Preparation and electrochemical properties of carbon-coated $\text{Li}_4\text{Ti}_5\text{O}_{12}$ anode materials for Lithium Ion Batteries

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$\text{Li}_4\text{Ti}_5\text{O}_{12}/\text{C}$ composites were synthesized by three different solid-state methods using polyvinyl alcohol (PVA) as a carbon source. The physical and electrochemical characteristics of pure $\text{Li}_4\text{Ti}_5\text{O}_{12}$ and $\text{Li}_4\text{Ti}_5\text{O}_{12}/\text{C}$ composites were extensively investigated. Comparing with $\text{Li}_4\text{Ti}_5\text{O}_{12}$ sample, the $\text{Li}_4\text{Ti}_5\text{O}_{12}/\text{C}$ composites show better electrochemical properties, especially for the discharge capacity and rate performance. Owing to the existence of conductive carbon layer, the reversible discharge capacities of $\text{Li}_4\text{Ti}_5\text{O}_{12}/\text{C}$ composites may go up to 175.5 mAhg^{-1} , and the capacity retention for the best system could reaches to 97.4% after 50 cycles. In addition, one of these composites shows excellent high rate discharge performance, the discharge capacity remains at 162.2 mAhg^{-1} at 3 C rate.

Keywords: Lithium-ion battery; Anode material; $\text{Li}_4\text{Ti}_5\text{O}_{12}$; carbon coating; PVA

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