

Unique NiO Based 1 D Core/Shell Nano-Heterostructure Electrodes for High-Performance Supercapacitor

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Abstract : Unique one-dimensional (1D) Ni-NiO and Co-Ni/Co₃O₄-NiO core/shell nano-heterostructures are fabricated by combining the electrochemical deposition and annealing. The high-performance pseudo-capacitor electrode based on the Ni-NiO and Co-Ni/Co₃O₄-NiO core/shell nano-heterostructures is designed and demonstrated. The Co-Ni/Co₃O₄-NiO core/shell nano-heterostructures exhibit high specific capacitance (2013 Fg⁻¹ at 2.5 Ag⁻¹), high energy and power density (23 Wh kg⁻¹ and 5.5 kW kg⁻¹, at the discharge current density of 20.8 A g⁻¹), good capacitance retention, and long cyclicality. The remarkable electrochemical property of the large surface area nano-heterostructures is demonstrated based on the novel nano-architectural design of the electrode with the coexistence of the two highly redox active materials at the surface supported by highly conducting metal alloy channel at the core for faster charge transport.

Keywords : nano-heterostructures, energy storage, supercapacitors, electrochemical deposition

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