Symp B04

Chemical Approaches for Controlling Volume Expansion of the Metal-Based Anode Materials for Li Secondary Batteries

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Many efforts have been made to implant Sn-based anode to Li-secondary battery since it was first reported by Idota *et al.* (Science) in 1997. These electrodes exhibited a higher capacity (> 600 mAh/g) than the conventional graphite anode (372 mAh/g), but showed faster capacity fading upon cycling. The most detrimental factor that hinders the use of Sn-based anodes in Li-ion cells is its poor cycling stability as a result of the drastic volume change between Sn and $Li_{4.4}Sn$ of 358%. Consequently, the particles become detached and electrically inactive. In this presentation, I report new approaches for minimizing such drastic volume changes via mesopore formation, nanoparticles size control, and amorphous nanoparticle formation.