The Effect of Calcination Temperature on Combustion Preparation of ZnFe_2O_4 as Anode for Lithium Batteries

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A porous structure of ZnFe_2O_4 was prepared by combustion. The effects of the self-propagation reaction and calcination temperature on the morphological and electrochemical energy storage properties of ZnFe_2O_4 were studied. The results show that with the combustion reaction of the dry gel at 169.8 °C, the crystallinity and grain size of the pure phase ZnFe_2O_4 are positively correlated with the increase of calcination temperature. Due to its highly porous structure and good crystallinity, the calcined ZnFe_2O_4 at 700 °C shows the best electrochemical performance. The first specific discharge capacity reaches 1482.4 mAh g⁻¹, and the reversible capacity after 50 cycles is still 1319.4 mAh g⁻¹. The rate performance test indicates that the 700 °C sample has a very good reversible capacity and an excellent rate performance over a wide current density range. At a high current rate of 1600 mA g⁻¹, the reversible capacity can be kept above 900 mAh g⁻¹. The above results indicate that the combustion method is indeed a simple and efficient method for preparing ferrite, and the obtained material has good electrochemical properties.

Keywords: ZnFe_2O_4 , combustion preparation, lithium batteries, anode materials

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