Article

Investigation on synthesis of SnO_2 nano-particles using sol–gel process for energy storage application

Sudha Periathai R., Pon Vengatesh R., Jeyakumaran N. & Prithivikumaran N.

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ABSTRACT

One of the greatest challenges in the twenty-first century is unquestionably energy storage. It is now essential that new, low-cost and environmentally friendly energy conversion and storage systems are to be found. Metals that store Lithium are the most appealing and competitive candidates for new types of anode (negative electrodes) in Lithium ion rechargeable batteries. SnO_2has been demonstrated to be one of the most promising anode materials for high performance Lithium-ion batteries (LIBs) due to its high theoretical specific storage capacity (782 mAh/g) as compared with the commercially used graphite. In the present work, secondary Li-ion battery was fabricated using SnO_2 nanoparticles synthesised by Sol-gel process as anode material without any surface modification. TEM analysis confirmed the nanometric size of the synthesised SnO_2 nanoparticles. Electrochemical impedance study has been carried out for the assembled cell of configuration SnO_2 electrode sheet/ 1 M LiPF6 PC:DME 1:1/ Li metal. The ohmic resistance (R_Ω) and the charge-transfer resistance (R_{ct}) are found to be 2.28Ω and 52Ω respectively.The Galvanostatic charge/discharge profile was studied at three current rates such as 0.44C, 0.88C and 1Cin the potential window between 0.1 V to 1.2 Vand their coulombic efficiencies were analysed.

KEYWORDS: SnO_2 | anode material | lithium-ion battery | sol–gel process