

Nanostructured inorganic materials for energy storage applications

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Development of high performance electrode materials for lithium ion batteries (LIBs) and supercapacitors (SCs) is important issue in automotive, electronic, and power storage applications because the electrodes affect devices' total energy/power densities and cycle stability. To improve the performance, a variety of approaches have been applied in the development of new electrode materials and optimization of the electrode formulation. In this presentation, among various strategies, I will present methods for nanostructuring of electrode materials to improve ionic and electronic transport as well as to alleviate mechanical stress during the cycles. I will discuss i) how to induce 'self-assembly' in different length scale in a 'block copolymer – precursor blend system' to fabricate controlled nanostructure, porosity and composite structure and ii) nanostructure effects on electrochemical performance of electrode materials including metals, metal oxides, carbons and composite materials.