# Supporting Information

## Hierarchical Structures Composed of $MnCo_2O_4$@$MnO_2$ Core-Shell Nanowire Arrays with Enhanced supercapacitor Properties

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## Part I: Calculations

The specific capacitance ($C_s$) of hybrid nanowire arrays electrodes was calculated from the discharge curves as follows:[1]

$$C_s = \frac{I\Delta t}{m\Delta V}$$

where I (A) is the discharge current, Δt (s) is the discharge time and m (g) is the mass of the active material in the electrode, ΔV (V) is the voltage interval of the discharge.

The energy density and power density were calculated from the discharge curves as follows: [2, 3]

$$E = 0.5 \times C_s \times V^2$$

$$P = \frac{E}{\Delta t}$$

where E (Wh $kg^{-1}$) is the energy density, V (V) is the potential window of discharge, P (W $kg^{-1}$) is the power density, and Δt (s) is the discharge time.

1. K. K. Lee, S. Deng, H. M. Fan, S. Mhaisalkar, H. R. Tan, E. S. Tok, K. P. Loh, W. S. Chin and C. H. Sow, Nanoscale, 2012, 4, 2958 – 2961.
2. W. Chen, R. B. Rakhi, L. B. Hu, X. Xie, Y. Cui, H. N. Alshareef, Nano Lett., 2011, 11, 5165.
3. L. F. Chen, X. D. Zhang, H. W. Liang, M. G. Kong, Q. F. Guan, P. Chen, Z. Y. Wu, S. H. Yu, ACS Nano, 2012, 6, 7092.

## Part II: Supplementary Figures

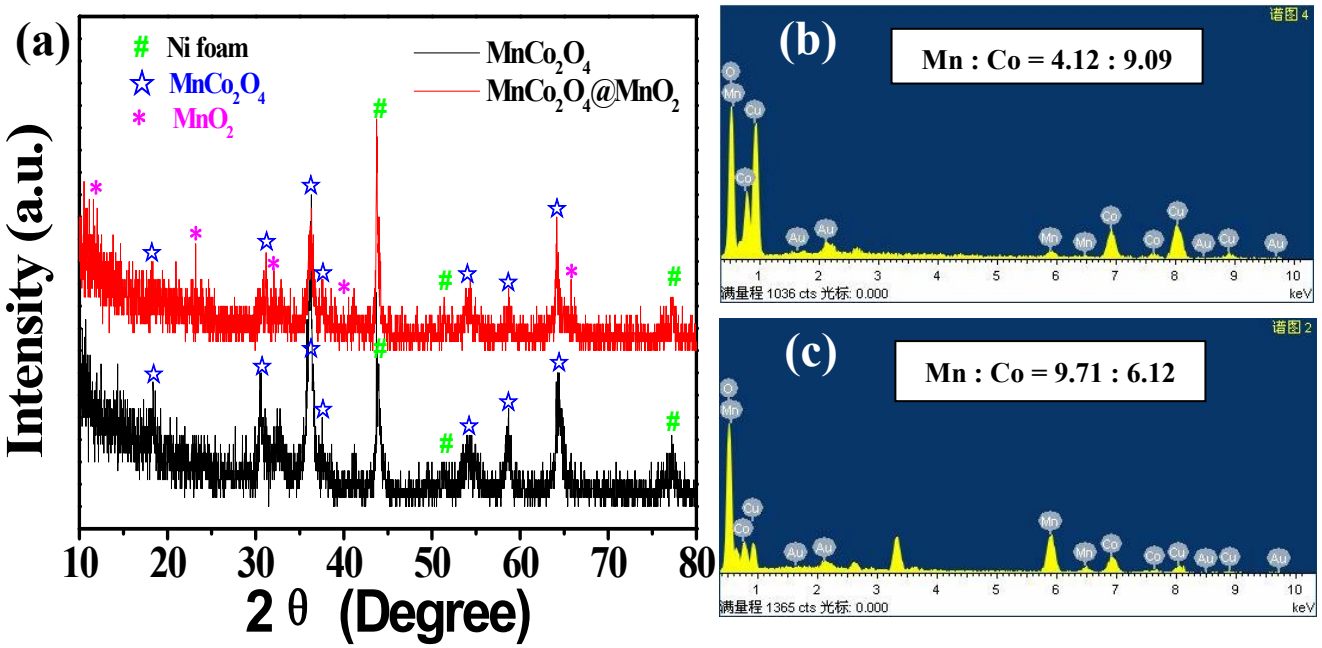


**Figure S1** (a) XRD patterns of $MnCo_2O_4$ nanowire arrays (black line) and $MnCo_2O_4$@$MnO_2$ core-shell nanowire arrays (red line) on nickel foam. EDX spectrum of (b) $MnCo_2O_4$ NWAs and (c) $MnCo_2O_4$@ $MnO_2$ core-shell NWAs.

