# High-Performance Sn@Carbon Nanocomposite Anode for Lithium Batteries

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Abstract

Nanosize tin particles (Sn-PMCMT) embedded in electrically conducting porous multichannel carbon microtubes are synthesized by co-electrospinning followed by air stabilization and carbonization in Ar/H2 atmosphere. Scanning and transmission electron microscopy show that the material is nanostructured with nanosize Sn particles well embedded into the carbon host matrix.

Composite electrodes prepared using Sn-PMCMT, Super-P carbon and Na-carboxymethylcellulose as binder, exhibit a superior rate capability and exceptional cycle life in cell tests at room temperature. Discharge capacities as high as 632 mAh/g at 0.7 C rate are obtained during the first galvanostatic cycles. The delivered capacities are still in excess of 350 mAh/g after 600 cycles, most of them performed at 2C rate. These outstanding results represent the highest performance so far reported for this type of electrode.

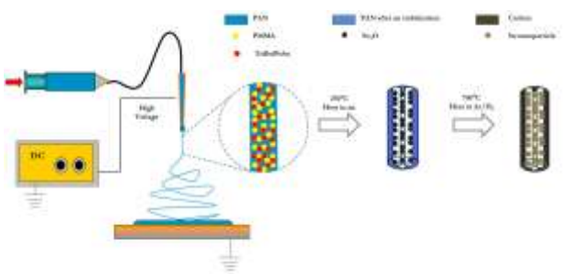

Fig. 1: Schematics of a homemade electrospinning spinneret used in preparing first PAN/PMMA/TBPT nanofibers and Sn@carbon nanoparticles embedded in hollow carbon nanofibers.

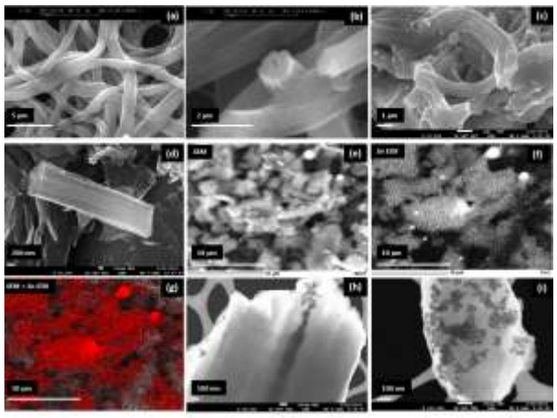

Fig. 2: Secondary electron SEM images at different magnifications of the as-prepared Sn-PMCMT composite nano-fibers (panels a and b). Secondary electron SEM images at different magnifications of the Sn-PMCMT composite nano-fibers after grinding (panels c and d). Secondary electron micrograph (panel e), EDX mapping of Sn (panel f), overlapping of Sn EDX mapping to secondary electron micrograph of a portion of the Sn-PMCMT powder (panels g and h). TEM micrograph of Sn-PMCMT fibers (panel h) and powder (panel i).