Electrochemical Performance of Nanocomposite Alloy Anodes for Lithium-ion Batteries

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Lithium-ion batteries (LIBs) have been evaluated as an effective alternative energy resources substituted for fossil fuels. Especially, antimony (Sb) has been widely researched as an anode material due to its high theoretical capacity (660 mAh g-1) compared to that of carbon (372 mAh g-1). However, during the (de)lithiation reaction, Sb suffers from its huge volume change (~390%), which could cause pulverization between anode and current collector. To overcome this difficulty, we focus on the development of metal alloys including Sb as a promising anode material via high energy mechanical milling, where hybrid matrix composed of TiC and C is introduced. The as-prepared composite anodes exhibit high initial coulombic efficiency, high reversible capacity, and excellent high-rate capabilities.
Keywords: lithium ion batteries, antimony nanoparticles, composite anodes, hybrid matrix