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The Mg/Zr codoping on morphology and electrochemical properties of $\text{Li}_4\text{Ti}_5\text{O}_{12}$ anode materials

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Abstract: Homogeneous nanoparticles of $\text{Li}_4\text{Ti}_5\text{O}_{12}$ are prepared by solid-state method assisted with codoping of Mg and Zr. In this present study, orthogonal test is taken and the optimal case is $\text{Li}_{3.9}\text{Mg}_{0.1}\text{Ti}_{3.95}\text{Zr}_{0.05}\text{O}_{12}$ heated at 750°C for 10h. We find temperature and Mg ions are the more powerful factors on particles size and morphology. The results show $\text{Li}_{3.9}\text{Mg}_{0.1}\text{Ti}_{3.95}\text{Zr}_{0.05}\text{O}_{12}$ have the most fine particles with diameters distributed in the range of 10-100nm and have relatively good rate capacity and cycling stability. Moreover, $\text{Li}_{3.9}\text{Mg}_{0.1}\text{Ti}_{3.95}\text{Zr}_{0.05}\text{O}_{12}$ first discharge capacity is 186.6mAhg^{-1} at 0.57C, the pure $\text{Li}_4\text{Ti}_5\text{O}_{12}$ is 164.7mAhg^{-1} at 0.57C. The electrochemical of $\text{Li}_{3.9}\text{Mg}_{0.1}\text{Ti}_{3.95}\text{Zr}_{0.05}\text{O}_{12}$ improved obviously.

Key words: Mg-Zr codoped $\text{Li}_4\text{Ti}_5\text{O}_{12}$ solid-state method orthogonal test

1. Introduction

In response to the demands for next generation electric vehicles (EVs) and hybrid electric vehicles (HEVs), lithium ion batteries which are light weight, cost effective, high safety and long lasting have become the research focus^[12]. Conventional anode materials carbon cannot meet the requirement of high safety as its product lithium

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