Li₄Ti₅O₁₂ Coating Layer as Li⁺ Conductor and Cycle Stabilizer for SnO₂ Anode

Gong Shiding, Zhang Yaoyao, Sun Fang, Zeng Tianbiao, Hu Xuebu *

College of Chemistry and Chemical Engineering, Chongqing University of Technology, Chongqing 400054, China
*E-mail: xuebu@cqut.edu.cn
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Li₄Ti₅O₁₂ as Li⁺ conductor and cycle stabilizer was coated successfully on mesoporous SnO₂ spheres (M-SnO₂) via in-situ synthesis. The structure and morphology of as-prepared samples were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The results indicated that the SnO₂ spheres were coated fully by Li₄Ti₅O₁₂ layer, and the Li₄Ti₅O₁₂ layer did not change the structure or morphology of M-SnO₂. Electrochemical impedance spectra (EIS) and charge/discharge tests showed that the outer Li₄Ti₅O₁₂ coating layer enhanced Li⁺ diffusion in SnO₂ anode. The Li⁺ diffusion coefficient for S-1 and S-2 reached to 9.87×10⁻¹³ cm² s⁻¹ and 1.82×10⁻¹² cm² s⁻¹, while the value of M-SnO₂ was only 6.36×10⁻¹³ cm² s⁻¹. The cycle stability and rate cycle property of SnO₂-based anode were improved significantly due to promotional role of Li₄Ti₅O₁₂ coating layer.

Keywords: SnO₂, Li₄Ti₅O₁₂, Li⁺ conductor, cycle stabilizer, Li⁺ diffusion coefficient

FULL TEXT

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