Synthesis of Polypyrrole-coated NiO/Ni(OH)₂ Hybrid Flowers Composite by Pulse Electro-polymerization for supercapacitor with Improved Electrochemical Capacitance

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doi: 10.20964/2020.12.68

Received: 1 February 2020 / Accepted: 21 September 2020 / Published: 31 October 2020

This work describes a novel strategy to synthesize polypyrrole-coated NiO/ α -Ni(OH)₂ hybrid flower with an improved capacitance performance for supercapacitor. Polypyrrole nanoparticles with a size of 80-100 nm were prepared by a pulse electro-polymerization and uniformly embedded into the petal gap of the self-assembled NiO/ α -Ni(OH)₂ hybrid flower. Due to the enhancement of the electrical conductivity and the improvement of electrochemical pseudo-capacitance, the as-synthesized polypyrrole-coated NiO/ α -Ni(OH)₂ hybrid flower composite showed a high reversible specific capacity of 359 F g⁻¹ at 5 A g⁻¹ in 2 M KOH electrolyte in a potential range of 0 - 0.45 V. Benefiting from the unique electro-polymerization design, the obtained hybrid flower composite demonstrated excellent capacitive performance and cycling stability after 1000 cycles, demonstrating the promising application as a high-performance pseudocapacitive material for supercapacitors.

Keywords: Supercapacitors, Polypyrrole, Hybrid flower, Pulse electro-polymerization

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