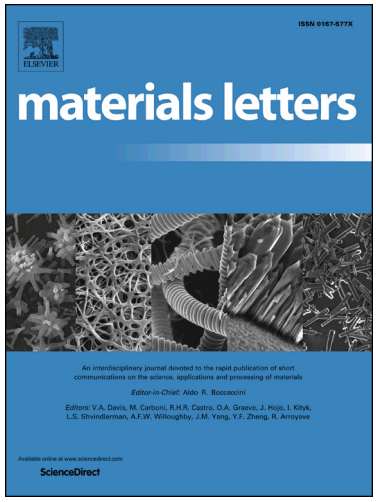

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Xueyang Shen, Ziping Cao, Jinya Zhang, Tianzhe Li, Wenchao Jiang

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In-situ loading of ZnO nanoparticles on carbon felt as novel binder-free flexible anode for high performance Lithium-ion batteries

Xueyang Shen [a *], Ziping Cao [b *], Jinya Zhang [a], Tianzhe Li [a], Wenchao Jiang [a]

[a] *College of Electronic and Optical Engineering& College of Microelectronics , Nanjing University of Posts and Telecommunications, Nanjing 210046, China*

[b] *College of Telecommunication & Information Engineering, Nanjing University of Posts and Telecommunications, Nanjing 210046, China*

*e-mail: shenxy2014@njupt.edu.cn, caozp@njupt.edu.cn

Abstract

The paper reports a novel ZnO/carbon felt (CF) flexible electrode via a facile solvothermal method. The flexible electrode presents a unique architecture with well-dispersed ZnO nanoparticles on shallow grooves of carbon felt. As a binder-free LIB anode, it exhibits a stable reversible capacity of 520.2 mA h g^{-1} after 100 cycles at a current density of 100 mA g^{-1}. The improved lithium storage properties can be attributed to the combined effect of both CF matrix and nano-sized embedded ZnO. The shallow grooves of elastic carbon fibers are favorable to accommodate the large volume expansion of ZnO and sustain good cycle stability. Moreover, the conductive network of CF may promote the electrical contact of the flexible electrode, making contribution to the enhanced rate performance. The structure, morphology and the electrochemical performances of ZnO/CF electrode for flexible LIBs are analyzed in details.

Keywords: Lithium batteries, Flexible, Anode, Znic oxide, Carbon felt

1. Introduction

With the prompt development of electronic technology, the problems of efficient power supply are increasingly becoming a pop topic [1]. Lithium ion batteries (LIBs) have been widely used in today's portable electronic equipment due to their high-efficiency and environmental-friendly characteristics [2]. But with the advent of flexible electronics (implantable medical devices, wearable sensors and flexible notebook/smart phone, etc), traditional LIBs are not able to meet all the growing needs of these bendable and wearable devices [3, 4]. Therefore, flexible LIBs have