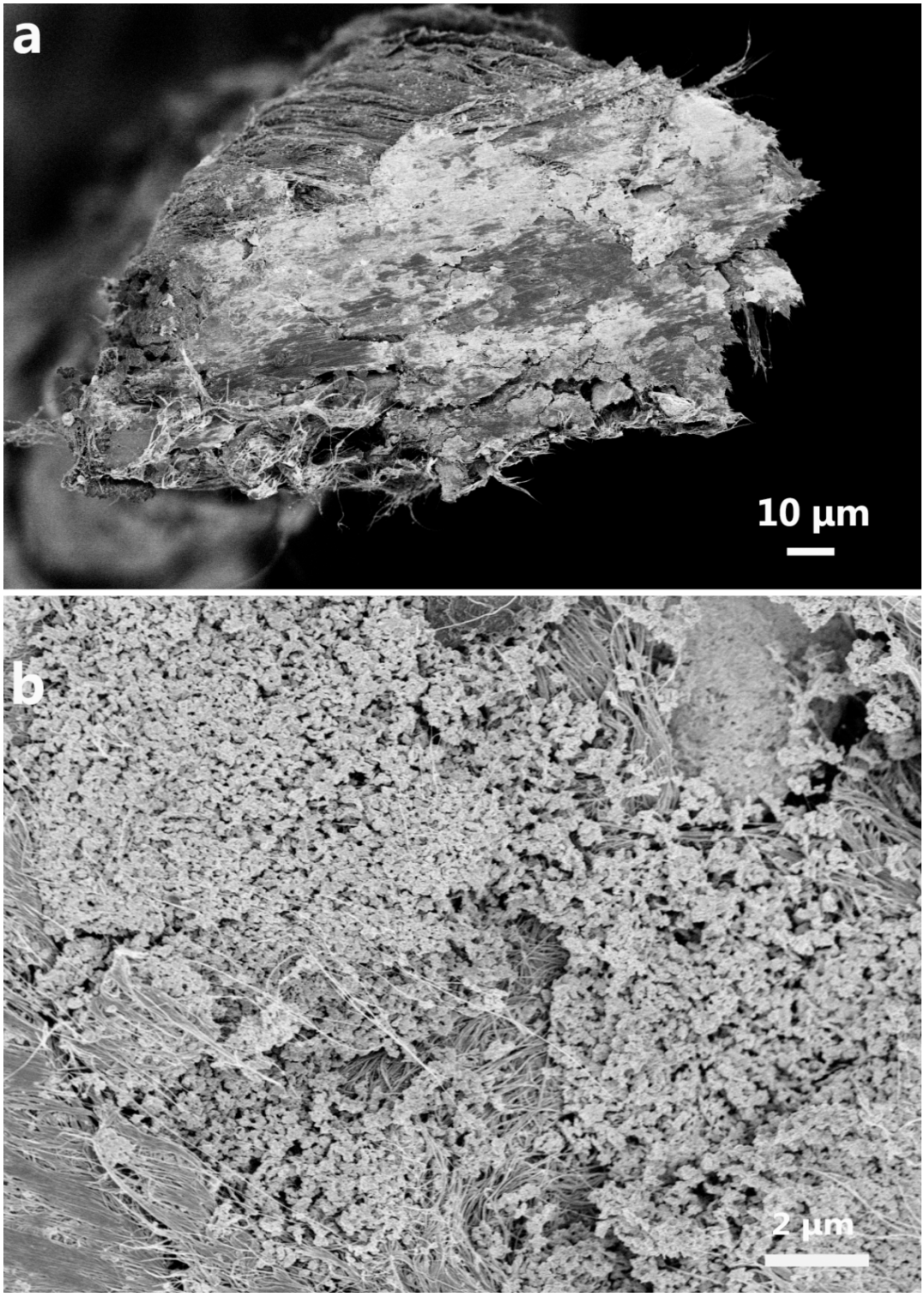

Figure S3. a and **b.** Cross-sectional SEM images of an MWCNT/$Li_4Ti_5O_{12}$ composite fiber at low and high magnifications, respectively.

