Supporting Information

Nanostructured (Co, Ni)-based Compounds Coated on a Highly Conductive Three Dimensional Hollow Carbon Nanorod Array (HCNA) Scaffold for High Performance Pseudocapacitors

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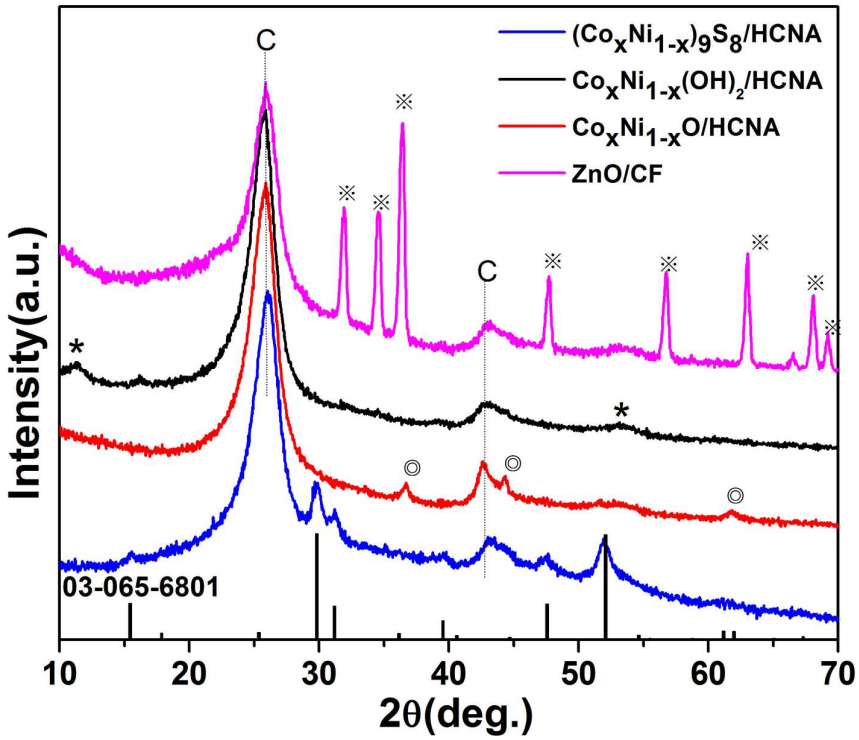

Figure S1. XRD patterns of the ZnO/C, $Co_xNi_{1-x}(OH)_2$/HCNA, $Co_xNi_{1-x}O$/HCNA, and $(Co_xNi_{1-x})_9S_8$/HCNA electrodes. The peaks labeled by the specific characters are ascribed to ZnO (※), $Co_xNi_{1-x}(OH)_2$ (*), and $Co_xNi_{1-x}O$ (◎), respectively. The XRD pattern of $(Co_xNi_{1-x})_9S_8$/HCNA electrode is accordance with the standard pattern of $(Co_xNi_{1-x})_9S_8$ (JCPDS 03-065-6801) and C.

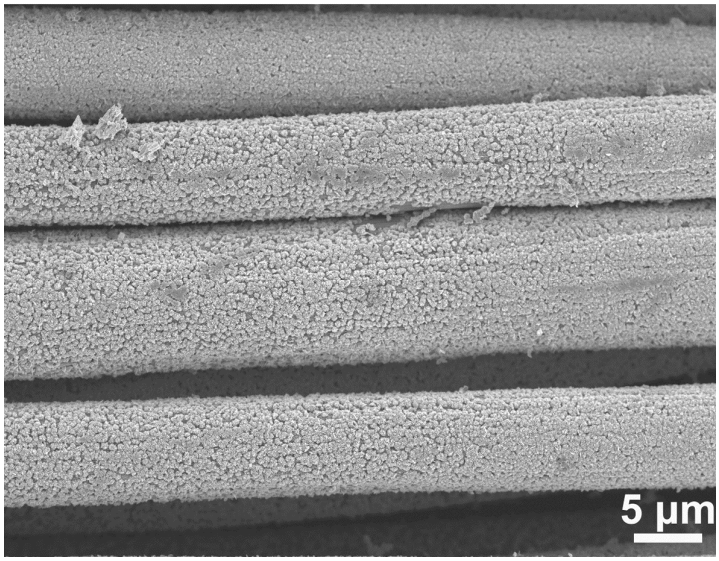

Figure S2. SEM images of $Co_xNi_{1-x}(OH)_2$ directly deposited on the carbon fiber (CF) paper.

