Supporting Information

Hierarchically Structured MnO_2 Nanowires Supported on Hollow Ni Dendrites for High-performance Supercapacitors

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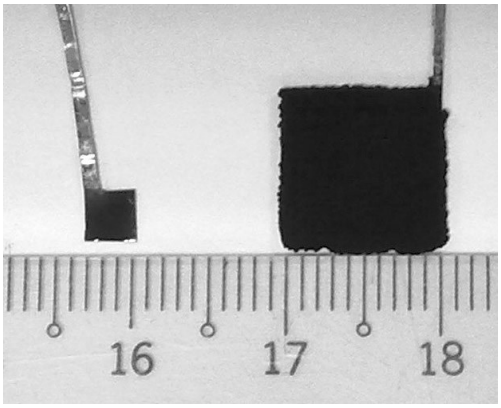

Figure S1. Digital photos of the Ni@MnO_2 electrodes deposited on 0.1- (left, 0.33cm×0.33cm) and 1-cm^2 (right, 1cm×1cm) Ni substrates.

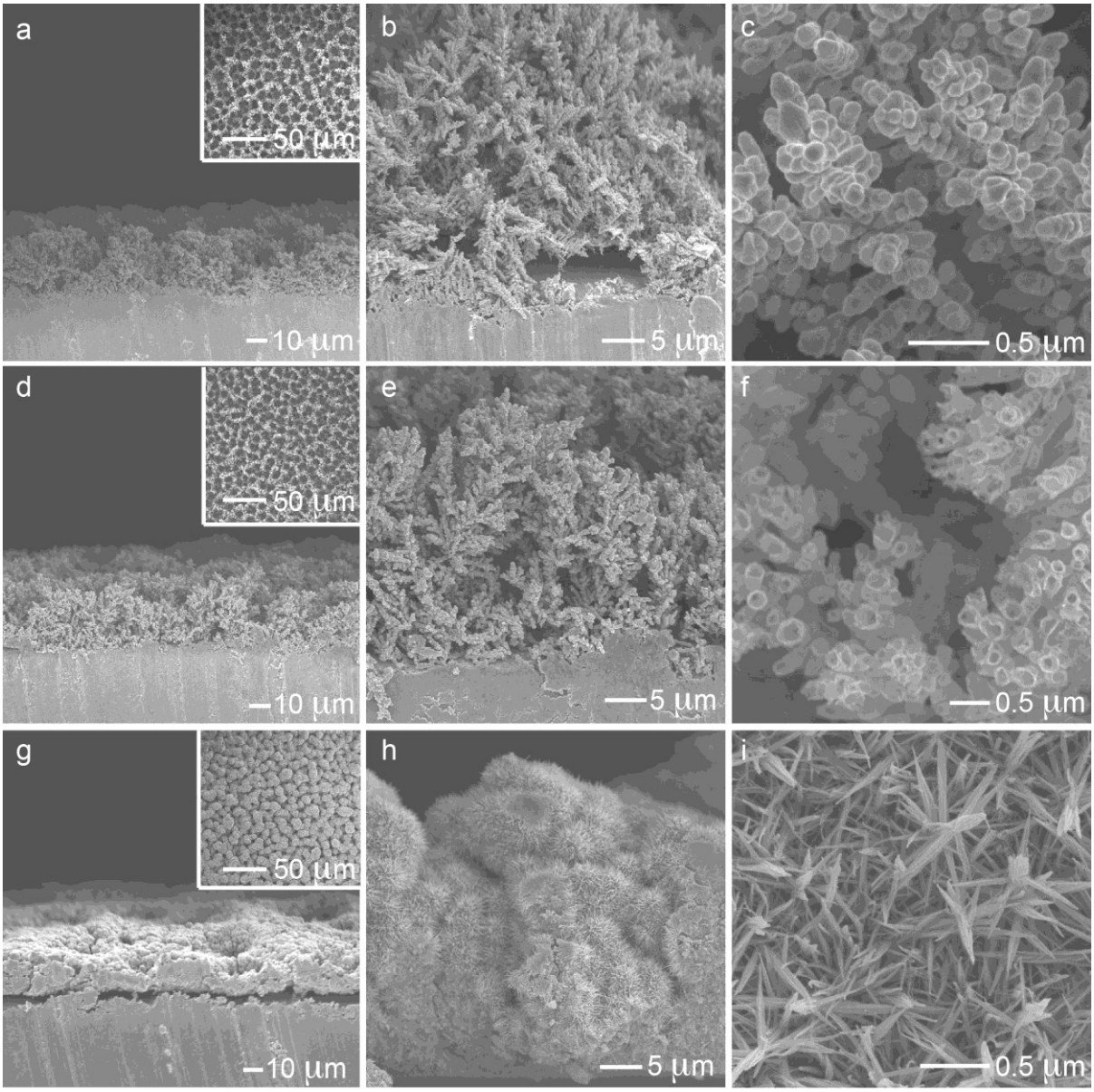

Figure S2. SEM images of the (a-c) Cu dendrites, (d-f) hollow Ni dendrites, and (g-i) hollow Ni dendrite-supported MnO_2 nanowires prepared on a square Ni foil with an area of 0.1 cm^2. Panels (a, d, g) and the corresponding insets are low-magnification side- and top-view images, respectively. Panels (b, e, h) and (c, f, i) are high-magnification side- and top-view images, respectively.

