**Supporting Information**

**General strategy to construct uniform carbon-coated spinel LiMn$_2$O$_4$ nanowires for ultrafast rechargeable lithium-ion batteries with long cycle life**

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Figure S1. SEM images of the SS-LMO obtained from solid-state reaction of MnO$_2$ and LiOH at 700 °C.
Figure S2. TEM images of the typical nanowires after hydrothermal process for 48 h.
Figure S3. X-ray photoelectron spectroscopy (XPS) C1s spectrum of MnO$_2$ nanosheets.
Figure S4. AFM image of the as-obtained C-LMO NWs.
**Figure S5.** Relative concentration of C, O, Mn and Cu at the edge and middle zone of an individual LiMn$_2$O$_4$ nanowire.
Figure S6. Nitrogen adsorption-desorption isotherm (the inset shows the pore size distributions calculated using the BJH method).
Figure S7. The first charge/discharge profiles of C-LMO NWs at 1 C (the inset is CV plot at 0.05 mV s$^{-1}$).
**Figure S8.** Discharge curves of C-LMO NWs at different discharge rates of 1 C (140 mA g\(^{-1}\)) to 30 C (4200 mA g\(^{-1}\)).
**Figure S9.** Comparison of the rate capabilities of C-LMO NWs, LMO nanowires,\textsuperscript{27} LMO nanotubes,\textsuperscript{12} LMO microcubes\textsuperscript{20} and LMO nanocones.\textsuperscript{15}
Figure S10. Electrochemical impedance spectroscopy (EIS) of the C-LMO NWs and SS-LMO electrodes. The inset equivalent circuit was used to fit the impedance data with the resistance of the electrolytes ($R_s$), where: $R_i$, resistance for Li$^+$ migration through the surface film; $C_i$, surface film capacitance; $C_{dl}$, double-layer capacitance; and $Z_w$, Warburg resistance.