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Nitrogen-doped carbon-coated hierarchical $\text{Li}_4\text{Ti}_5\text{O}_{12}$ - TiO_2 hybrid microspheres as excellent high rate anode of Li-ion battery

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Abstract

Nitrogen-doped carbon-coated $\text{Li}_4\text{Ti}_5\text{O}_{12}$ - TiO_2 (LTO-TO) hybrid microspheres were prepared by heat treating the dry mixture of urea and chemically lithiated dandelion-like TiO_2 microspheres in a stainless steel autoclave at 550 °C for 5 h. The hybrid materials were tested as anode of Li-ion batteries. As compared to the pristine sample, the N-doped carbon-coated LTO-TO microspheres exhibited higher specific capacity at both low and high current rates. Discharge capacities of 184 and 123 mAh g⁻¹ were obtained at 0.2 C and 20 C, respectively. Moreover, the LTO-TO/C electrode showed excellent cycle performance, with a discharge capacity of 121.3 mAh g⁻¹ remained after 300 cycles at 5 C, corresponding to an average capacity degradation rate of 0.073% per cycle. These high specific capacity, excellent rate capability and cycle performance demonstrated the high potentiality of the N-doped carbon-coated LTO-TO microspheres as anode material of both energy storage-type and power-type Li-ion batteries.

Keywords: $\text{Li}_4\text{Ti}_5\text{O}_{12}$; Li-ion batteries; Dual phase anode; Carbon coating; Rate capability

1. Introduction

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