

SYNTHESIS OF LITHIUM TITANATE BATTERY MATERIAL

By

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ABSTRACT

Lithium titanate ($\text{Li}_4\text{Ti}_5\text{O}_{12}$) is mainly used in lithium-ion batteries as an electrode (anode) material because of its exceptional electrochemical properties. Several methods have been reported in the literature to synthesise lithium titanate (LTO) using various lithium and titanium compounds. Three methods - i) microwave assisted, ii) sol-gel and iii) hydrothermal techniques were chosen for investigation in this research to identify a suitable process route for LTO preparation using anatase (TiO_2), lithium hydroxide, lithium carbonate and sodium hydroxide reagents.

LTO preparation through microwave assisted method was not suitable, as little LTO formation occurred and most of the anatase remained unreacted. Both sol-gel and hydrothermal techniques generated good quality LTO product. However, the hydrothermal technique was found to be a better option for the process development where the LTO product had higher surface area ($\sim 7\text{-}9\text{ m}^2/\text{g}$) and lower particles size (PSD d_{50} of $<0.5\text{ }\mu\text{m}$) compared to LTO prepared by the sol-gel method.

Keywords: Lithium titanate, synthesis, lithium hydroxide, anatase