Short Communication

A Novel Composite Anode Material of Si-SnO₂-graphene Prepared in Air for Lithium Ion Batteries

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For the first time, a novel composite material, that contained Si, SnO₂ and graphene, was prepared by using an air condition calcination method employing commercial silicon wafer, SnCl₄ and graphene as the starting materials. In this work, four samples, i.e., Si (sample a), Si+SnCl₄ (sample b), Si+SnCl₄+graphene (sample c) and Si+SnCl₄+lignin (sample d), were fabricated and systematically investigated. The physicochemical properties of the synthesized samples were characterized mainly by using X-ray diffraction (XRD) and scanning electron microscopy (SEM). XRD results strongly indicated that elementary Si existed in all prepared samples and SnO₂ was contained in sample b, c and d. The electrochemical properties of the resultants samples were investigated basically by employing cyclic voltammometry (CV), galvanostatic charge-discharge tests and electrochemical impedance spectroscopy (EIS), and the results revealed that the discharge capacities of sample c and d were respectively estimated to be about 350 and 272 mAh g⁻¹ after 20 cycles at 100 mA g⁻¹. It should be emphasized that no harsh preparation conditions were employed in this work. That is to say, this newly created novel kind of composite anode materials, i.e., sample c, can be large-scale produced easily, being very helpful to the development of commercial production of lithium ions batteries (LIBs) anode materials.

Keywords: anode material; Si; SnO₂; graphene; Li ion battery

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