Nanostructured Electrodes for Lithium Ion Batteries Using Biological and Chemical Scaffolds

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Abstract

Development of materials that deliver more energy at high rates is important for high power applications including portable electronic devices and hybrid electric vehicles. For lithium ion batteries, reducing materials dimensions can boost Li+ ion and electron transfer in nanostructured electrodes. Therefore, there is a growing need for nanostructured electrodes for lithium ion batteries to boost electron transfer for high power applications. There have been efforts to electrically address electrode materials with poor electronic conductivity through nanoscale wiring of active materials. However, the wiring tools used so far were functionalized for a single component, either active materials or conducting materials. The wiring did not completely exploit specificity but depended on random occurrence of contacts between either conducting networks or active materials. Here, we present two research directions that utilized biological and chemical template for achieving intimate nanoscale electrical wiring to active material.

Future Direction at PNNL: Integrating Bioinspired Strategy with Synthetic Materials for Energy Storage

Example from PNNL work: self-assembled TiO2 graphene nanocomposites showed greatly improved stability and high rate capacity due to improved conductivity. Courtesy of Dr. Jun Liu and Dr. Donghai Wang from PNNL.

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