Green Template-free Synthesis of Mesoporous Ternary Co-Ni-Mn Oxide Nanowires towards High-performance Electrochemical Capacitors

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One-dimensional (1D) mesoporous ternary Co-Ni-Mn oxide nanowires (CNMO NWs) have been controllably fabricated via a facile yet scalable template-free strategy involving a green hydrothermal route coupled with the following calcination. The composition of the reaction solvent composition, i.e., the volume ratio of the ethylene glycol and de-ionized water, plays a significant role in tuning the specific morphologies and micro-structures of the final CNMO products.[1-3] The as-derived 1D CNMO NWs are constructed with numerous nanoparticle subunits with the size of 5 – 10 nm, and possess lots of inter-particle mesopores ranged from 2 to 6 nm. The well-defined mesoporous CNMO NWs apparently possess appealing structural advantages, such as fast and convenient electron and ion transport, sufficient redox electrochemical centers with multiple valences, and high electroactive surface area. As a result, the as-fabricated mesoporous CNMO NWs manifest exceptional pseudocapacitance and excellent cycling stability at high rates when evaluated as a striking low-cost electrode for next-generation electrochemical capacitors.

Figure 1. Cycling performance of the derived ternary CNMOs NWs at (a) progressively varying current densities, and (b) current densities of 2 and 10 A g\(^{-1}\)

Reference: