Superior electrochemical performances of $\text{LiTi}_2(\text{PO}_4)_3/\text{C}$ composite anode for aqueous lithium-ion battery

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Aqueous rechargeable lithium battery has attracted widespread attention due to their environmental friendliness, long service life, and high safety. $\text{LiTi}_2(\text{PO}_4)_3$ anode exhibits a promising prospect considering its high structural stability and enhanced energy density. In this work, $\text{LiTi}_2(\text{PO}_4)_3$ /carbon composite has been synthesized by using folic acid as a superior carbon source. The high-quality carbon not only protects the electrode from corrosion but also increases its electrical conductivity. A series of composites with different carbon content were prepared, and the effectiveness of the as-synthesized materials was further carried out systematically. Results show that the composite with a carbon content of 7.1% (LTP-F-2) exhibits the optimal electrochemical performance and a good stabilization mechanism. The discharge capacities of LTP-F-2 at 0.5, 4, and 15 C are 109, 108, and 95 mAh g^{-1} , respectively, which are 33, 76, and 82 mAh g^{-1} higher than those of pristine $\text{LiTi}_2(\text{PO}_4)_3$ (LTP). LTP-F-2 delivers the discharge capacity of 102 mAh g^{-1} at 0.5 C after 100 cycles and 83 mAh g^{-1} at 6 C after 1000 cycles. The capacity retention of LTP-F-2 at 6 C is 89.3% without significant corrosion on the electrode surface. Taking together, the result above reveals that folic acid-derived $\text{LiTi}_2(\text{PO}_4)_3$ /carbon composite is an excellent alternative anode material in aqueous rechargeable lithium batteries.

Keywords: $\text{LiTi}_2(\text{PO}_4)_3/\text{C}$ composite, aqueous lithium-ion battery, anode

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