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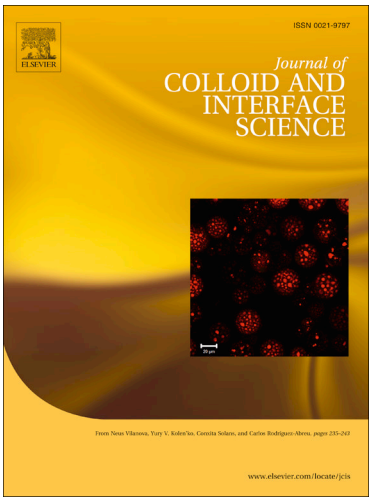

Hetero-nanostructured Materials for High-Power Lithium Ion Batteries

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GENERAL INFORMATION

Data Article

Title: Hetero-nanostructured Materials for High-Power Lithium Ion Batteries

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Abstract

The development of high technology electrical devices increased the importance of higher power density or higher capacity at high current density. Especially, rapid charge/discharge issues remain problematic for electric vehicle commercialization. After extensive investigation, researchers introduced hetero-nanostructured materials to the field of lithium ion batteries (LIBs), aiming to enhance the power density or improve the capacity at high current density and life cycle capability. Hetero-nanostructured materials consist of current collectors and directly attached active nanomaterials. Carbon, carbon nanotube (CNT), graphene, Nickel (Ni), Copper (Cu) and Aluminum (Al) were used for current collector, aiming to improve the electron transfer and the cyclability, due to high electrical conductivity and superior buffering effects. Also, Hetero-nanostructure can produce a favorable lithium diffusion condition by creating a lithium diffusion pathway. This article presents an explanation of important factors for high power density or high capacity at high current density. It summarizes the capacity of electrode materials at high current density, including structural descriptions and material types.

1. Introduction

The importance of lithium ion batteries (LIBs) has increased significantly on account of high energy densities and design flexibilities.[1] Renewable and clean energy sources, that are dependent on variables including weather and time, among others, initiated increasing demands for improving LIB performance with high energy densities.[2-4] Given design flexibility and safety, LIBs are being exploited for widespread application in portable electronic devices and electric vehicles (EV).[5-9] However, LIBs are restricted to low achievable power densities, when compared to electrochemical capacitors and