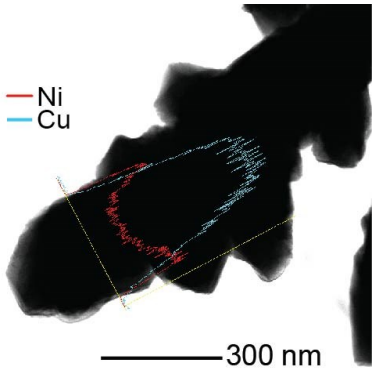

Figure S3. TEM image and elemental profile from EDX line scan showing the distribution of Ni and Cu across a Cu@Ni wire.

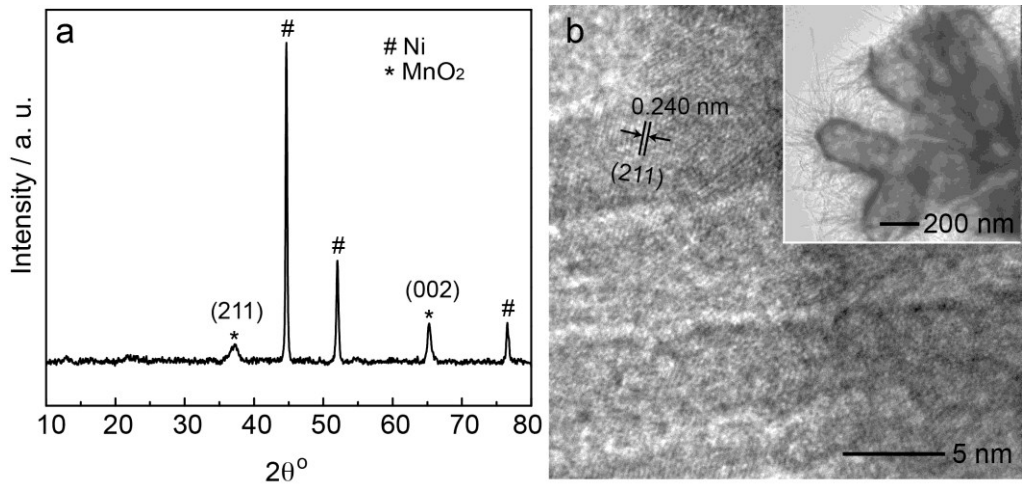

Figure S4. (a) XRD and (b) high-resolution TEM image of the Ni@MnO_2 structure. The three strong peaks located at 2θ = 44.5°, 51.8° and 76.5° are assigned to Ni (JCPDS: 04-0850). The other two peaks are corresponding to (211) and (002) reflections of α-MnO_2 (JCPDS: 44-0141). From the HRTEM image, the lattice fringes show a d-spacing of 0.240 nm, which agrees well with (211) plane of MnO_2.