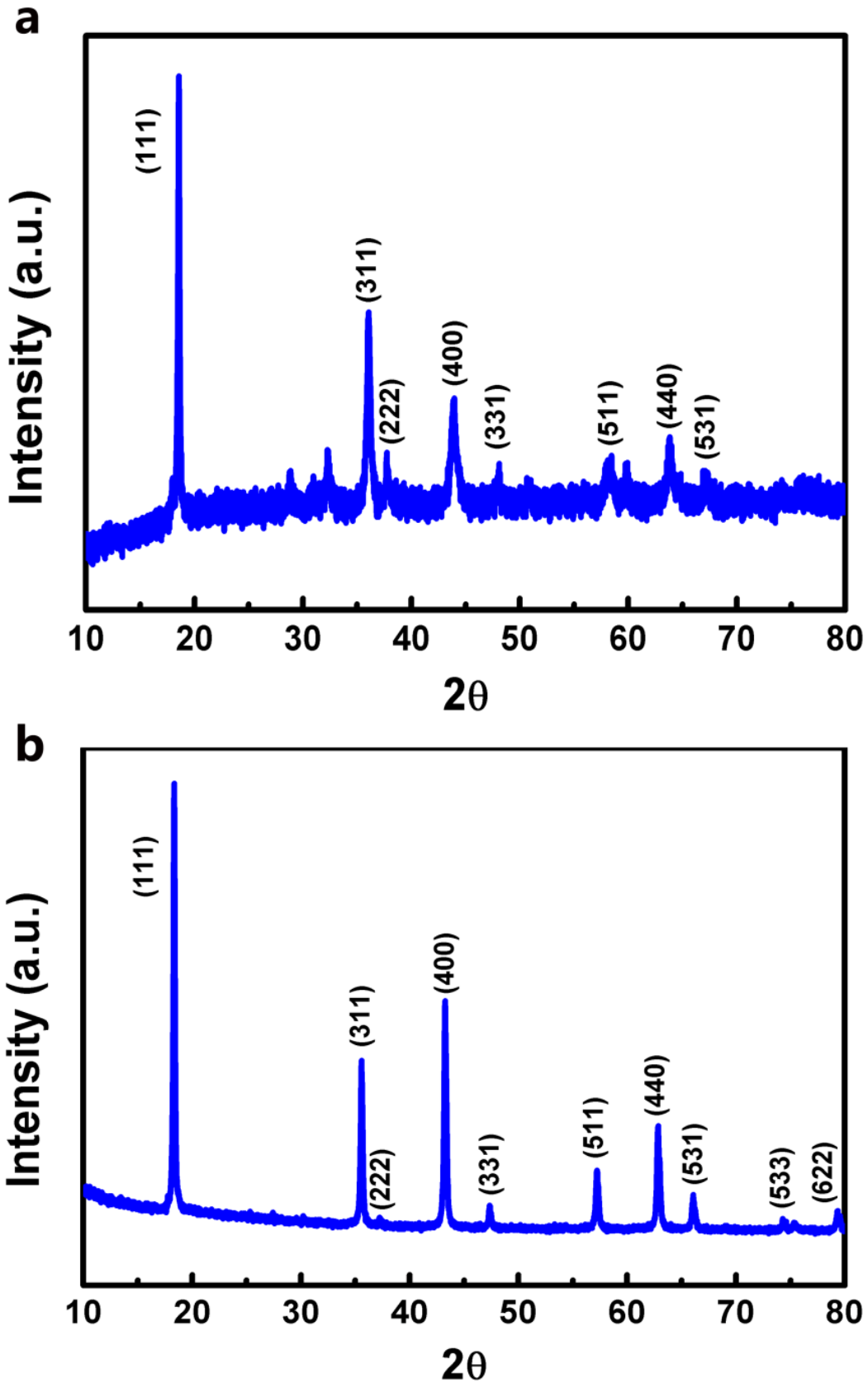

Figure S4. a and **b.** X-ray diffraction patterns of pure $LiMn_2O_4$ and $Li_4Ti_5O_{12}$ particles, respectively.

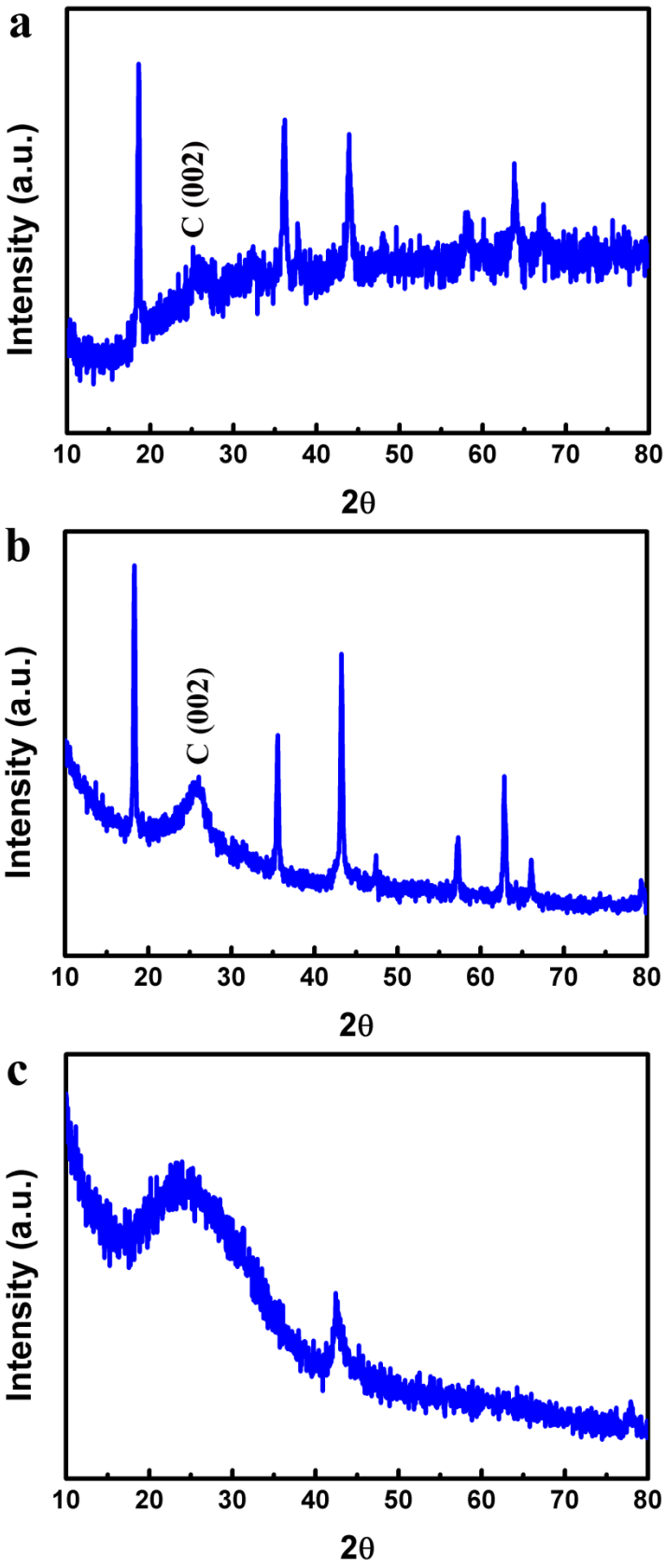

Figure S5. a, b and **c.** X-ray diffraction patterns of MWCNT/$LiMn_2O_4$ composite fiber, MWCNT/$Li_4Ti_5O_{12}$ composite fiber and pure MWCNT fiber, respectively.

