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Nanostructured materials for advanced energy storage

Cengiz S. Ozkan

University of California Riverside, USA

Abstract

Graphene is a one atom thick two-dimensional material that exhibits exceptional physical and electronic properties, and offers alternative and cost-effective applications in energy storage, biosensors, and medicine. I will describe innovative approaches for the synthesis of hierarchical three dimensional graphene hybrid materials which possess characteristics including ultra large surface area, mechanical durability and high conductivity which are appealing to diverse energy storage systems. Rapid charging and discharging supercapacitors are promising alternative energy storage systems for applications such as portable electronics and electric vehicles. Integration of pseudocapacitive metal oxides with structured nanomaterials has received a lot of attention recently due to their superior electrochemical performance. In order to realize high energy density supercapacitors, we developed a simple and scalable method to fabricate graphene-MWNT-metal oxide nanowire hybrid systems. Excellent capacitance retention and high charge-discharge cycles have been demonstrated. Such multi-scale engineered materials could have wide range implications to facilitate new technological innovations in energy storage.

Biography

Cengiz S. Ozkan is a Professor of Mechanical Engineering and a co-faculty of Materials Science and Engineering, Electrical Engineering and Biochemistry at the University of California Riverside. He holds a Ph.D. degree in Materials Science and Engineering from Stanford University. After completing his PhD studies, He worked for Applied Micro Circuits Corporation in San Diego, and concurrently served as a consulting professor at Stanford University and a lecturer in Electrical Engineering at University of California San Diego. His areas of expertise include nanomaterials processing, energy storage technologies, nanoelectronics, and biochemical sensors. He has more than 200 technical publications, over 50 patent disclosures, has given more than 100 presentations worldwide. He organized and chaired 14 scientific and international conferences.