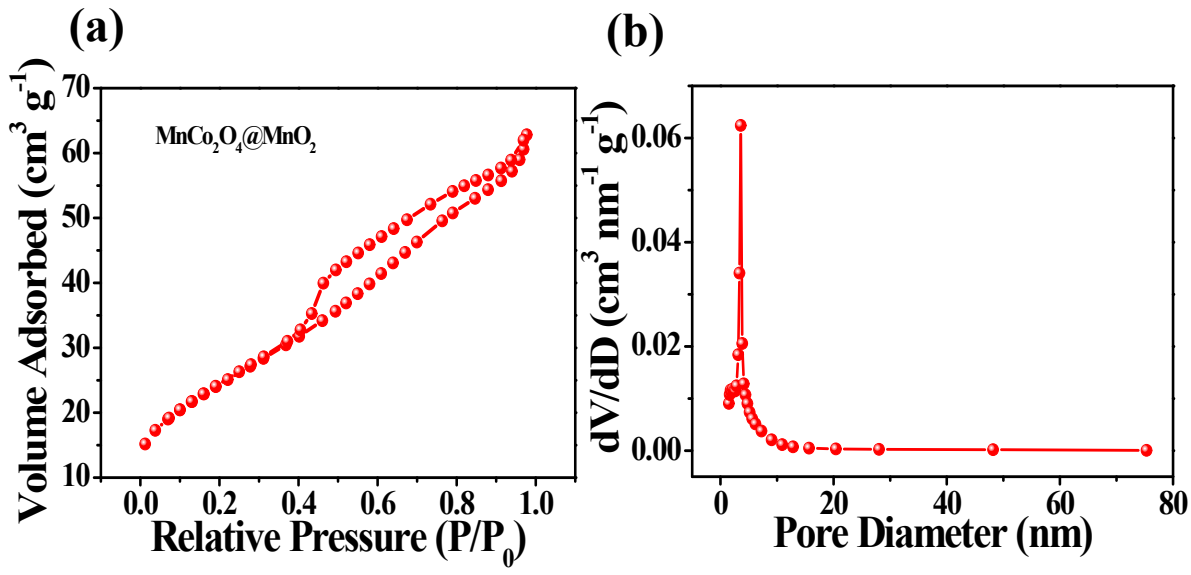


**Figure S2** (a) $N_2$ adsorption–desorption isotherms and (b) corresponding pore size distribution curves of the $MnCo_2O_4$@$MnO_2$ NWAs.

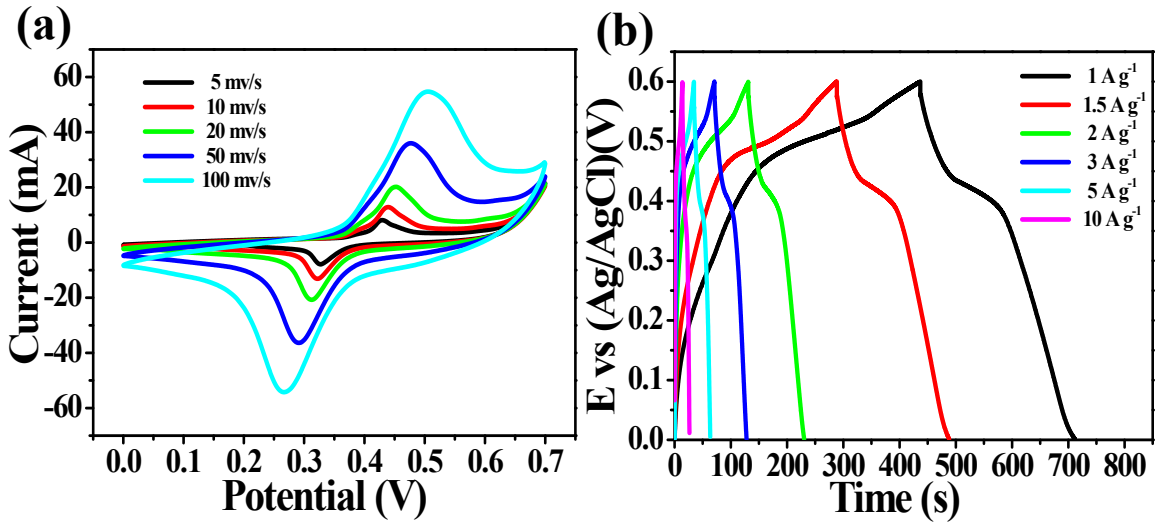


**Figure S3** (a) CV curves obtained at different scan rates and (b) Galvanostatic charge-discharge curves obtained at different current densities of the $MnCo_2O_4$ NWAs electrodes.

