The Structural and Electrochemical Properties of tin oxide based anode for Li ion batteries

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Great efforts are being made towards development of a variety of other anode materials such as lithium-alloying metals, electro-active polymers and silicon. Tin oxides have been suggested as possible anode materials, to replace the presently used carbonaceous materials, as they have larger reversible capacities. The alloying of Li directly into bulk tin metal causes a large volume expansion, producing cracking of the electrode, and rapid loss of capacity, and so is not of use in a practical battery. Tin oxides are also non-toxic and readily available and so would make a good choice for new battery technology. In this paper, ZnO: SnO_2 composite was prepared for negative electrode material and was electrochemically tested. The as prepared materials were subjected to x ray diffraction (XRD), Scanning electron microscopy (SEM) and Fourier transform infrared spectroscopic (FTIR) studies. Electrochemical lithium insertion behavior of the materials was examined in coin cells of the 2032 configuration. The sample delivered the highest discharge capacity of 1605 mAh/g in the initial cycle. A large loss of capacity between the initial and the later cycles is observed due to the required reduction of the tin and zinc ions to the bulk metal. The material can be a promising candidate as Li-ion battery anodes if the capacity loss can be reduced with further studies.