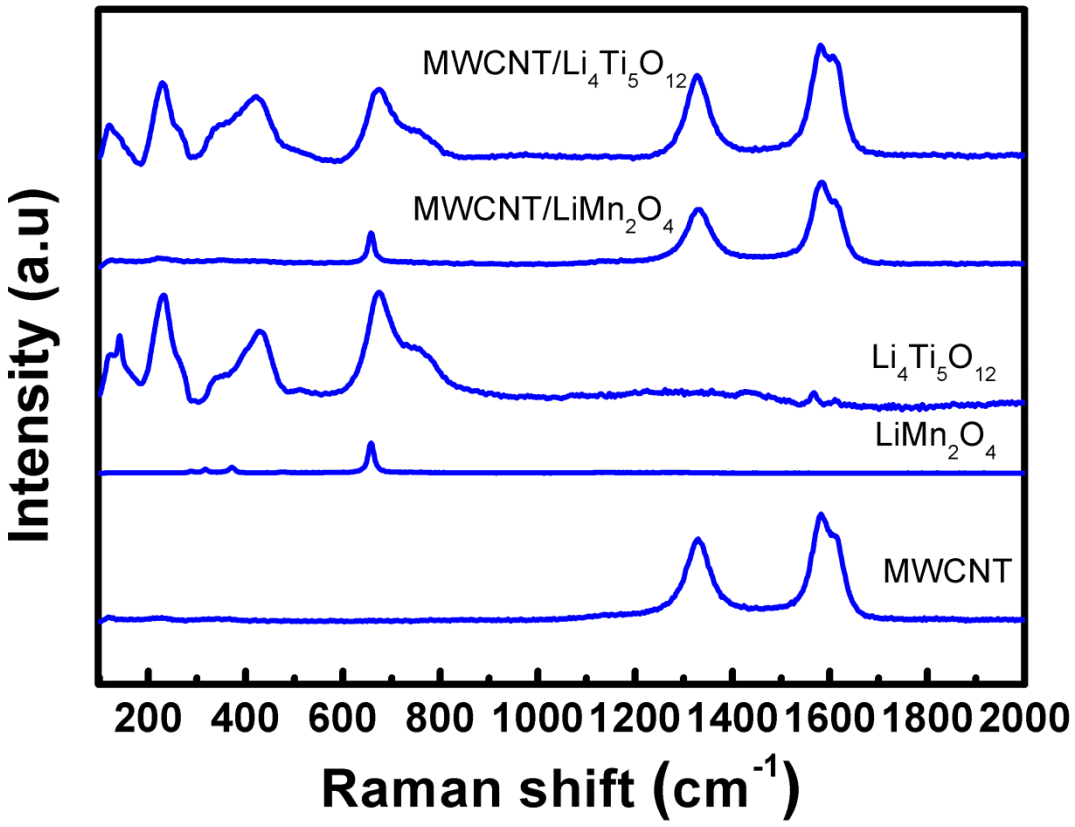

Figure S6. Raman spectra of MWCNT, $LiMn_2O_4$, $Li_4Ti_5O_{12}$, MWCNT/$LiMn_2O_4$ and MWCNT/$Li_4Ti_5O_{12}$ composite fibers.

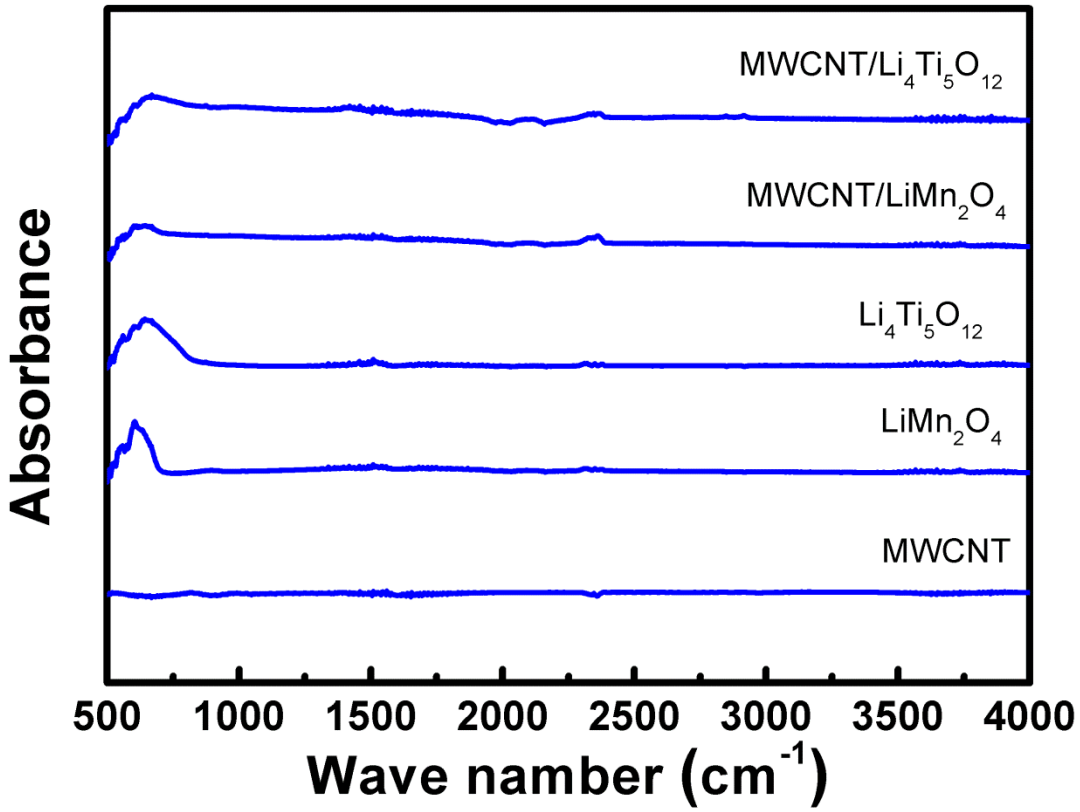

Figure S7. FTIR spectra of MWCNT, $LiMn_2O_4$, $Li_4Ti_5O_{12}$, MWCNT/$LiMn_2O_4$ and MWCNT/$Li_4Ti_5O_{12}$ composite fibers.

