Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Synthesis of Porous $MnCo_2O_4$ Microspheres with Yolk-Shell Structure Induced by Concentration Gradient and the Effect on their Performance in Electrochemical Energy Storage

Guoyong Huang [a,b], Shengming Xu [b,c,*], Yue Yang, [b,*] Hongyu Sun [d,*], Zhenghe Xu [b,e]

[a] School of Metallurgy and Environment, Central South University, Changsha 410083, China
[b] Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 100084, China
[c] Beijing Key Lab of Fine Ceramics, Tsinghua University, Beijing 100084, China
[d] Beijing National Center for Electron Microscopy, School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China
[e.] Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta T6G 2V4, Canada

**E-mail: smxu@tsinghua.edu.cn; eric1911@126.com; hysuny@mail.tsinghua.edu.cn.*

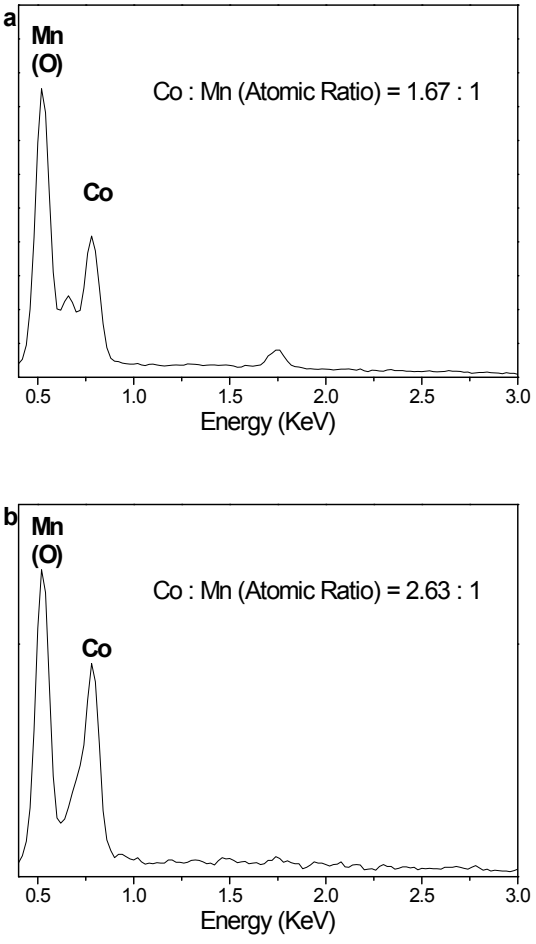

Fig. S1. Representative EDX spectra in Fig. 4a. (a) Core and (b) Shell.

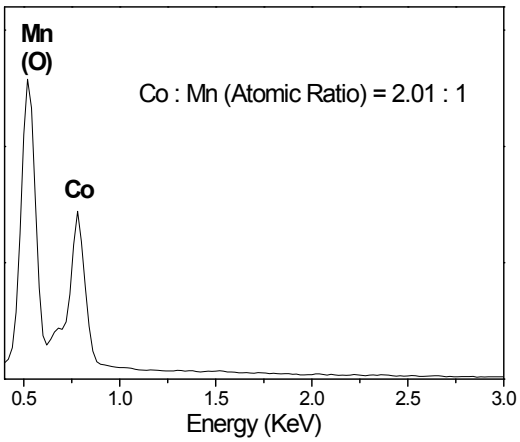

Fig. S2. Representative EDX spectrum in Fig. 5a.

