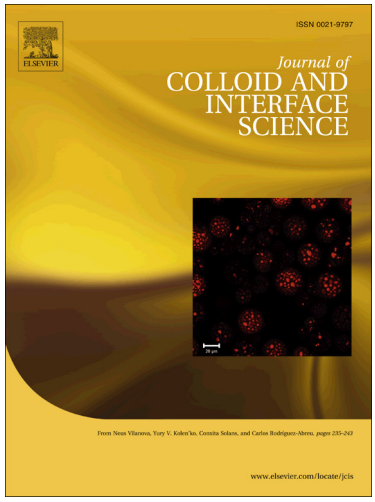

Regular Article

Self-assembly synthesis of a unique stable cocoon-like hematite @C nanoparticle and its application in lithium ion batteries

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Self-assembly synthesis of a unique stable cocoon-like hematite @C nanoparticle and its application in lithium ion batteries

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ABSTRACT:

A novel cocoon-like Fe_2O_3@C nanoparticle was fabricated via a facile hydrothermally molecular self-assembly procedure. Compared to bare Fe_2O_3 nanoparticles, the carbon coated Fe_2O_3 nanoparticles exhibit higher specific capacity, excellent rate capacity and cyclic stability as the anode in lithium ion batteries. These cocoon-like Fe_2O_3@C nanoparticles carry enhanced lithium storage properties with a reversible capacity of 358 $mAhg^{-1}$ after 150 cycles under the current density of 1000 mAg^{-1}, while the carbon-free bare Fe_2O_3 can only deliver a much lower capacity of 127.6 $mAhg^{-1}$ with a continuously decreasing trend. The excellent performance of Fe_2O_3@C is attributed to the coated carbon layers, which not only enhance the electronic conductivity but also reduce the stress upon the Fe_2O_3 nanoparticles caused by the volume change during the charge/discharge process.

Keywords:

Self-assembly; Fe_2O_3; Carbon coating; Lithium-ion anode

1. Introduction

Since the first commercialization in the 1990s, lithium-ion batteries (LIBs) have become the primary power source for portable electronic devices due to the advantages of high energy density, long life, environmental friendly and so on [1-4]. At present, the anode materials used in most

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