Electronic Supplementary Information

Designed Synthesis of LiMn$_2$O$_4$ Microspheres with Adjustable Hollow Structures for Lithium-Ion Battery Applications

Liang Zhou,$^{a,b}$ Xufeng Zhou,$^c$ Xiaodan Huang,$^a$ Zhaoping Liu,$^c$ Dongyuan Zhao,$^a$ Xiangdong Yao$^{d*}$ and Chengzhong Yu$^{*b}$

$^a$ Department of Chemistry, Fudan University, Shanghai, 200433, P. R. China.

$^b$ Australian Institute of Bioengineering and Nanotechnology, The University of Queensland, Brisbane, QLD 4072, Australia. Fax: 61-7-33463973; Tel: 61-7-33463283; E-mail: c.yu@uq.edu.au

$^c$ Ningbo Institute of Materials Technology & Engineering, Chinese Academy of Sciences, Ningbo, 315201, China.

$^d$ Queensland Micro and Nanotechnology Centre, Griffith University, Brisbane, QLD 4111, Australia. E-mail: x.yao@griffith.edu.au
**Figure S1.** XRD pattern (a), SEM images (b, c), and TGA curve (d) of MnCO$_3$ microspheres.
Figure S2. TEM images of MnCO$_3$ microspheres.
Figure S3. XRD pattern (a), SEM images (b, c), N₂ adsorption-desorption isotherm and pore size distribution (d) of porous MnO₂ microspheres treated after Step A1.
Figure S4. TEM image (a), N$_2$ adsorption-desorption isotherm and pore size distribution (b) of the MnO$_2$ hollow microspheres treated after Step B2.
Figure S5. SEM image of LiMn$_2$O$_4$-A. A broken hollow microsphere is indicated by the black arrow.
**Figure S6.** SEM image of LiMn$_2$O$_4$-B. A double-shelled hollow microsphere is indicated by the black arrow.
Figure S7. XRD patterns of MnO$_2$ and LiOH-H$_2$O mixtures prepared by the impregnation method (mixture-I) and the ground method (mixture-G).
**Figure S8.** TGA curves of MnO$_2$ and LiOH-H$_2$O mixtures prepared by the impregnation method (mixture-I) and the ground method (mixture-G).
Figure S9. XRD patterns and digital photos of LiMn$_2$O$_4$-I and LiMn$_2$O$_4$-G prepared by calcination of mixture-I and mixture-G at 600 ºC for 10 hours respectively.
Figure S10. SEM (a) and TEM (b) images of LiMn$_2$O$_4$-G.