Whisker Formation on a Thin Film Tin Lithium-Ion Battery Anode

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Abstract

Tin (Sn) is a candidate material for anodes (negative electrodes) of lithium-ion batteries (LIBs) because of its high theoretical energy capacity. Research on Sn as anode materials of LIBs is active for 30 years. In this work, we report an observation of Sn-whisker growth on Sn-thin films after lithiation and delithiation. The formed Sn whiskers are single crystals with an average number of 1306 ± 280 in 1 mm^2. The compressive stress generated by electrochemical lithiation of the Sn-thin films is likely the driving force for the growth of the Sn whiskers. Attention should therefore be paid to the issue of Sn whisker growth for Sn-based electrodes and other electrodes consisting low melting point elements, since Sn whiskers may penetrate through the separator, and short-circuit the electrochemical cell.

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