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Hydrothermal preparation of CoO/Ti₃C₂ composite material for lithium-ion batteries with enhanced electrochemical performance

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Abstract: The CoO/Ti₃C₂ composite is prepared via a facile hydrothermal route followed by calcination, of which the morphology and the microstructure are characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). CoO nanoparticles with the diameter of 10-20 nm are uniformly coated on the surface of Ti₃C₂ nanosheets, which increases the surface areas and prevents the aggregation of CoO. In addition, the CoO/Ti₃C₂ composite as an anode material for lithium-ion batteries (LIBs) demonstrates a higher initial discharge capacity of 1389 mAh g⁻¹ with a columbic efficiency of 61% at 100 mAh g⁻¹. The reversible capacity can remain about 313 mAh g⁻¹ after 100 cycles, which is much higher than that of the pure Ti₃C₂. The present results indicate that CoO/Ti₃C₂ composite has a potential application in the anode of LIB.

Keywords: CoO/Ti₃C₂; Hydrothermal; Lithium-ion batteries; Electrical properties.

1. Introduction

Lithium-ion battery is recognized as an important electrical energy storage

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