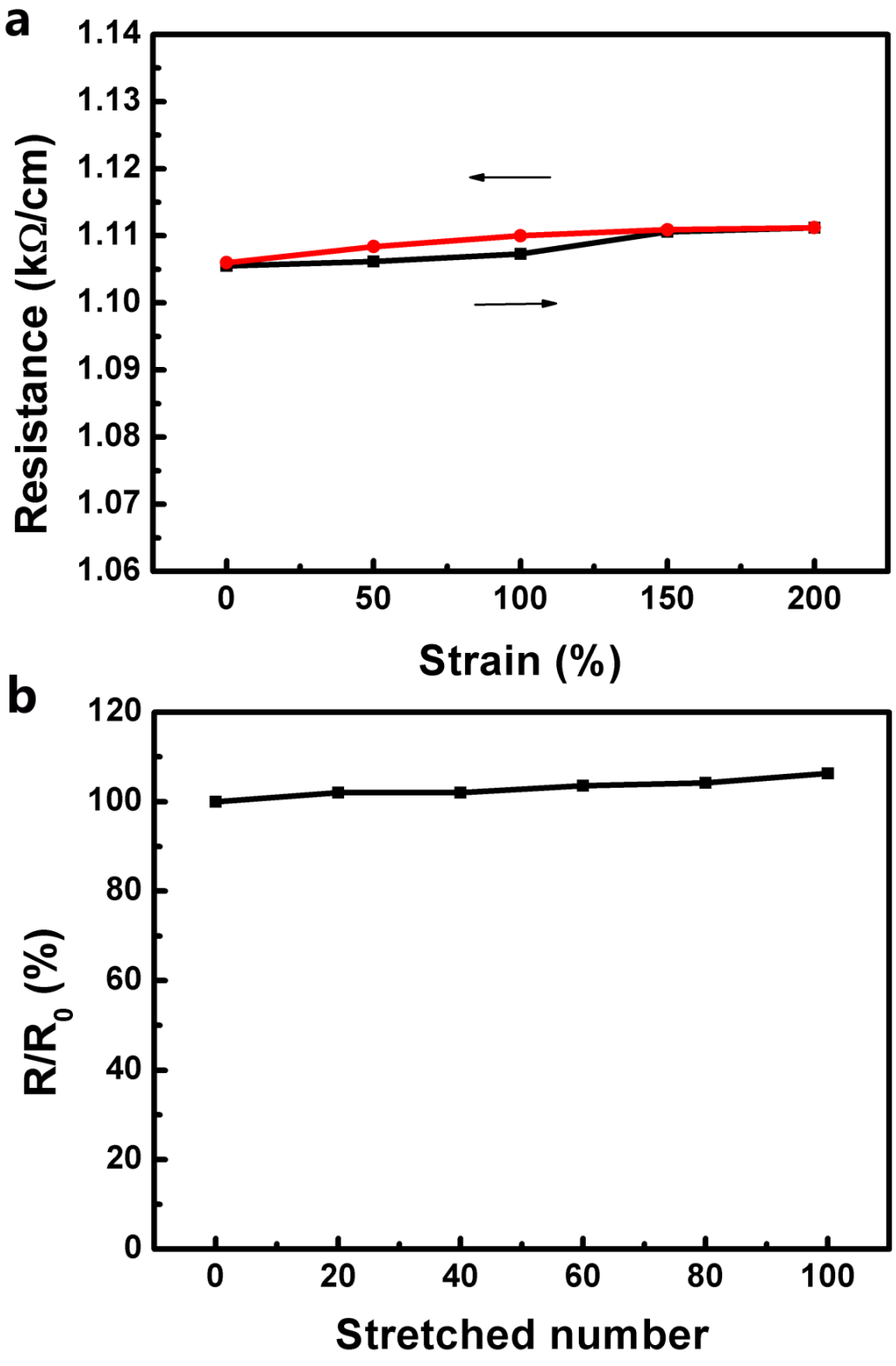

Figure S8. a. Changes of resistances for the positive electrode during the stretching and releasing process with a strain of 200%. **b.** Dependence of resistance on stretched number (at a strain of 200%). R_0 and R correspond to resistances before and after stretching, respectively.

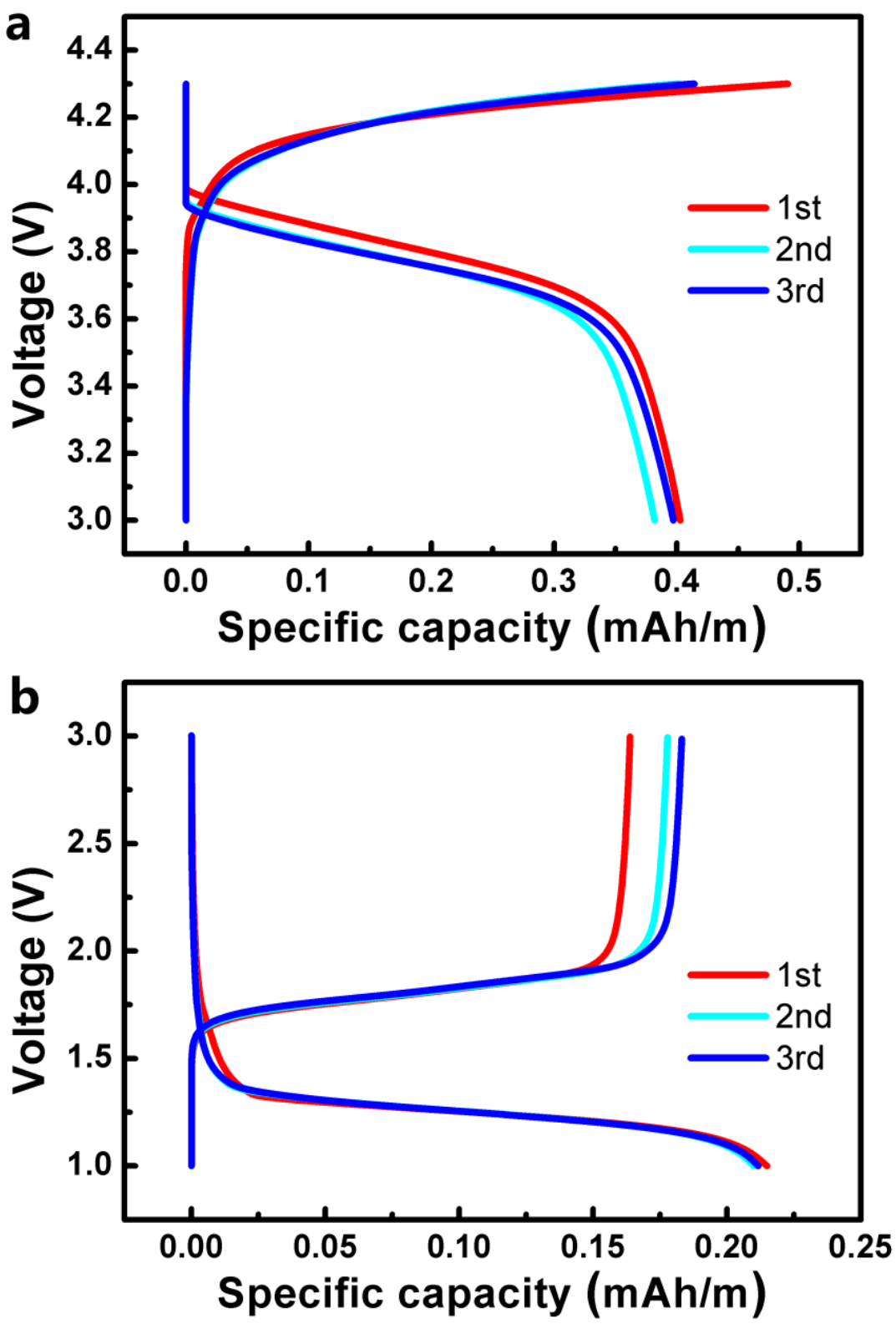

Figure S9. a and **b.** Charge and discharge profiles of positive (MWCNT/$LiMn_2O_4$ composite fiber) and negative (MWCNT/$Li_4Ti_5O_{12}$ composite fiber) electrodes in half cells with lithium as the counter electrode, respectively.

