

MICRO- AND NANO-STRUCTURES FOR HIGH CAPACITY LI ION BATTERY ELECTRODES BY ECONOMICAL AND SIMPLE FABRICATION METHODS

Enrique Quiroga-González, Oscar Pérez-Díaz, Lorena García-González

Institute of Physics, Benemérita Universidad Autónoma de Puebla, 72570 Puebla, Mexico

Micro- and nano-structured materials have been finding their way in different fields, presenting new and sometimes improved properties, being the energy storage field not the exception. Si (the anode material with the highest capacity) structured with low dimensionality like in the form of micro-/nano-wires allows the use of the material in very efficient and high capacity batteries, due to its improved mechanical properties. On the other hand, S (the cathode material with the highest capacity), being encapsulated or constraint in micro-/nano-structures of carbon, avoids undesired migrations and enhances by orders of magnitude the electronic transport and charging rate.

We propose to microstructure Si using combinations of simple chemical etching techniques like Metal Assisted Chemical Etching (MACE) and etching in KOH solutions. Mesoporous Si is obtained during the processing, and works as sacrificial material. Si microwires ready for working as anode are obtained.

For the cathode side, porous carbon with micro- and meso-pores is obtained and is infiltrated with S. The starting material is biomass like corncobs and peanut shells, making the process cheap and sustainable.

Keywords: Li ion battery, Microstructured Si anode, Porous carbon

Presenting author's email: equiroga@ieee.org