

Spark plasma-sintered Sn-based intermetallic alloys and their Li-storage studies

Nithyadharseni P
Reddy MV
Nalini B
Saravanan P
Vinod VTP
Cerník M
Chowdari BVR

ABSTRACT:

In the present study, SnSb, SnSb/Fe, SnSb/Co, and SnSb/Ni alloy powders processed by co-precipitation were subjected to spark plasma-sintering (SPS) at 400 °C for 5 min. The compacts were structurally and morphologically characterized by X-ray powder diffraction and scanning electron microscopy, respectively, while the electrochemical performance was investigated by galvanostatic cycling, cyclic voltammetry, and electrochemical impedance spectroscopy. Galvanostatic charge–discharge cycling of materials was examined in a voltage window of 0.005–1.5 V, with the current density of 60 mA g(sup-1). The SPSed SnSb/Fe, SnSb/Co, and SnSb/Ni compounds showed high capacities of 715, 670, 740 mAh g(sup-1) in the initial cycles. However, rapid capacity fading was observed except for the SnSb and SnSb/Co alloy. Whereas, the SPSed SnSb alloy exhibits low reversible capacity of 528 mAh g(sup-1), but it maintained high capacity retention with good cycling stability. However, SnSb/Co alloy shows high capacity of 447 mAh g(sup-1) (capacity retention of 67 %) at the end of the 50th cycle. The result of the present study reveals that the SPSed samples exhibited good capacity retention with cycling as compared to the bulk samples obtained by other methods.