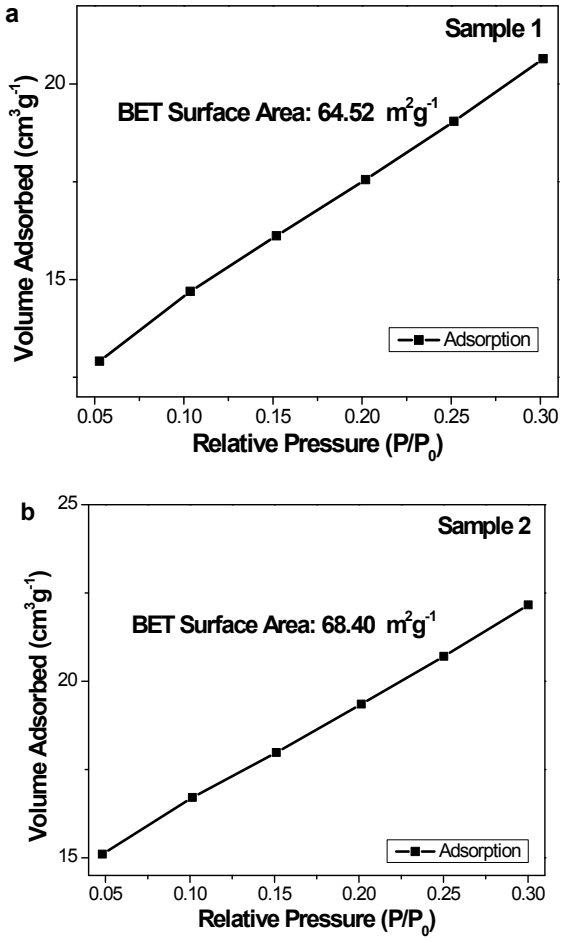

Fig. S3. N_2 adsorption isotherms of $MnCo_2O_4$ samples.

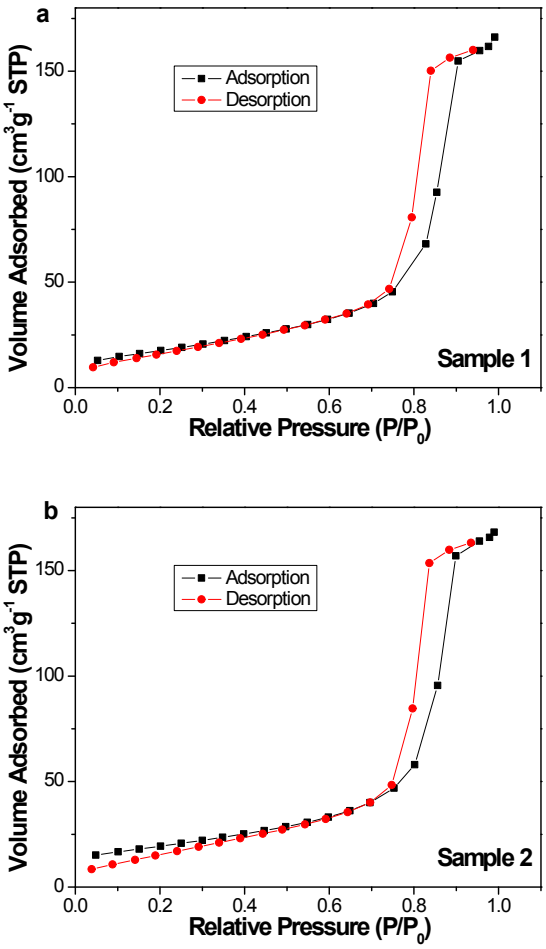

Fig. S4. N_2 adsorption/desorption isotherms of $MnCo_2O_4$ samples.

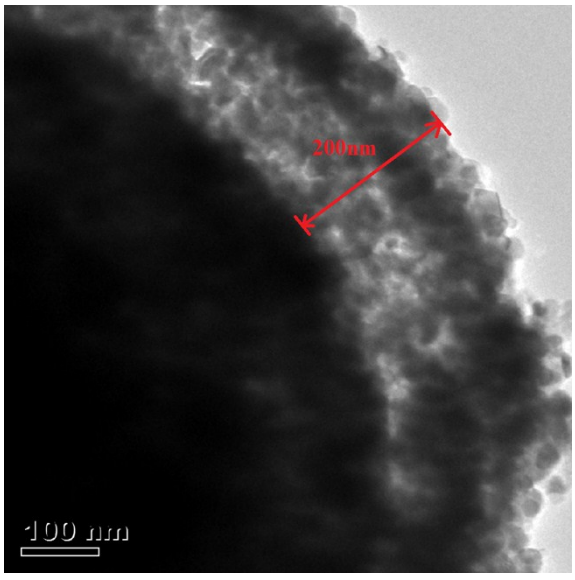

Fig. S5. TEM image of partial enlarged detail of Sample 1 microsphere.

