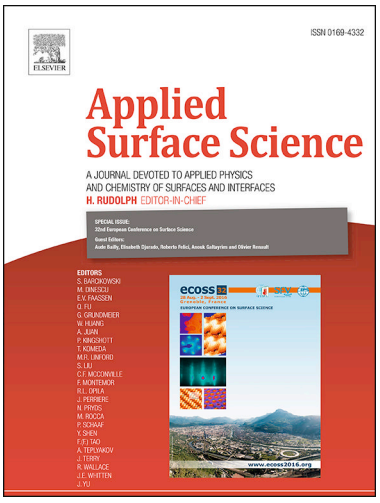

Full Length Article

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Freestanding Nano Crystalline Tin@Carbon Anode Electrodes for High Capacity Li-Ion Batteries

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Abstract

Due to their high specific capacities tin based electrode materials are in the focus of many researchers almost for a decade. However, tin based electrodes are hampered in practical applications due to the volumetric changes during the lithiation and delithiation processes. Therefore, we designed and synthesized a novel "yolk-shell" structure in order to remove these challenges. The production of high purity nano Sn particles were synthesized through a facile chemical reduction method. As-synthesized nano particles were then embedded into conformal and self-standing carbon architectures, designed with hollow space in between the shell and the active electrode particles. As-synthesized Sn@C composite particles were decorated between the layers of graphene produced by Hummers method in order to obtained self-standing thin graphene films. A stable discharge capacity of 284.5 mAh g^{-1} after 250 cycles is obtained ~~after 250 cycles~~. The results have shown that Sn@C@Graphene composite electrodes will be a promising novel candidate electrode material for high capacity lithium ion batteries.

Keywords: Li-ion batteries, graphene, Sn, free standing, anode electrodes