Synthesis and Characterization of Hierarchical NiO/Ni-Co-Mn Oxide Nanocomposite Materials for High Performance Supercapacitors

Ziyang Qin¹, Ruidong Xu^{1,2,*}, Bohao Yu¹, Wenbin Wang¹, Ying Zhang¹

¹ Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming 650093, China

² State Key Laboratory of Complex Nonferrous Metal Resources Clean Utilization, Kunming 650093, China

*E-mail: rdxupaper@aliyun.com

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Hierarchical NiO/Ni-Co-Mn oxide nanocomposite materials on nickel foam substrates were prepared by chemical bath deposition. The elemental mappings, microstructures and phase structures were observed by field-emission scanning electron microscope and X-ray diffraction, and the electrochemical properties were measured by electrochemical workstation. The grid-like NiO nanosheets grew directly on nickel foam substrates, thereafter Ni-Co-Mn oxide nanosheets were coated on NiO nanosheets to form a layered composite structure. Cyclic voltammetry analysis shows that the obvious Faradaic reactions were found and the charge could be stored quickly. The low charge transfer resistance displays that the nanocomposite structure can improve the electrochemical activity. Meanwhile, the high specific capacity (1468.14 F g⁻¹ at a current density of 1 A g⁻¹) and high cycle performance (90.76% retention at 5 A g⁻¹ after 3000 cycles) have been obtained by galvanostatic charge-discharge measurements. Therefore, NiO/Ni-Co-Mn oxide nanocomposite material as an ideal energy storage material may be potential to use in high performance supercapacitors.

Keywords: NiO nanosheets; Ni-Co-Mn oxide nanosheets; chemical bath deposition; hierarchical composite structure; supercapacitor

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