Supporting Information

Hierarchically Structured MnO$_2$ Nanowires Supported on Hollow Ni Dendrites for High-performance Supercapacitors

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Figure S1. Digital photos of the Ni@MnO$_2$ electrodes deposited on 0.1- (left, 0.33cm×0.33cm) and 1-cm$^2$ (right, 1cm×1cm) Ni substrates.
Figure S2. SEM images of the (a-c) Cu dendrites, (d-f) hollow Ni dendrites, and (g-i) hollow Ni dendrite-supported MnO$_2$ nanowires prepared on a square Ni foil with an area of 0.1 cm$^2$. Panels (a, d, g) and the corresponding insets are low-magnification side- and top-view images, respectively. Panels (b, e, h) and (c, f, i) are high-magnification side- and top-view images, respectively.
Figure S3. TEM image and elemental profile from EDX line scan showing the distribution of Ni and Cu across a Cu@Ni wire.

Figure S4. (a) XRD and (b) high-resolution TEM image of the Ni@MnO₂ structure. The three strong peaks located at 2θ = 44.5°, 51.8° and 76.5° are assigned to Ni (JCPDS: 04-0850). The other two peaks are corresponding to (211) and (002) reflections of α-MnO₂ (JCPDS: 44-0141). From the HRTEM image, the lattice fringes show a d-spacing of 0.240 nm, which agrees well with (211) plane of MnO₂.
Figure S5. XPS spectra of the Ni hollow dendrite-supported MnO2 nanowires. (a) Survey scan showing peaks of Mn, Ni, and O. (b) Mn 2p, (c) Mn 3s, and (d) O 1s spectra.

Figure S6. Comparison of the CVs for the hollow Ni dendrites and Ni@MnO2 structure in 1 M Na2SO4 at a scan rate of 5 mV s⁻¹. Inset is the enlarged CV of the hollow Ni dendrites. The much smaller current from Ni dendrites indicates little contribution of capacitance from the Ni support.
Figure S7. (a) N₂ adsorption/desorption isotherms at 77 K and (b) pore size distribution of the Ni@MnO₂ composite which was scraped off the Ni foil (1 cm²).

The BET surface area of the sample was analyzed by using the Nova-3000 Series, Quantachrome nitrogen adsorption apparatus. The sample was degassed for a period of 6 hours at 150 °C prior to nitrogen adsorption measurements. BET multipoint method was used for the determination of BET surface area by using the adsorption data in the relative pressure (P/P₀) range of 0.05-0.3. The pore volume and average pore size of the sample was determined by taking the nitrogen adsorption volume at the relative pressure (P/P₀) of 0.994. The pore sizes of the sample are mainly distributed at ~4 and ~15 nm. The BET surface area was found to be 23.4 m² g⁻¹. This relatively low specific surface area could be partly attributed the ruptured hierarchical structure upon scraping off the substrate and the dense coating of MnO₂.