

Studies on the Synergistic Effects of Each Component of Hierarchical Ternary Nanocomposites for Lithium-Ion Battery Cathodes

Yuanbing Mao, Department of Chemistry, University of Texas-Pan American, Edinburg TX 78539

As one major energy storage devices, almost all current lithium-ion batteries (LIBs) are explored with single active cathode materials or binary composites, even though optimized nanocomposites and the synergistic effects of each component have pivotal importance. We are designing and synthesizing hierarchical carbon nanotubes (CNTs)/active cathode nanowires/conductive polymers ternary nanocomposites and investigate synergistic effects of each functional component for high-performance LIB cathodes. It is showing that CNTs provide excellent electrical conductivity, active cathode nanowires provide good electrochemical performance, and conductive polymers act as glue between CNTs and nanowires to further enhance the electrical conductivity. More importantly, in order to effectively utilize all the desired functions of each component, we are focusing on studying the synthesis-structure-function relationship of the ternary nanocomposites. We have successfully developed a reliable synthetic procedure to make the ternary nanocomposites. Other notable outcomes from these studies include:

- Identification of proper synthetic conditions for the ternary nanocomposites
- Evidence of the effect of composition on electrochemical performance
- Evaluation of the effect of conductive polymer addition on electrochemical performance of binary nanocomposites

