**ABSTRACT**

Li4Ti5O12/Snnano-composites have been prepared as anode material for lithium ion batteries by high-energy mechanical milling method. Structure of the samples has been characterized by X-ray diffraction (XRD), which reveals the formation of phase-pure materials. Scanning electron microscope (SEM) and transmission electron microscope (TEM) suggests that the primary particles are around 100 nm size. The local environment of the metal cations is confirmed by Fourier transform infrared (FT-IR) and the X-ray photoelectron spectroscopy (XPS) confirms that titanium is present in Ti4+ state. The electrochemical properties have been evaluated by galvanostatic charge/discharge studies. Li4Ti5O12/Sn–10% composite delivers stable and enhanced discharge capacity of 200 mAh g−1 indicates that the electrochemical performance of Li4Ti5O12/Snnano-composites is associated with the size and distribution of the Sn particles in the Li4Ti5O12 matrix. The smaller the size and more homogeneous dispersion of Sn particles in the Li4Ti5O12 matrix exhibits better cycling performance of Li4Ti5O12/Sn composites as compared to bare Li4Ti5O12 and Sn particles. Further, Li4Ti5O12 provides a facile microstructure to fairly accommodate the volume expansion during the alloying and dealloying of Sn with lithium.