Preparation of thin-walled Na₂Ti₃O₇ nanotube and its electrochemical properties

Mingzhen Ding¹, Jia Cheng², Zhouzhou Li¹, Ying Chen¹, Ke Zhang¹, Jie Qu^{1,*}

¹College of Chemistry and Chemical Engineering, Hunan Normal University, Changsha 410081, China

²Hunan Hua Teng Pharmaceutical Co., Ltd, Changsha 410205, P. R. China

*E-mail: qujie@hunnu.edu.cn

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Sodium-ion battery is one of the most promising alternatives to lithium-ion devices. However, suitable anode materials still need further research. Here, Na₂Ti₃O₇ (NTO) nanotubes were synthesized by a facile one-step hydrothermal method, and the morphology was controlled by varying the hydrothermal temperature. X-ray diffraction (XRD) and Transmission electron microscopy (TEM) studies are performed to investigate the morphology and structure of the prepared samples. The results show that NTO-150 owns only 2-3 walls with a thickness of ca. 4 nm. Cyclic voltammetry (CV) and galvanostatic cycling demonstrate that NTO-150 owns higher specific capacity and better cycling stability. Electrochemical impedance spectroscopy (EIS) further indicates such nanotubes with thin wall thickness, tubular structure and large volume space can not only promote the ion transport kinetics, but also accommodate the volume expansion.

Keywords: Sodium-ion battery; Na₂Ti₃O₇; Nanotube; Electrochemical performance

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