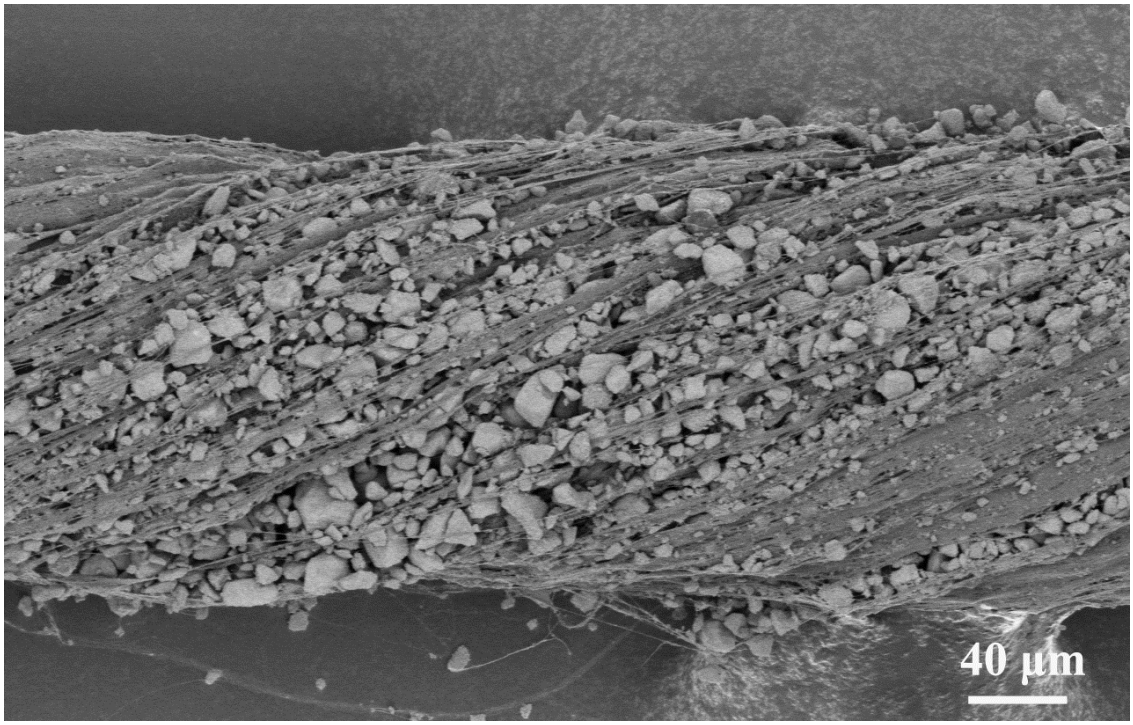

Figure S10. SEM image of the MWCNT/$LiMn_2O_4$ composite fiber (weight percentage of 87% for the $LiMn_2O_4$).

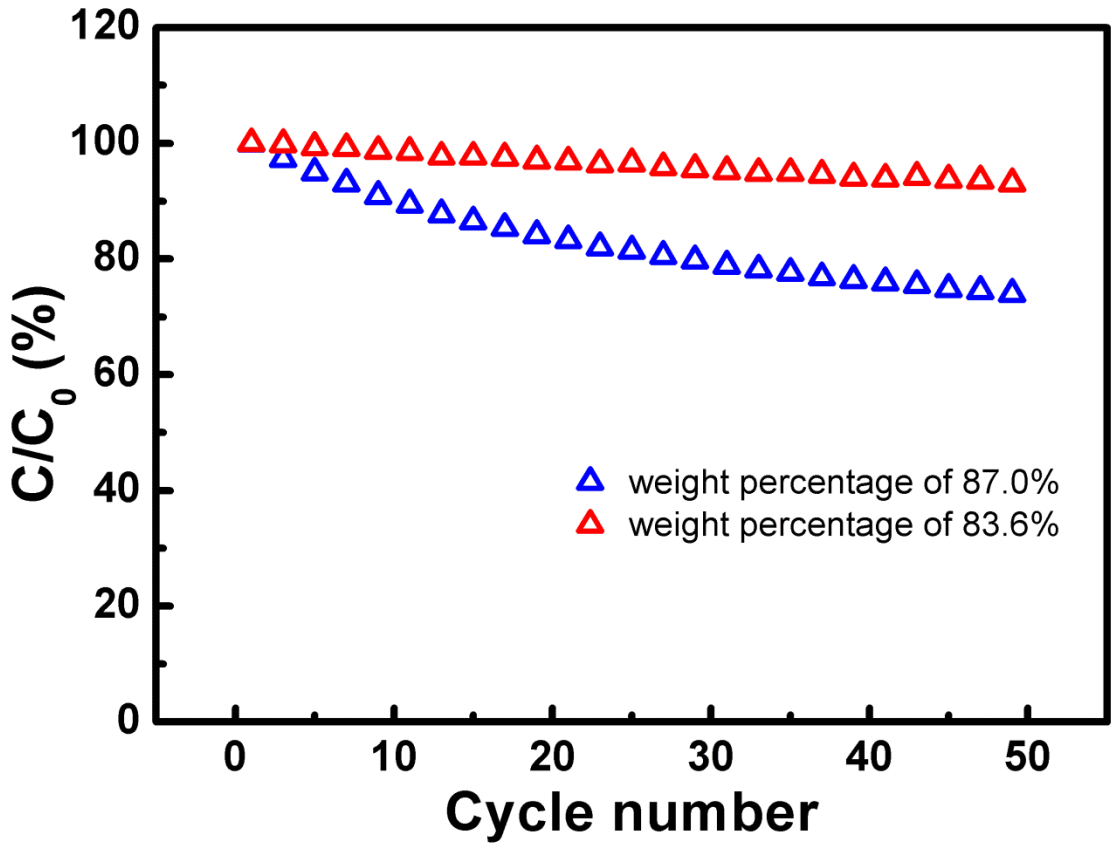

Figure S11. Dependence of specific capacity of positive electrode (MWCNT/$LiMn_2O_4$ composite fiber) in half cells on cycle number. C_0 and C correspond to the specific capacities at the first and following cycle, respectively.

