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

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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 $9.87 \times 10^{-13} \text{ cm}^2 \text{ s}^{-1}$ and $1.82 \times 10^{-12} \text{ cm}^2 \text{ s}^{-1}$, while the value of M-SnO₂ was only $6.36 \times 10^{-13} \text{ cm}^2 \text{ s}^{-1}$. 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

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