Tubular Organization of SnO_2 Nanocrystallites for Improved Lithium Ion Battery Anode Performance

Yong WANG[1], Jim Yang Lee[1,2], Hua Chun Zeng[2]

[1] Singapore-MIT Alliance, National University of Singapore, 4 Engineering Drive 3, 117576, Singapore,
[2] Department of Chemical and Biomolecular Engineering, Faculty of Engineering, National University of Singapore, 10 Kent Ridge Crescent, Singapore, 119260.

***Abstract* – Porous tin oxide nanotubes were obtained by vacuum infiltration of tin oxide nanoparticles into porous aluminum oxide membranes, followed by calcination. The porous tin oxide nanotube arrays so prepared were characterized by FE-SEM, TEM, HRTEM, and XRD. The nanotubes are open-ended, highly ordered with uniform cross-sections, diameters and wall thickness. The tin oxide nanotubes were evaluated as a substitute anode material for the lithium ion batteries. The tin oxide nanotube anode could be charged and discharged repeatedly, retaining a specific capacity of 525 mAh/g after 80 cycles. This capacity is significantly higher than the theoretical capacity of commercial graphite anode (372 mAh/g) and the cyclability is outstanding for a tin based electrode. The cyclability and capacities of the tin oxide nanotubes were also higher than their building blocks of solid tin oxide nanoparticles. A few factors accounting for the good cycling performance and high capacity of tin oxide nanotubes are suggested.**