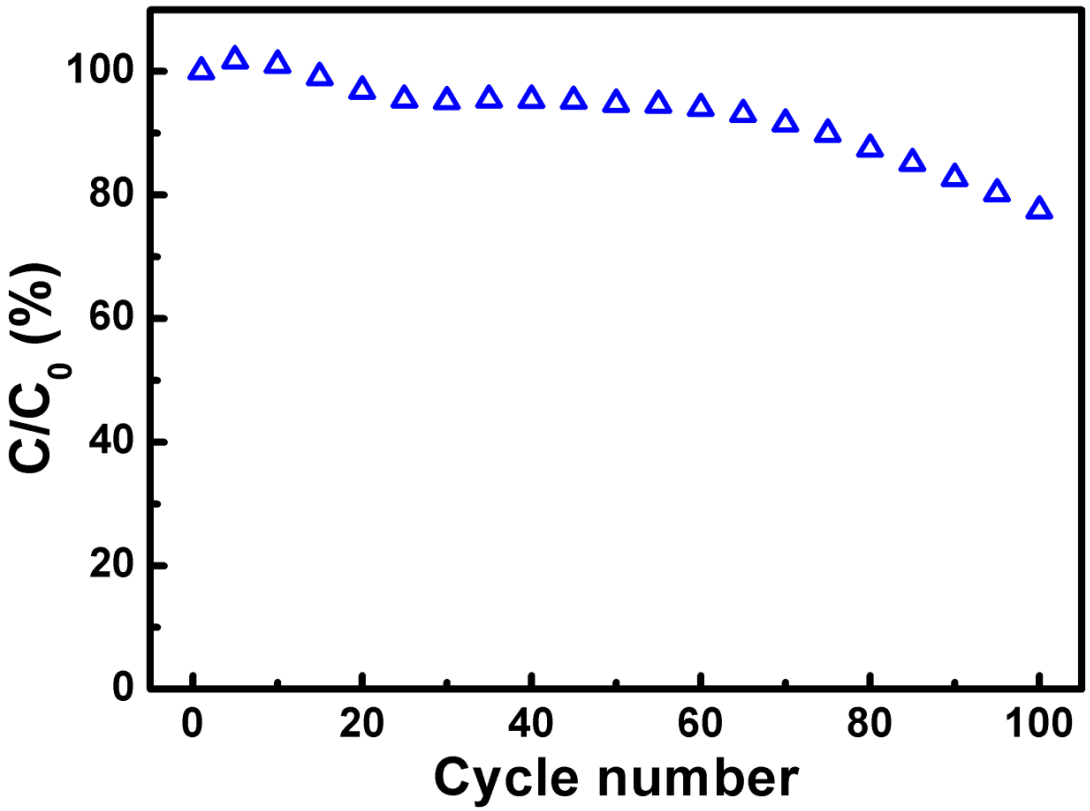

Figure S12. Dependence of specific capacity of a fiber-shaped battery on cycle number. C_0 and C correspond to the specific capacity at the first and following cycle, respectively.

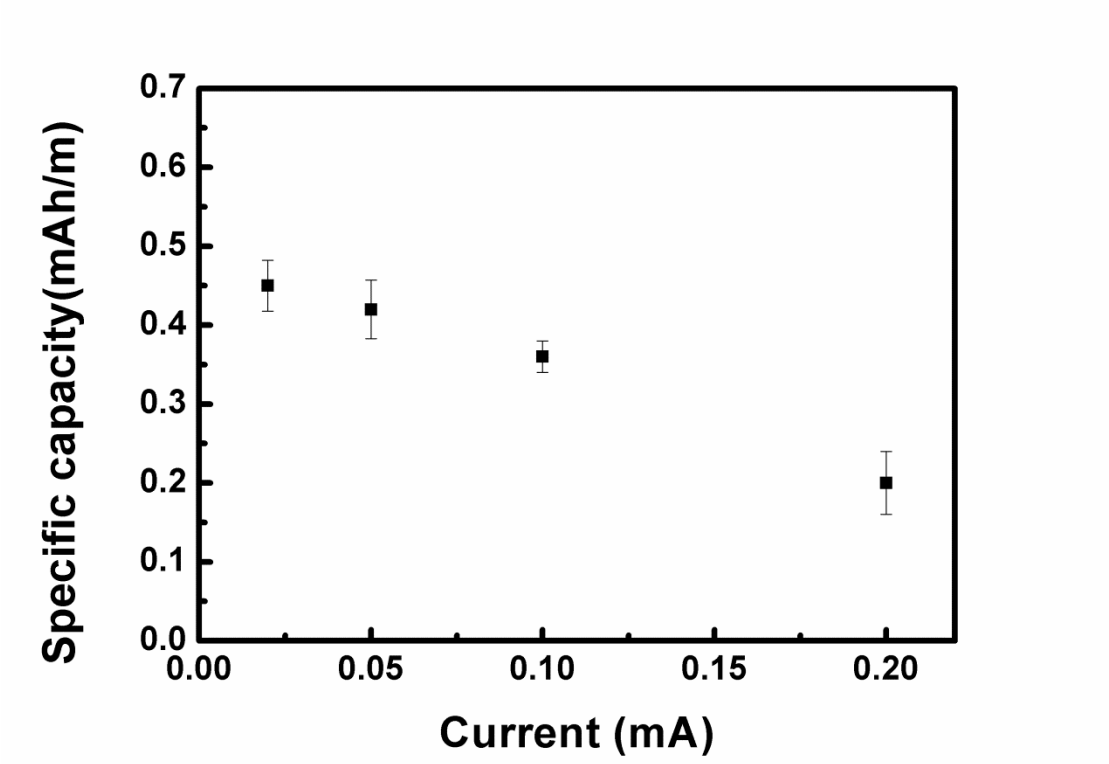

Figure S13. Dependence of specific capacity of a fiber-shaped battery on current.

