Sn Embedded $\text{Li}_4\text{Ti}_5\text{O}_{12}$ /C Composite as a High Capacity Anode Material for Li-ion Battery

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Sn embedded $\text{Li}_4\text{Ti}_5\text{O}_{12}$ /C composite (C-Sn/ $\text{Li}_4\text{Ti}_5\text{O}_{12}$) was prepared using TiO_2 sphere as precursor. The physical characteristics of C-Sn/ $\text{Li}_4\text{Ti}_5\text{O}_{12}$ were characterized by X-ray diffraction (XRD), thermogravimetric analysis (TG), Raman spectra, elemental analysis, scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The electrochemical performances were investigated by cyclic voltammograms (CVs) and galvanostatic charge-discharge tests. These analyses indicate that C-Sn/ $\text{Li}_4\text{Ti}_5\text{O}_{12}$ was spherical-like particles about 1 μm . Moreover, it was composed of inner spinel $\text{Li}_4\text{Ti}_5\text{O}_{12}$, outer-coated carbon layer and Sn embedded between inner $\text{Li}_4\text{Ti}_5\text{O}_{12}$ and outer carbon layer. Combining high specific capacity of Sn particles and high electronic conductive of carbon coated layer, as-prepared C-Sn/ $\text{Li}_4\text{Ti}_5\text{O}_{12}$ shows improved discharge capacity. Compared with carbon-coated $\text{Li}_4\text{Ti}_5\text{O}_{12}$ (C- $\text{Li}_4\text{Ti}_5\text{O}_{12}$), the C-Sn/ $\text{Li}_4\text{Ti}_5\text{O}_{12}$ exhibited better capability at 200 mA g^{-1} with a discharge capacity increased by $\sim 16.3\%$. After 100 cycles, the discharge capacity of C-Sn/ $\text{Li}_4\text{Ti}_5\text{O}_{12}$ was stable at $\sim 242 \text{ mAh g}^{-1}$.

Keywords: $\text{Li}_4\text{Ti}_5\text{O}_{12}$; Sn; carbon layer; anode

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