

عنوان مقاله:

Characterization of Sn/Graphene composite as anode in lithium ion batteries

محل انتشار:

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خلاصه مقاله:

Developing anode materials with high capacity and cycling stability is one of the researches of highest interest in lithium ion battery (LIB). Sn or Sn-based anode materials have been widely considered as one of the most promising anode candidates for its relatively high conductivity and noticeable theoretical capacity (994 mAh g⁻¹) [1]. Drastic volume change of Sn occurring during lithium insertion/deletion in charging/discharging process leads to cracking and pulverization of the electrodes and eventually quick fading of capacity. To address this problem, fabricating carbonaceous composite material such as Sn/C [2] anodes and Sn/CNTs [3] anodes seems to be an applicable strategy. Graphene (G) has recently been investigated as the functional matrix support for Sn-based nanostructures due to its intrinsic properties of flexible two-dimensional (2D) structure, high surface area, and excellent electrical conductivity, which not only facilitate the transfer of electrons, but also diminish the stress of the collective electrode upon battery cycling [4-5]. The discharge capacity at 1st and 2nd cycles and the cycleability during 25 cycles were evaluated as two most important criteria in LIBs. Physical characterizations such as SEM and XRD have been done to study the morphology of the system as working electrode. The electrolyte role has been studied since it affects both potential window and diffusion of lithium ions determining the impedance of electrolyte. Also, Electrochemical Impedance Spectroscopy (EIS) was analyzed to study the resistance behavior of the system. The Sn/graphene composite was produced through co-electrodeposition of components in aqueous medium under the constant and pulsed current applied on current collector substrate. The findings indicated that the composite produced has comparable discharge capacity in 1st and 2nd cycles while noticeably higher cycleability during 25 cycles. Additionally, EIS studies indicated that the graphene improves the resistance behavior of the system.

کلمات کلیدی:

Lithium ion battery, Sn/ Graphene composite, discharge capacity, cycleability, cyclic voltammetry

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