The Electrochemical Performances of Zn-Al-Hydrotalcites in Zn-Ni Secondary Batteries

Xiaohua Yu¹, Yasong Qu¹, Shuanglin Yu¹, Yunting Cai¹, Xiaocai He², Pan Feng¹,
Ying Wang¹, Gang Xie^{1,3}

¹ Faculty of metallurgy and energy engineering, Kunming University of Science and Technology, Kunming Yunnan 650093, China

² Yunnan Metallurgical Group Chuang Neng Metal fuel battery Co., LTD, Kunming 650503, China

³ State key laboratory of pressure hydrometallurgical technology of associated non-ferrous metal resources, Kunming Yunnan 650503, China

*E-mail: yxhyxh1978@aliyun.com

doi: 10.20964/2019.01.34

Received: 14 September 2018 / Accepted: 5 November 2018 / Published: 30 November 2018

Zn-Al-hydrotalcites (Zn-Al-LDHs) are successfully synthesized by a hydrothermal method and a co-precipitation method and are investigated as negative electrode materials for Zn-Ni batteries. Scanning electron microscope (SEM) images, X-ray diffraction (XRD) patterns and laser scattering particle analysis show that the as-prepared sample is flaky in structure and well-crystallized, and the particle sizes are approximately 20-40 μm . The electrochemical performances of Zn-Al-LDHs determined by different methods are investigated by potentiodynamic polarization, electrochemical impedance spectroscopy (EIS) and galvanostatic charge/discharge measurements. Compared with pure ZnO powders, Zn-Al-LDHs have good anticorrosion ability. The lower charge platform (1.86 V) and higher discharge platform (1.71 V) of Zn-Al-LDHs indicate that they have better charge/discharge performance as negative active materials for Zn-Ni batteries. These findings show excellent cycle stability in the 40th cycle, with the capacity retention ratio of 81.4% and cycle efficiency of approximately 90%, which are much higher than those of pure ZnO (44%).

Keywords: Zn-Al-LDHs; Zn-Ni secondary batteries; Electrode performance; Cyclic stability

[FULL TEXT](#)

© 2019 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).