Synthesis of lithium titanate (li4ti5O12) by addition of excess lithium carbonate (li2CO3) in titanium dioxide (tiO2) xerogel

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Abstrak

Lithium titanate, Li4Ti5O12 (LTO) is a promising candidate as lithium ion battery anode material. In this investigation, LTO was synthesized by a solid state method using TiO2 xerogel prepared by the sol-gel method and lithium carbonate (Li2CO3). Three variations of Li2CO3 content addition in mol% or Li2CO3 molar excess were fabricated, i.e., 0, 50 and 100%, labelled as sample LTO-1, LTO-2 and LTO-3, respectively. The characterizations were made using XRD, FESEM, and BET testing. These were performed to observe the effect of lithium excess addition on structure, morphology, and surface area of the resulting samples. Results showed that the crystallite size and surface area of each sample was 50.80 nm, 17.86 m2/gr for LTO-1; 53.14 nm, 22.53 m2/gr for LTO-2; and 38.09 nm, 16.80 m2/gr for LTO-3. Furthermore, lithium excess caused the formation of impure compound Li2TiO3, while a very small amount of rutile TiO2 was found in LTO-1. A near-pure crystalline Li4Ti5O12 compound was successfully synthesized using the present method with stoichiometric composition with 0% excess, indicating very little Li+ loss during the sintering process.