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Self-assembled MXene($\text{Ti}_3\text{C}_2\text{T}_x$)/ α - Fe_2O_3 Nanocomposite as Negative Electrode Material for Supercapacitors

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Abstract

To further improve the electrochemical performance of MXene materials, MXene($\text{Ti}_3\text{C}_2\text{T}_x$)/ α - Fe_2O_3 nanocomposites are fabricated by a self-assembly method via electrostatic attraction between negatively charged $\text{Ti}_3\text{C}_2\text{T}_x$ MXenes and positively charged cocoa-like α - Fe_2O_3 nanoparticles at room temperature. As a negative electrode material, the resulting nanocomposites show excellent electrochemical performance, including a wide operating potential of 1.2 V (-1.2 ~0 V), a high specific capacitance of 405.4 F g⁻¹ at the current density of 2 A g⁻¹ and a specific capacitance of 197.6 F g⁻¹ even at the current density of 20 A g⁻¹ in 5 M LiCl. In addition, the nanocomposites possess a high cycling stability with 97.7% capacitance retention of the initial capacitance after 2000 cycles. The impressive results indicate that the prepared MXene($\text{Ti}_3\text{C}_2\text{T}_x$)/ α - Fe_2O_3 nanocomposites is a promising

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