Supplementary Information

Engineering One-Dimensional and Two-Dimensional Birnessite Manganese Dioxides on Nickel Foam-Supported Cobalt-Aluminum Layered Double Hydroxides for Advanced Binder-Free Supercapacitors

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SI-1. (a, b) SEM images of Ni foam. The inset in (a) is the optical image of Ni foam.
SI-2. (a, b) SEM images of NF/LDH arrays; (c) The EDS mapping of Co, Al, O and Ni elements of the rectangle area in (a). The inset in (b) is the photograph of Ni foam after the growth of LDH arrays.
SI-3. (a, b) SEM images of NF/LDH nanowalls.
SI-4. (a, b) TEM images of LDH nanoplates. The insets are the corresponding SAED and FFT patterns of CoAl-LDH, respectively; (c) The EDS spectrum and element composition of LDH nanoplates.

<table>
<thead>
<tr>
<th>Element</th>
<th>Atomic %</th>
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<tbody>
<tr>
<td>Co</td>
<td>6.63</td>
</tr>
<tr>
<td>Al</td>
<td>3.23</td>
</tr>
<tr>
<td>O</td>
<td>10.58</td>
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SI-5. SEM images of NF/LDH@MnO$_2$ nanowires (a) and NF/LDH@MnO$_2$ nanosheets (c). (b) and (d) are the corresponding EDS mapping of Co, Al, Mn and O elements of the rectangle area in (a) and (c), respectively.
SI-6. (a) STEM image of NF/LDH@MnO$_2$ nanosheets; (b) corresponding EDS mapping of Co, Al, Mn and O elements of the rectangle area in (a), respectively.
SI-7. The charging/discharging curves of NF/LDH@MnO_2 nanowires electrode obtained at the current density of 1 A g^{-1} before and after 5000 cycles.
EIS data of NF/LDH, NF/LDH@MnO₂ nanowires and NF/LDH@MnO₂ nanowires electrodes in the frequency range from $10^4$ to 0.01 Hz at the amplitude of the sinusoidal voltage of 5 mV. The insets are the high-frequency parts and corresponding equivalent circuit.
SI-9. (a) Galvanostatic charge-discharge curves and (b) specific capacitances of the symmetric supercapacitor at different current densities.
SI-10. The digital image of a red-light-emitting diode (LED) lighted by the as-prepared NF/LDH@MnO$_2$ nanowires//MEGO device.