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An excellent strategy for synthesis of coral-like $ZnFe_2O_4$ particles for capacitive pseudocapacitors

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Abstract

Herein, coral-like $ZnFe_2O_4$ particles were prepared by a stepwise strategy, which contains a synthesis process and a subsequent etching process. Etching process can greatly improve the specific surface area of the $ZnFe_2O_4$. The specific surface area of the coral-like $ZnFe_2O_4$ particles is 200 times larger than the un-etched $ZnFe_2O_4$ particles. The ferric ion of $ZnFe_2O_4$ can be reduced gradually by hydrazine to form Fe^{2+}, which will be coordinated with methyl mercaptoacetate to dissolve in DMF. Etched coral-like $ZnFe_2O_4$ particles have been tested as an electrode material for supercapacitor through electrochemical analysis. Etched coral-like $ZnFe_2O_4$ particles display a larger specific capacitance (~471 F g^{-1}) than the un-etched $ZnFe_2O_4$ particles (~162 F g^{-1}) at a scan rate of 2 mV s^{-1}. An excellent stability of cycling performance with 80.6% specific capacitance retention after 3000 cycles can be achieved. The results suggest that the as-prepared $ZnFe_2O_4$ particles might be of potential application for supercapacitor electrode materials. The strategy paves an efficient way for synthesizing new ferrite particles with high specific surface area for the electrode material of supercapacitor.

Keywords: Supercapacitor, $ZnFe_2O_4$, Etching

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