# Abstract of Presentation

Presentation Title:

Advanced Electrochemical Supercapacitors with Tailored Nanomaterials

Abstract :

Today, electrochemical capacitors (ECs) have the potential to emerge as a promising energy storage technology. The weakness of EC systems is certainly the limited energy density, which restricts applications to power delivery over only few seconds. As a consequence, many research efforts are focused on designing new materials to improve energy and power densities.

Since the energy density is a product of capacitance and squared voltage (or voltage), strategies aimed at increasing both of them are of particular importance. An electrochemical double-layer capacitor (EDLC) stores electrical charge in an electrical double layer at the electrode-electrolyte interface. High surface area electrode materials, such as activated carbons, maximize this interface, resulting in larger capacitance. More recently, new categories of carbon materials have been proposed with much higher surface area: carbon nanotubes (CNTs) or fibers (CNFs) and fine-tuned microporous carbons, which still rely on reversible (ECs) have the potential to emerge as a promising energy storage technology. The weakness of EC systems is certainly the limited energy density, which restricts applications to power delivery over only few seconds. As a consequence, many research efforts are focused on designing new materials to improve energy and power densities.

Revolutionary concepts for the design of electrodes, electrolytes, and interfaces have been suggested. For instance, the integration of multiple physico-chemical functionalities or the synthesis of materials with fine-tuned micro- and meso-pore size distributions show enhanced charge-storage efficiency. Also the search for new materials and nanofabrication technology has enabled the development of nano-architectured electrodes for high performance pseudocapacitors as well as hybrid devices with appropriate dimensional control for ion channels. The continuing improvements in the material properties and electrode designs as well as the development of different hybrid strategies bode well for increasing the energy and power densities in ECs.

The present lecture will review the recent advances in ECs for applications combined with fuel cells, solar cells, wind powers, and other renewable energy sources.