Preparation of LiTi_2O_4 as a Lithium-ion Battery Anode by a Carbon-thermal Reduction Method

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doi: 10.20964/2018.02.33

Received: 27 June 2017 / Accepted: 7 November 2017 / Published: 28 December 2017

The anode material LiTi_2O_4 was successfully synthesized by a carbon-thermal reduction method. The standard Gibbs free energy of formation of LiTi_2O_4 is estimated by bond enthalpy, and the thermodynamics of the carbon-thermal reaction are calculated. The microstructure of the LiTi_2O_4 sample is obtained by scanning electron microscope (SEM) and X-ray diffraction (XRD). The results show that the as-prepared LiTi_2O_4 has a spinel structure (space group $Fd3m$) and that the average particle size is approximately 0.4-1.2 μm . LiTi_2O_4 shows excellent electrochemical performance in terms of galvanostatic charge/discharge tests, specific capacity and cycling performance. Electrochemical measurements indicate that the symmetrical redox peaks are observed at approximately 1.52 V, and the reversible capacity is approximately 135.9 mAh/g at a rate of 0.2 C.

Keywords: Thermodynamics calculation; LiTi_2O_4 ; Carbon-thermal reduction; Lithium-ion battery

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