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Study of the performance of $Sn_xSb_yS_z$/carbon nanofibers composite as anode of sodium-ion batteries

L. A. Rodríguez-Guadarrama, J. Escorcia-García, E. Quiroga-González & I. L. Alonso-Lemus

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Abstract

Sodium-ion batteries (SIBs) have emerged as a promising alternative for energy storage. In this work, it has been synthesized a nanocomposite material of $Sb_xSb_yS_z$/Carbon nanofibers (CNFs) using low-cost synthesizing methods. First, CNFs have been obtained by electrospinning method with subsequent carbonation at 700°C. Afterward, a $Sb_xSb_yS_z$ thin coating is deposited on the CNFs by chemical bath deposition technique to obtain the $Sb_xSb_yS_z$/CNFs. In order to obtain the $SnSb_2S_4$ crystalline phase, the composite is heated at 300°C in nitrogen atmosphere. The evaluation of this nanocomposite as the anode for SIBs has a reversible discharge capacity of 180 mAh g^{-1} and a columbic efficiency of 61.4% after 9 cycles. On the other hand, the resistance associated to the charge transfer to the CNFs decreases from 115.03 Ω to 77.86 Ω due to the incorporation of $Sn_xSb_yS_z$. Finally, an easy and inexpensive route has been proposed for the synthesis of $Sb_xSb_yS_z$/CNFs composite with great potential to be used as anode material for SIBs.

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Author information

Affiliations

1. Sustentabilidad de los Recursos Naturales y Energía, CINVESTAV, Unidad Saltillo, Av. Industria Metalúrgica 1062,

Parque Industrial, Ramos Arizpe, 25900, Coahuila, Mexico

L. A. Rodríguez-Guadarrama

2. Parque Industrial, CONACYT-CINVESTAV, Unidad Saltillo, Av. Industria Metalúrgica 1062, Ramos Arizpe, 25900, Coahuila, México

J. Escorcia-García

3. Institute of Physics, Benemérita Universidad Autónoma de Puebla, San Claudio and 184 Sur 72574, Puebla, Mexico

E. Quiroga-González

4. Sustentabilidad de los Recursos Naturales y Energía, CONACYT-CINVESTAV, Unidad Saltillo, Av. Industria Metalúrgica 1062, Ramos Arizpe, 25900, Coahuila, México

I. L. Alonso-Lemus

Corresponding author

Correspondence to I. L. Alonso-Lemus.

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