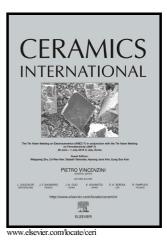
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ACCEPTED MANUSCRIPT

Rational design of coaxial MWCNTs@Si/SiOx@C nanocomposites as extending-life anode materials for lithium-ion batteries

Yifan Chen^{a,b*}, Qinan Mao^a, Liang Bao^a, Tao Yang^a, Xiaoxiao Lu^a, Ning Du^{b*}, Yaguang Zhang^b, Zhenguo Ji^{a*}

^aCollege of Materials & Environmental Engineering, Hangzhou Dianzi University, Hangzhou 310018, People's Republic of China

^bState Key Lab of Silicon Materials and Department of Materials Science and Engineering, Cyrus Tang Center for Sensor Materials and Applications, Zhejiang University, Hangzhou 310027, People's Republic of China

Abstract

uniform multi-walled One-dimensional (1D) carbon nanotubes (MWCNTs)@Si/SiOx@C nanocomposites were prepared by the magnesiothermic reduction of MWCNT@SiO₂ nanocables and subsequent carbon coating process. Through simply altering the acid-treatment conditions, SiOx were reserved on the surface of MWCNTs to seal and fix the Si nanoparticles, along with the carbon coating layer, the reducted Si nanoparticles (Si NPs) were entirely encapsulated in the 1D coaxial nanocomposites. Due to the multiple volume expansion limit effects of inner Si nanoparticles, the cycling stability has been greatly improved. When workd as anodes for lithium-ion batteries, the MWCNTs@Si/SiOx@C electrode exhibits better electrochemical properties than bulk Si and MWCNTs, as well as an extending cycle life of 500 cycles in comparsion to our previous MWCNTs@Si nanocomposites. It is believed that the MWCNTs can provide structural support and enhance the electronic mobility, while the SiOx and carbon buffer component would anchor the Si NPs firmly Download English Version:

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