SnO₂ Quantum Dots Decorated Reduced Graphene Oxide Nanosheets Composites for Electrochemical Supercapacitor Applications

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SnO₂ quantum dots (QDs) intercalated with reduced graphene oxide nanosheet (rGO) composites are constructed by a simple hydrothermal process. The synergistic effect between the various assembly elements of the nanocomposite can compensate for the shortcomings of the individual components. The nanocomposite is attached to nickel foam to produce electrodes without adding carbon black and a binder, and the electrochemical properties of the composite electrodes are measured in 1 M Na₂SO₄ electrolyte. The results show that the prepared composite electrodes have a capacity of 253.3 F/g at a current density of 100 mA/g, and the capacity remains at 198.9 F/g even at 2000 mA/g, indicating an excellent rate capability. Moreover, cyclic voltammetry results indicate that the composite electrodes present a specific capacitance retention of 95.9% after 6000 cycles, which supports potential application in supercapacitors.

Keywords: SnO₂ quantum dots; graphene; composite materials; supercapacitor; specific capacitance

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