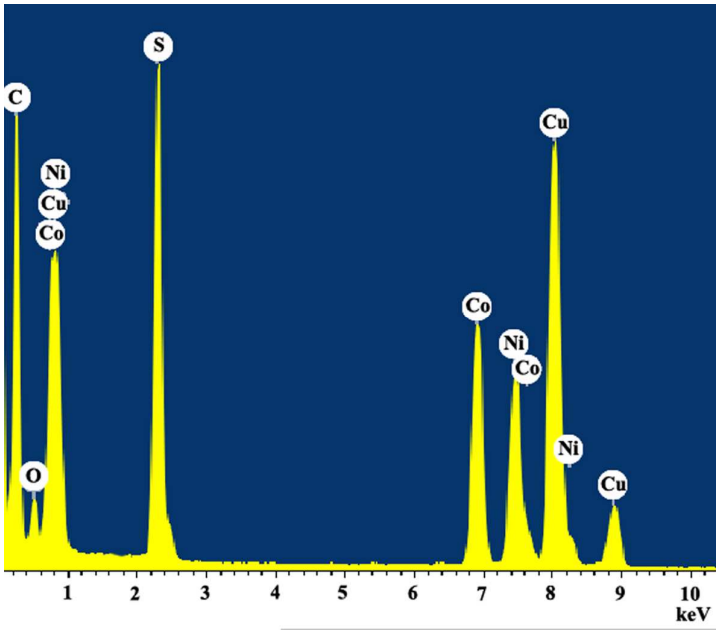

Figure S3. EDX spectrum of $(Co_xNi_{1-x})_9S_8$/HCNA. Cu element orginates from Cu grid. C element is from carbon film on the Cu grid, carbon fiber (CF) and hollow carbon nanorod scaffold (HCNA). O element come from some functional groups of CF and HCNA. Co, Ni and S elements can be ascirbed to $(Co_xNi_{1-x})_9S_8$.

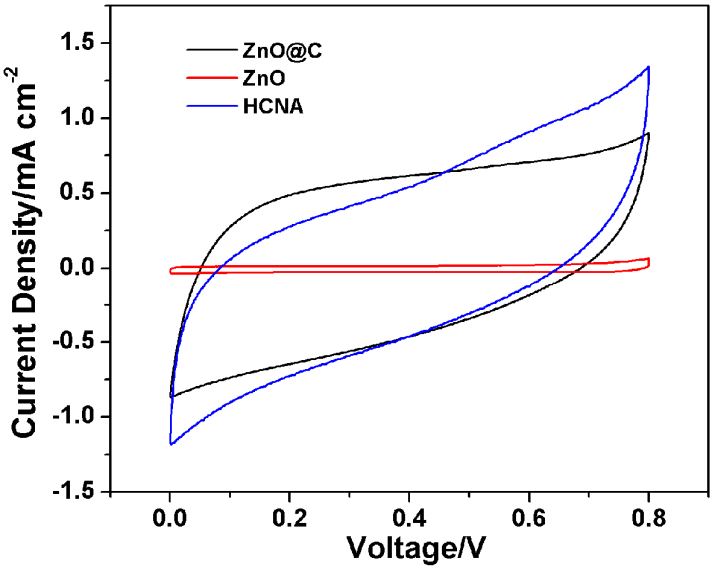

Figure S4. CV curves of the ZnO, ZnO/C, and HCNA electrodes. The discharge areal capacitances of the ZnO, ZnO/C, and HCNA electrodes are estimated as 0.22, 4.60, and 4.71 mF cm^{-2} (100 mV s^{-1}), respectively, which are calculated as according to the integrated area of CV curves.