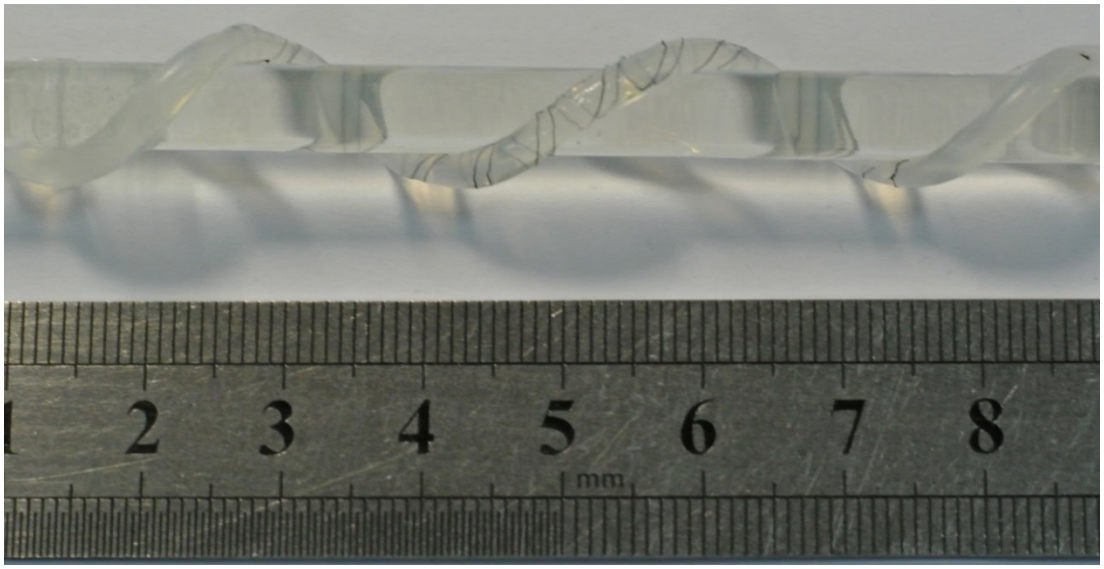

Figure S14. Photograph of a stretchable fiber-shaped battery being wound on a glass rod.

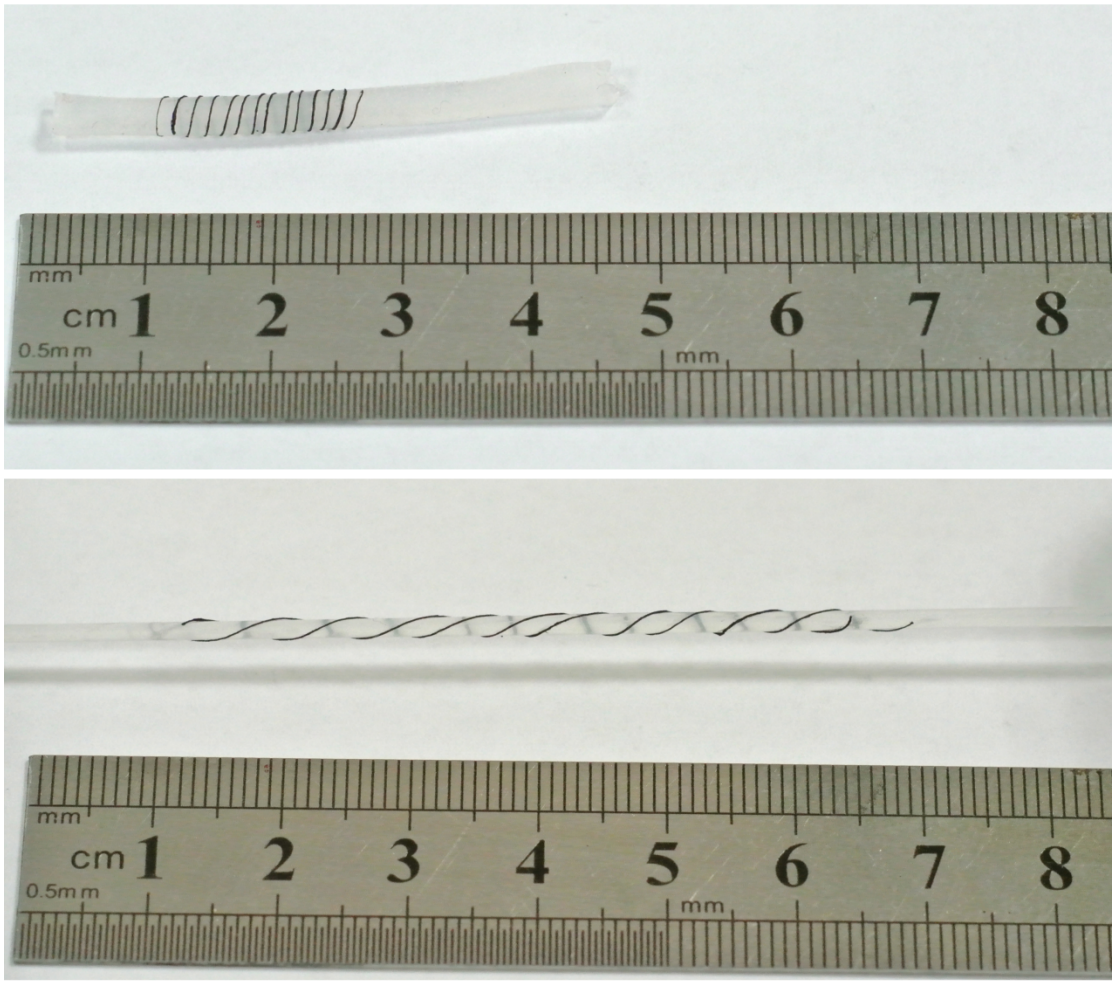

Figure S15. Photographs of a stretchable fiber-shaped battery with a strain over 200%.

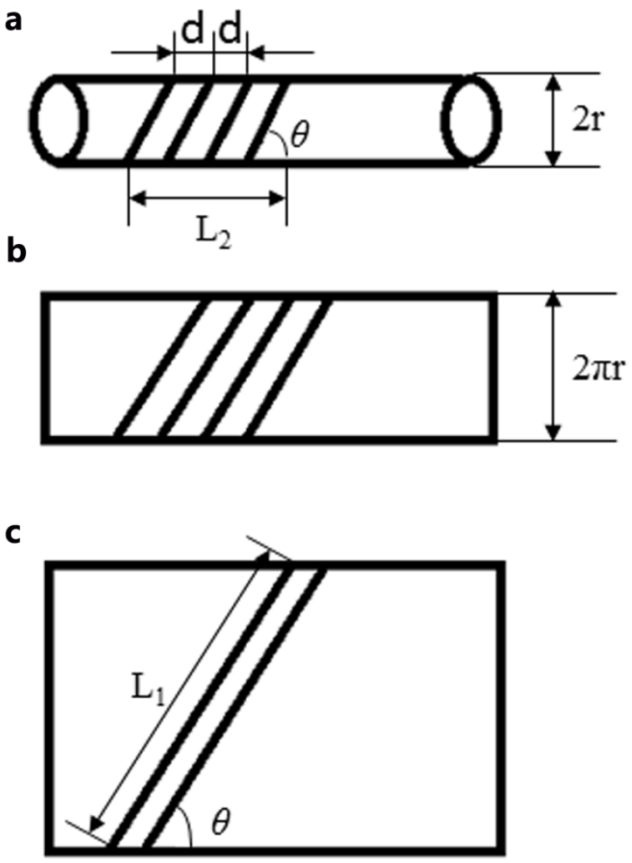

Figure S16. Schematic illustration to the stretchability of a fiber-shaped lithium-ion battery based on the twist structure.