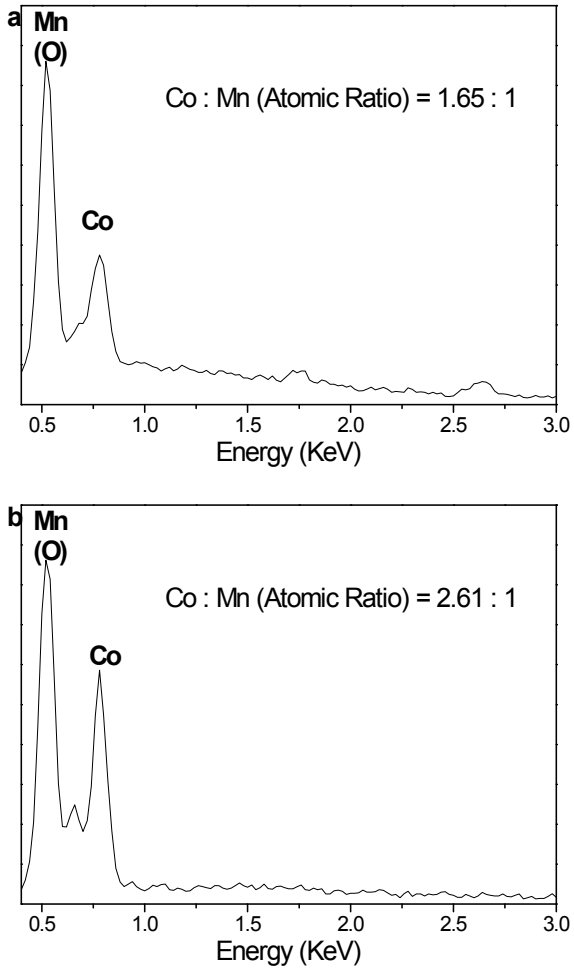

Fig. S6. Representative EDX spectra in Fig. 11a. (a) Core and (b) Shell.

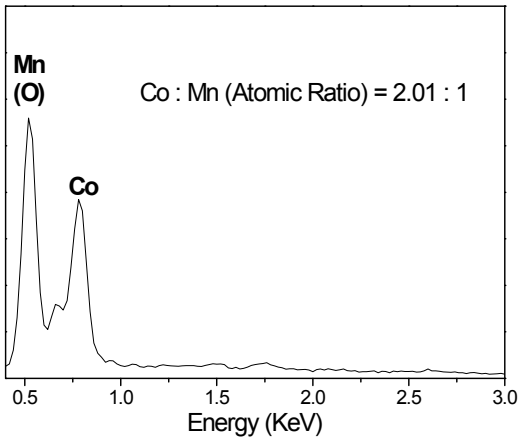

Fig. S7. Representative EDX spectrum in Fig. 12a.

