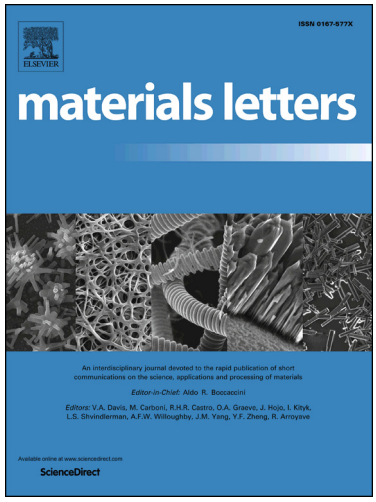

N-doped carbon encapsulated MnO nanoparticles for enhanced lithium storage

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N-doped carbon encapsulated MnO nanoparticles for enhanced lithium storage

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Abstract: N-doped carbon encapsulated MnO nanoparticles (MnO/NC) is synthesized via a straightforward hydrothermal strategy and a subsequent annealing treatment. When evaluated as an anode for lithium ion batteries, MnO/NC exhibits a high reversible capacity (1158 mA h g^{-1} over 300 cycles at 0.2 A g^{-1}), good cyclability, and excellent rate performance. The superior electrochemical performance should be attributed to the synergistic effect of MnO nanoparticles and N-doped carbon capsules.

Keywords: Energy storage and conversion, Nanoparticles, Nitrogen-doped carbon, Electrical properties, Lithium ion batteries

1. Introduction

With the fast consumption of energy, advanced lithium ion batteries (LIBs) are greatly desired [1]. However, the current conventional anode materials are far from satisfying the demand for LIBs. Exploring alternative anodes with excellent lithium storage capacity is essential for the expanding applications of LIBs. Transition metal oxides have drawn tremendous attention due to their high theoretical specific capacities [2]. In particular, MnO shows great potential as anode material for LIBs due to its relatively high theoretical capacities (755 mA h g^{-1}), low operating voltage, cost effectiveness, and nature abundance [3]. Nevertheless, the large volume expansion during cycling results in severe agglomeration and pulverization of MnO particles, leading to significant capacity fading and rather poor cycle lifespan [4]. In addition, its poor rate capability due to extremely low electrical conductivity hindered its practical application for LIBs [5, 6].