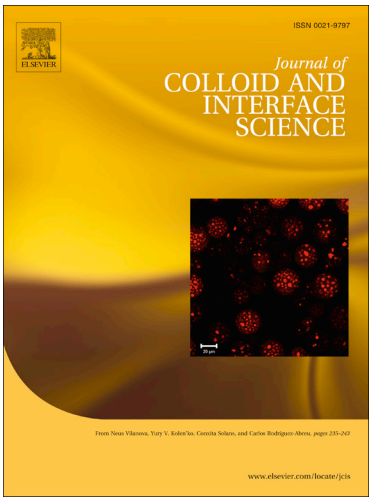

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Cobalt nanofibers coated with layered nickel silicate coaxial core-shell composites as excellent anode materials for lithium ion batteries

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Abstract

A novel type of cobalt nanofibers coated with layered nickel silicate (Co nanofibers @ voids @ $Ni_3Si_2O_5(OH)_4$) coaxial core-shell composites were successfully prepared via a well-known Stöber process and two hydrothermal methods. In the composites, the international nanosheet structure of the nickel silicate provided interlayer spaces for lithium ions in the process of insertion and extraction. The cobalt nanofibers served as a mechanical support for the nickel silicate nanosheets, which increased the electrical conductivity of the whole electrode. In addition, one-dimensional coaxial structure was stable to buffer the volume change and avoid the destruction of the structure. Moreover, the voids provided effective channels for the transportation of lithium ions. The Co nanofibers @ voids @ $Ni_3Si_2O_5(OH)_4$) coaxial core-shell composites presented superior electrochemical properties compared with the published $Ni_3Si_2O_5(OH)_4$-related materials. With the advantages of exceptional performances and facile preparation, the composites show prospective application potential as advanced anode materials in lithium ion batteries.

Key words: Cobalt nanofibers; Nickel silicate; Anode materials; electrochemical properties

1. Introduction

Due to high energy density, long cycle life as well as safety, lithium ion batteries (LIBs) as one predominant power source have been widely used in numerous fields, such as electric vehicles and smart grids [1, 2]. However, the ever-increasing demands for lithium ion batteries stimulated extensive research beyond lithium ion battery technologies to explore new abundant, low-cost and nontoxic

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