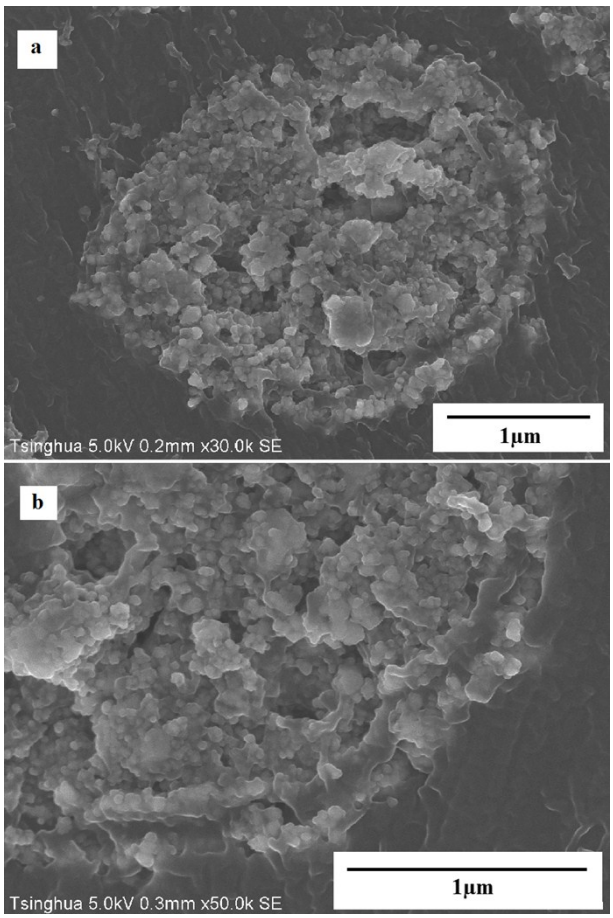

Fig. S8. SEM images of the cross section of Sample 1 (mixtures of $MnCo_2O_4$/ATB/PVDF) after 40 cycles at 0.2 Ag^{-1}.

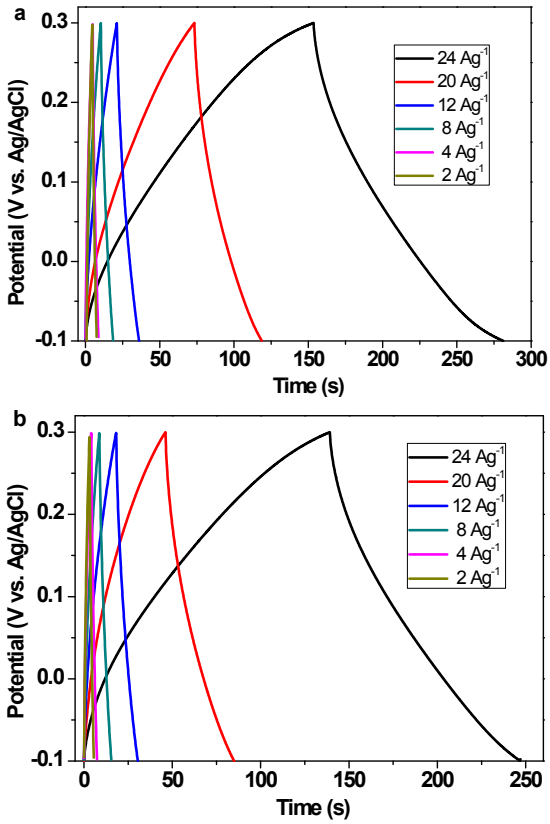

Fig. S9. Galvanostatic charge-discharge curves of $MnCo_2O_4$ electrodes at various current densities. (a) Sample 1 and (b) Sample 2.

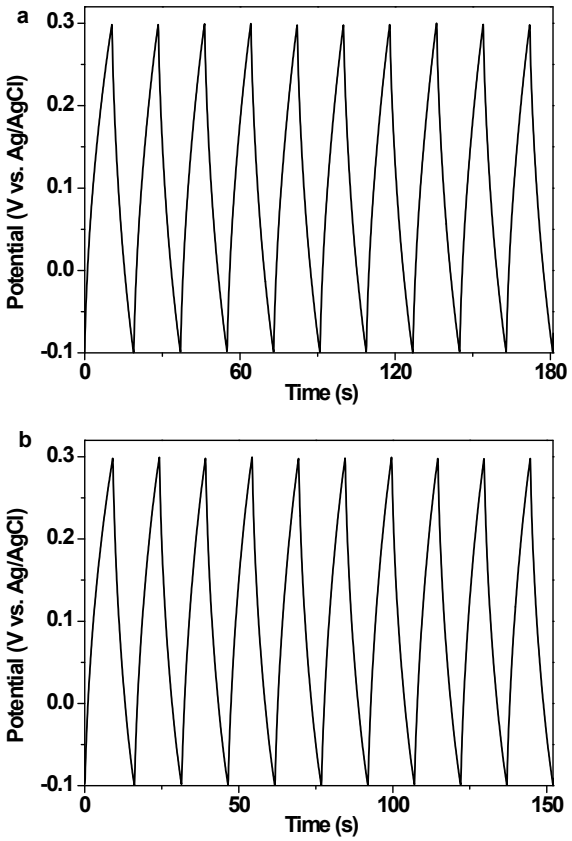

Fig. S10. First ten galvanostatic charge-discharge curves of $MnCo_2O_4$ electrodes in the range of -0.10~0.30 V at 12 Ag^{-1}. (a) Sample 1 and (b) Sample 2.