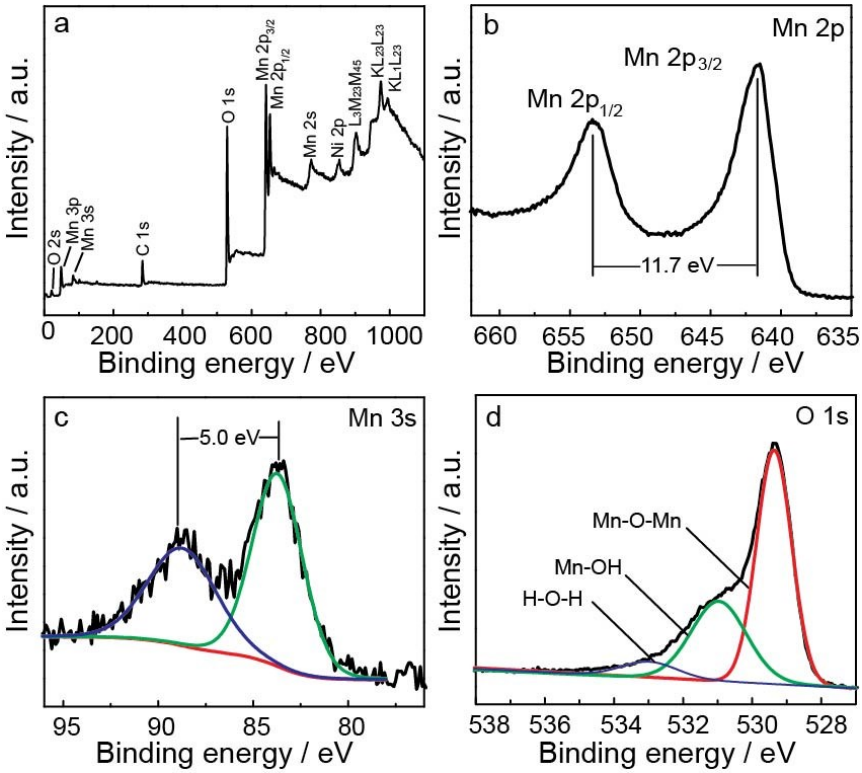

Figure S5. XPS spectra of the Ni hollow dendrite-supported MnO2 nanowires. (a) Survey scan showing peaks of Mn, Ni, and O. (b) Mn 2p, (c) Mn 3s, and (d) O 1s spectra.

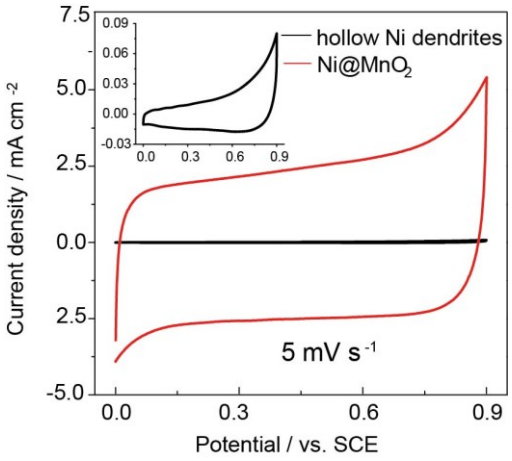

Figure S6. Comparison of the CVs for the hollow Ni dendrites and Ni@MnO_2 structure in 1 M Na_2SO_4 at a scan rate of 5 mV s^{-1}. Inset is the enlarged CV of the hollow Ni dendrites. The much smaller current from Ni dendrites indicates little contribution of capacitance from the Ni support.

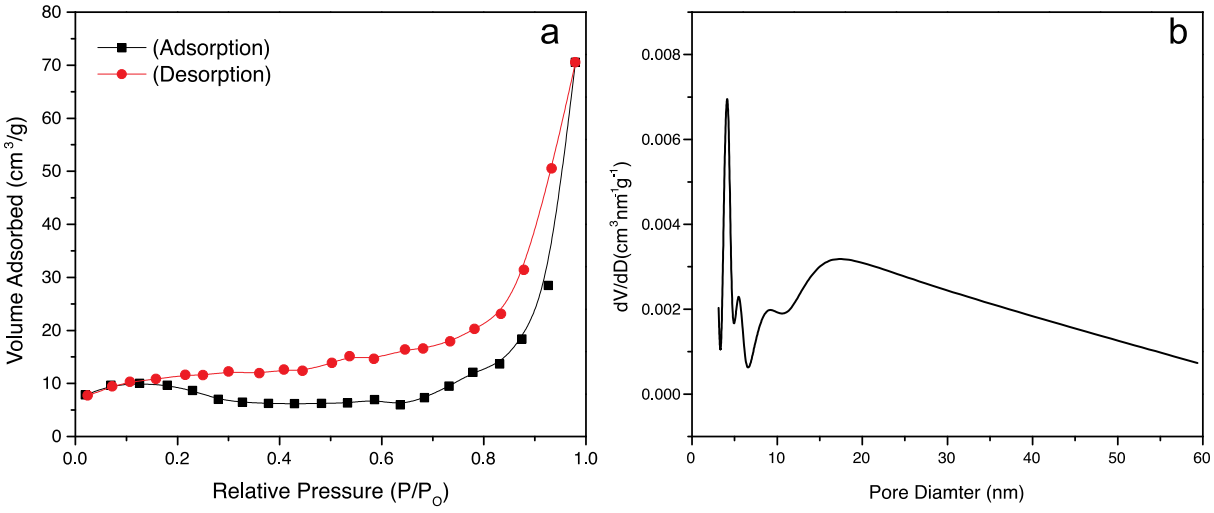

Figure S7. (a) N_2 adsorption/desorption isotherms at 77 K and (b) pore size distribution of the Ni@MnO_2 composite which was scraped off the Ni foil (1 cm^2).

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/Po) 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/Po) 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 m^2 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 MnO_2.