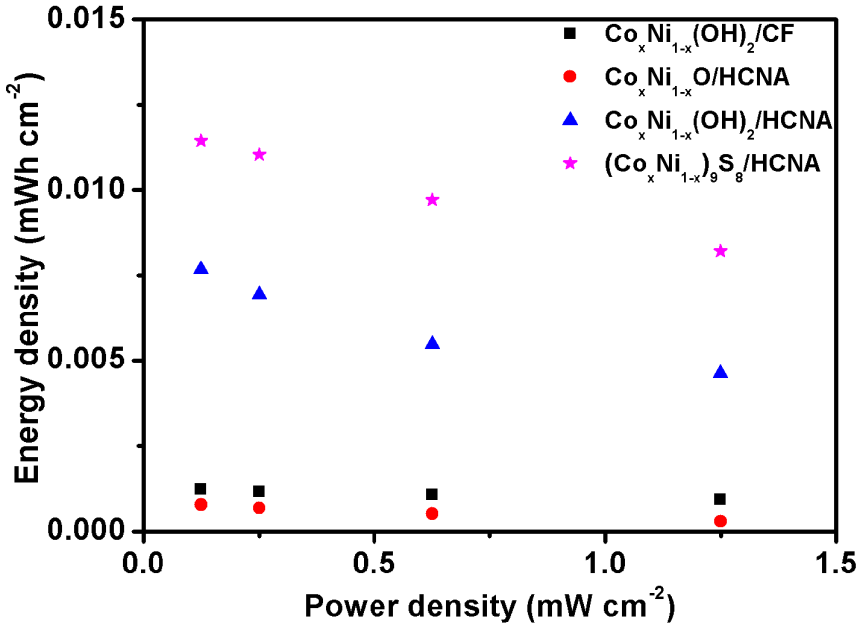

Figure S5. Ragone plots of energy *vs.* power density of the $Co_xNi_{1-x}(OH)_2$/CF, $Co_xNi_{1-x}(OH)_2$/HCNA, $Co_xNi_{1-x}O$/HCNA, and $(Co_xNi_{1-x})_9S_8$/HCNA electrodes evaluated at different charge/discharge current densities. Energy density (E) and power density (P) are caluclated from the following equations: $E=1/2C\Delta V^2$, $C=1/4C_s$, $P=E/\Delta t$, where C_s is the discarge areal capacitance of electrode materials, ΔV is the operating voltage window, and Δt is the discharge time.

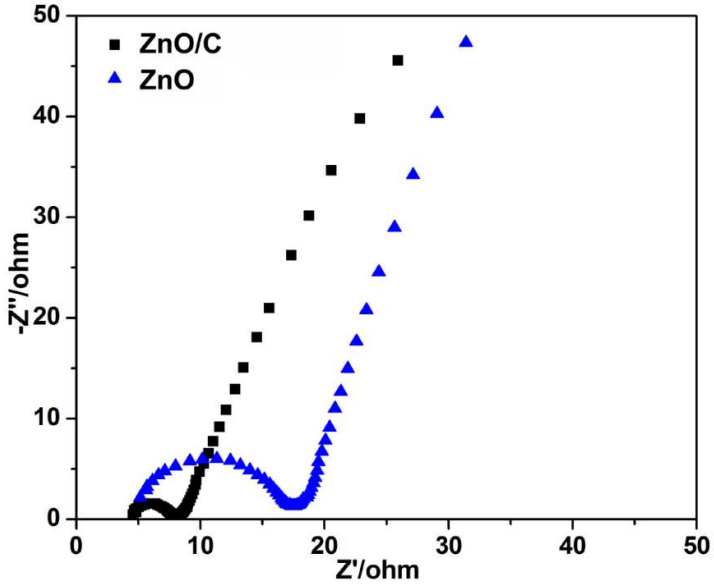

Figure S6. EIS Nyquist plots of the ZnO and ZnO/C nanorod array electrodes (Inset: Equivalent circuit diagram proposed for analysis of the EIS data) measured in 1.0 M Na_2SO_4 electrolyte. The charge transfer resistance R_{ct} is 10.1 Ω for the ZnO nanorod arrays and 2.8 Ω for the ZnO/C nanorod arrays.