Facile Synthesis of $\text{Co}_3\text{O}_4/\text{CoF}_2 \cdot 4\text{H}_2\text{O}$ /graphene Composites for Supercapacitor Electrodes

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$\text{Co}_3\text{O}_4/\text{CoF}_2 \cdot 4\text{H}_2\text{O}$ /graphene composites and Co_3O_4 /graphene composites are synthesized by a facile microwave-assisted hydrothermal synthesis, followed by calcining at 350 °C. The synthesized composites are characterized by X-ray diffraction, and scanning electron microscopy. Electrochemical property of the prepared composites is measured by cyclic voltammetry and galvanostatic charge-discharge. Results show that $\text{Co}_3\text{O}_4/\text{CoF}_2 \cdot 4\text{H}_2\text{O}$ /graphene composites exhibit better specific capacitance and retention ratio of initial specific capacitance when compared with Co_3O_4 /graphene composites. Particularly, $\text{Co}_3\text{O}_4/\text{CoF}_2 \cdot 4\text{H}_2\text{O}$ /graphene composites prepared using $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$ as material exhibit the highest specific capacitance at various current densities, retention ratio of the specific capacitance at the current density ranging from 1 to 4 A g⁻¹ and retention ratio of initial specific capacitance after 1000 cycles, indicating excellent rate capability and cycling stability. These characteristics demonstrate that $\text{Co}_3\text{O}_4/\text{CoF}_2 \cdot 4\text{H}_2\text{O}$ /graphene composites prepared using $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$ as material possess a great potential application in supercapacitors.

Keywords: Supercapacitors, Co_3O_4 , $\text{CoF}_2 \cdot 4\text{H}_2\text{O}$, graphene

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