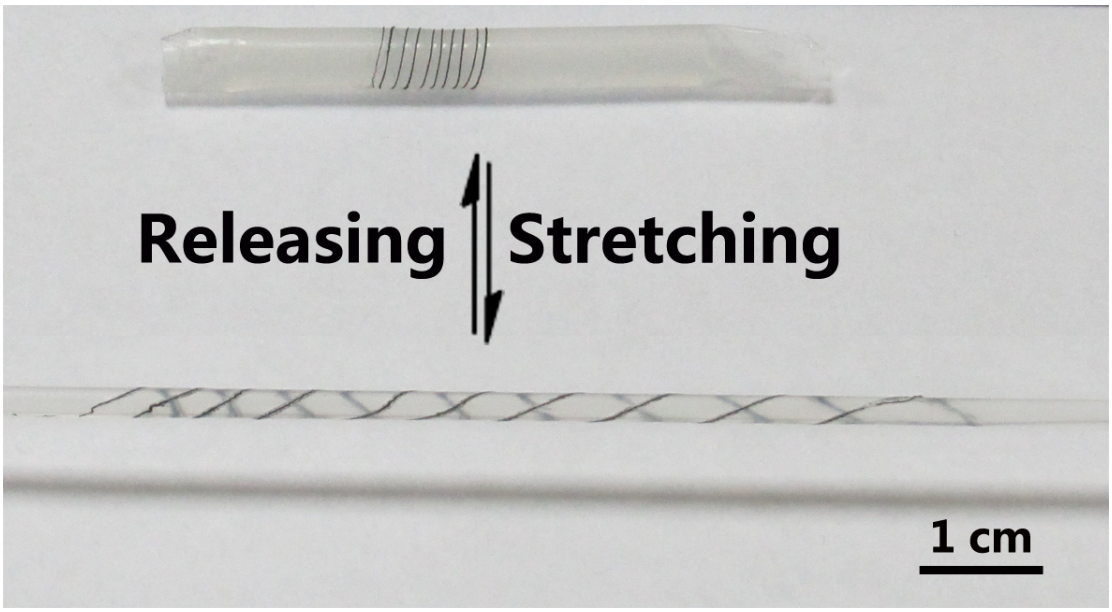

Figure S17. Photograph of a stretchable fiber-shaped battery with a strain of 600%.

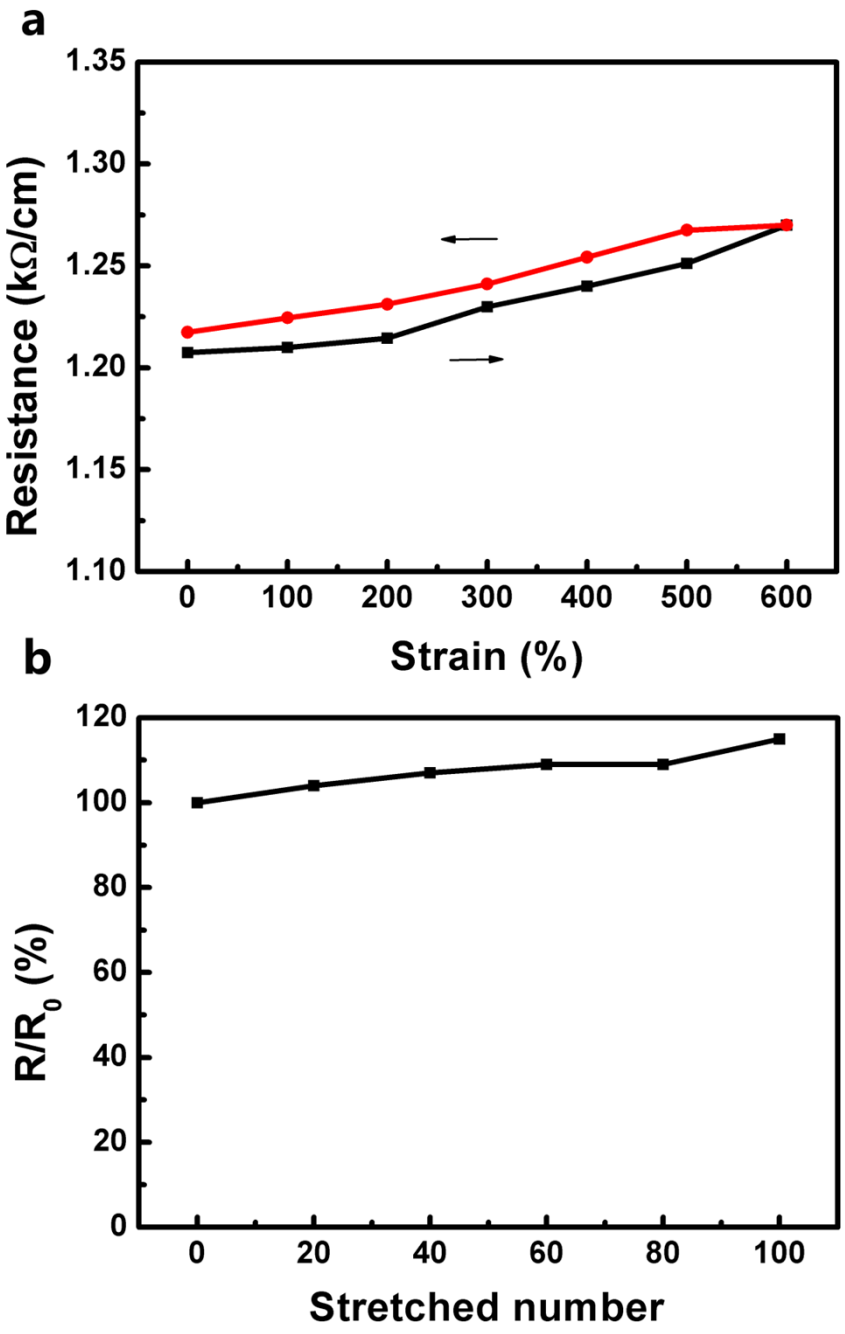

Figure S18. a. Changes of resistances for the positive electrode during the stretching and releasing process with a strain of 600%. **b.** Dependence of resistance on stretched number at the strain of 600%. R_0 and R correspond to resistances before and after stretching, respectively.