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Hierarchical core–shell NiS/Co_3S_4@ Ni Nanowire composite for high performance supercapacitor electrode

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In this study, hierarchical nickel nanowires (h-Ni NWs) were employed as a conductive backbone to enhance the electrochemical behavior of Ni Co sulfides for efficient energy storage. The composite was fabricated through a simple hydrothermal route, yielding a core–shell NiS/Co_3S_4@h-Ni NW structure. The physicochemical properties of the obtained materials were investigated using X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), and scanning electron microscopy (SEM). Electrochemical analyses were performed in a 4 M LiOH electrolyte within a three-electrode system. The optimized NiS/Co_3S_4@h-Ni NW electrode delivered a remarkable specific capacity of 1893 $C \cdot g^{-1}$ at 1 $A \cdot g^{-1}$ and retained 98.63% of its initial value after 10,000 charge discharge cycles at 20 $A \cdot g^{-1}$. These outstanding results are attributed to the synergistic effects between the nickel nanowire core and the (Ni/Co) sulfide shell, which facilitate charge transfer and structural stability.

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