Chapter 25
Hybrid Nanocomposite Metal Oxide Materials for Supercapacitor Application

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ABSTRACT

Transition metal oxides qualify themselves as promising electrode material for supercapacitor applications by virtue of its large values of capacitance and energy density, facilitated by reversible faradaic redox reactions at the electrode-electrolyte interface. However, poor conductivity, lower surface area and lower power density curb their deployment in practical applications. Towards this end, establishing a synergistic effect among the transition metal oxides has been recognized as a feasible way to overcome the limitations of individual metal oxide components without compromising its pseudocapacitance. These hybrid metal oxide composite electrodes can achieve better electrical conductivity and enhance the flow of electrolytic ions into the active part of the electrode material, thereby utilizing the full potential of the device. This chapter intends to present a decent update on the synthesis methods, structural properties and electrochemical performances of various hybrid nanocomposite transition metal oxide materials for supercapacitor applications.

KEYWORDS: Supercapacitors, Transition metal oxides, Hybrid nanocomposite metal oxides, Energy storage device, Electrochemical characterization, Pseudocapacitors, Capacitance, Composite materials, Electrical conductivity, Cyclic stability

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