#49301-DNI10: Fabrication and Investigation of Porous Tin Oxide Anodes for Li-Ion Micro Batteries

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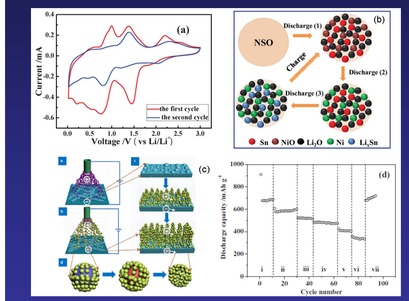

(a) Cyclic voltammograms of $NiSnO_3$ anode in a voltage window of 0.02~3.0 V at a scan rate of 0.1 mV s^{-1}, (b) Discharge/charge mechanism of $NiSnO_3$ anode as "self-matrices" in a lithium ion battery, (c) Schematic mechanism of hollow and nanoporous SiO_2 with tree-like nanostructure on nickel foam synthesized by SG-ESD technique, and (d) Rate capability of Sn@carbon composites heated-treated at 900 °C at different rates: (i) 25, (ii) 100, (iii) 150, (iv) 200, (v) 250, (vi) 300, (vii) 25 mA g^{-1}, respectively.

During the past funding year, we have extended our research to (1) developing binder-free porous core-shell structured Ni/NiO configuration and porous NiO-Ni nanocomposite anodes; (2) heat treatment effect of current collectors (such as: Ni foam, Stainless Steel, Al, Cu, etc) on electrochemical performance; (3) electrochemically activated carbon micro-electrode arrays for electrochemical micro-capacitors; (4) developing mesoporous silicon anodes; (5) synthesis of nanoporous SiO_2 films fabricated by sol–gel assisted electrostatic spray deposition; (6) synthesis and evaluation of porous core-chell Sn@Carbon composite anodes; and (7) developing novel "self-matrix" $NiSnO_3$ anode in lithium ion battery application. All these research efforts have significantly enhanced our understanding of fundamental issues regarding intrinsic properties of conversion mechanism and alloying mechanism based porous materials as anodes for Li-ion batteries.