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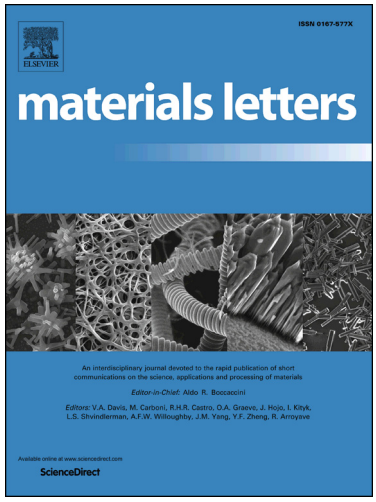

Electrochemical performance of nickel hydroxide nanopetals for supercapacitor electrodes

Biny R. Wiston, M. Ashok

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Electrochemical performance of nickel hydroxide nanopetals for supercapacitor electrodes

Biny R. Wiston[a], M. Ashok[a,*]
[a] New Generation Materials Laboratory, Department of Physics, National Institute of Technology, Tiruchirappalli 620015, India
[*]ashokm@nitt.edu (M. Ashok)

Abstract

Nickel hydroxide and nickel oxide were prepared via a facile chemical precipitation method, whose structure, morphology and electrochemical properties were compared. Nickel hydroxide demonstrated nanopetal-like morphology, pseudocapacitive nature, a superior specific capacitance of 701 F g^{-1} at 1 A g^{-1} and admirable capacitance retention of 84.16 % even after 5000 consecutive charge-discharge cycles in 2 M KOH aqueous electrolyte. Meanwhile, nickel oxide grew into a cluster of randomly shaped nanostructures with pseudocapacitive behavior and comparatively lower specific capacitance of 171 F g^{-1} at 1 A g^{-1}. In nickel hydroxide, the freedom of movement of electrolyte ions is responsible for its loftier charge storage capability.

Keywords: Energy storage & conversion, surfaces, Pseudocapacitance

1. Introduction

Increased usage of portable electronic gadgets elevated the demand for efficient energy storage device. Supercapacitors are promising next generation energy storage devices with superior cycling stability, high power density, improvable energy density and expandable potential window [1-3]. Currently, materials with a high specific surface area, appropriate morphology for swift ion and electron transfer and good stability are making a breakthrough as supercapacitor electrodes. Over a variety of electrode materials, transition metal hydroxides have drawn much attention, owing to their unique layered structure, high specific surface area and good chemical stability [4-6]. High theoretical capacitance, stability, low cost and easy availability make nickel hydroxide as an attractive electrode material for supercapacitors [7]. Meanwhile, the choice of suitable current collector also plays a crucial