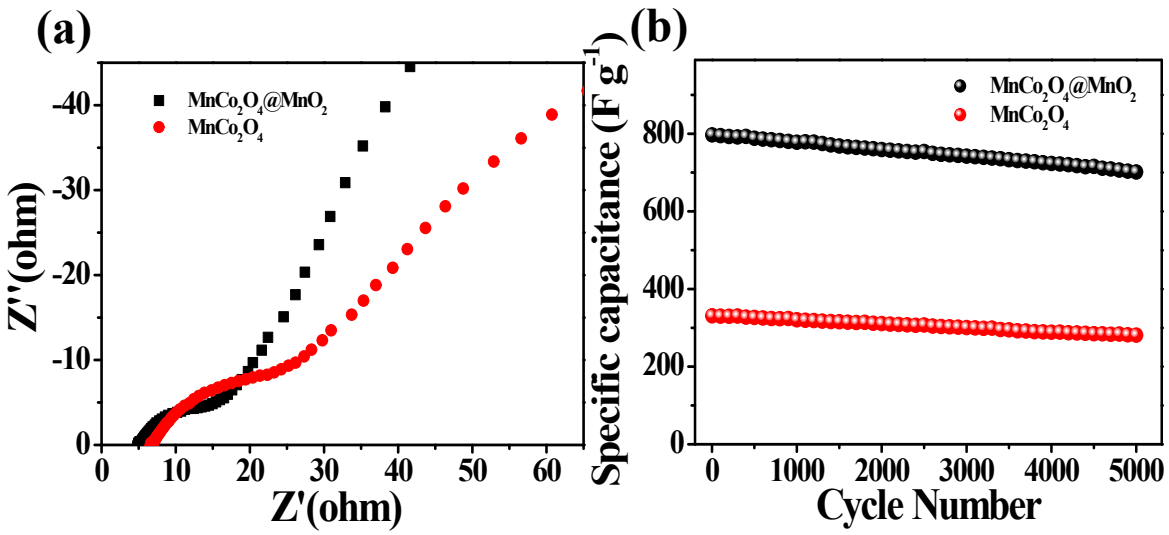


**Figure S4** (a) Comparison of Nyquist plots of the $MnCo_2O_4$ and $MnCo_2O_4$@$MnO_2$ electrodes. (b) Cycling performance of the $MnCo_2O_4$ and $MnCo_2O_4$@$MnO_2$ electrodes at a current density of 2 A $g^{-1}$.

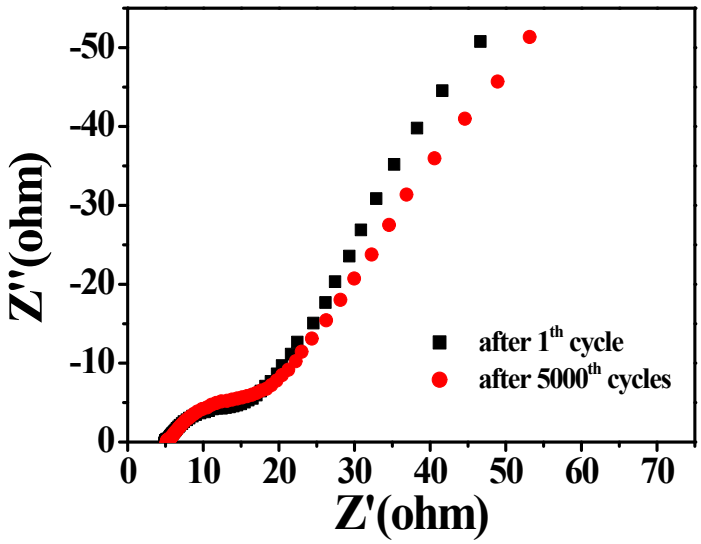


**Figure S5** Comparison of Nyquist plots of the $MnCo_2O_4$@$MnO_2$ electrodes before and after cyclic test.

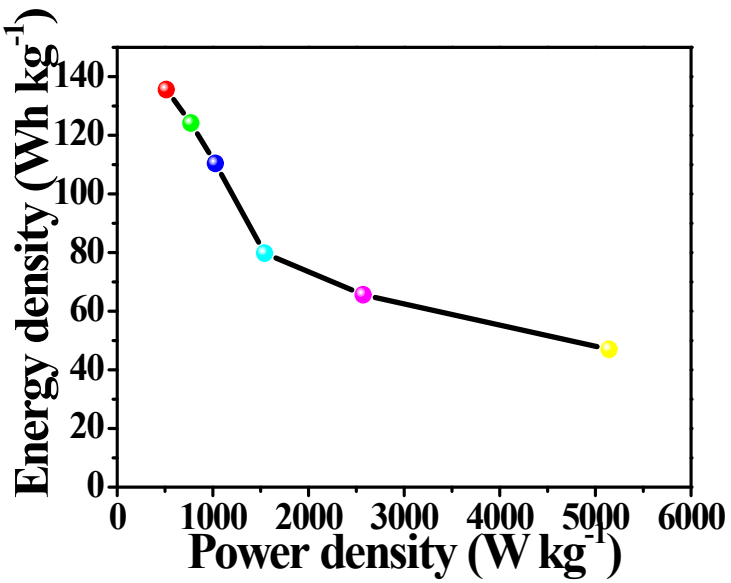


**Figure S6** Ragone plot of the symmetric supercapacitor.