Supporting Information

General strategy to construct uniform carbon-coated spinel LiMn₂O₄ nanowires for ultrafast rechargeable lithium-ion batteries with long cycle life

Weiwei Sun,^a[‡] Huiqin Liu,^a[‡] Yumin Liu,^b Gongxun Bai,^c Wei Liu,^a Shishang Guo,^{*,a} and Xing-Zhong Zhao^{*,a}

^aSchool of Physics and Technology and Key Laboratory of Artificial Micro- and Nano-structure of Ministry of Education, Wuhan University, Wuhan, 430072, China;

^bInstitute for Interdisciplinary Research (IIR), Jianghan University, Wuhan 430056, Hubei, PR China;

^cDepartment of Applied Physics, The Hong Kong Polytechnic University, Hong Kong (China)

*Corresponding Author: E-mail: gssyhx@whu.edu.cn;

xzzhao@whu.edu.cn.

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 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 LiMn₂O₄ nanowire.

	Element	Weight (%)	Atomic (%)
	С	0.3	1.4
	0	0.4	1.3
	Mn	31.7	34.2
	Cu	67.6	63.1
0.48 nm	Total	100	100
<u>a</u>	Element	Weight	Atomic
A GINTERNA AND AND AND AND AND AND AND AND AND A		(%)	(%)
	С	(%) 1.3	(%) 6.4
	C O	(%) 1.3 0.0	(%) 6.4 0.0
	C O Mn	(%) 1.3 0.0 0.6	(%) 6.4 0.0 0.6
5 nm	C O Mn Cu	(%) 1.3 0.0 0.6 98.1	(%) 6.4 0.0 0.6 93

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,²⁷ LMO nanotubes,¹²

LMO microcubes²⁰ and LMO nanocones.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.

