Effect of preparation temperature and cycling voltage range on molten salt method prepared SnO2

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Abstract

We prepared nano-sized tin (IV) oxide (SnO\textsubscript{2}) via molten-salt technique: heating a mixture of tin tetrachloride, lithium nitrate and lithium chloride at 280 °C in air. The powders are characterized by X-ray diffraction and transmission scanning microscopy techniques. The XRD studies showed a structure similar to tetragonal structure. The cyclic voltammetry studies showed characteristic cathodic peak potentials of reduction of Sn\textsuperscript{4+} to Sn metal in the first cathodic scan, and alloying–de–alloying reaction of Sn at 0.25 and 0.5 V vs. Li for successive cathodic and anodic scans cycled in the voltage range, 0.005–1.0 V. Galvanostatic cycling studies show that reversible capacities (MSM SnO\textsubscript{2} prepared at 280 °C) of 640, 720, 890 mAh g\textsuperscript{-1} in the voltage range, 0.005–1.0 V, 0.005–1.3 V and 0.005–1.5 V, respectively at a current rate of 100 mA g\textsuperscript{-1}. We also discussed the effect of particle size and its electrochemical properties in the voltage range, 0.005–1.0 V.