Engineering Nanomaterials for Supercapacitor Applications

Date: 29 November 2018 (Thursday)
Time: 10:00am to 1:00pm (1st hour of defense)
Venue: EA 02-15

by Abdelnaby Mohamed Kotb Elshahawy

Abstract

Supercapacitors are considered one class of unique energy storage devices, but they suffer from generally low energy density compared to metal ion batteries. Thus, it is critical to enhance their energy density, while maintaining their high-power density and long cycling life. Among different types, hybrid-type supercapacitors, which store energy through faradic reaction, have received a great deal of attention recently. These hybrid-type supercapacitors combine a battery-type and capacitive-type electrode, where considerable efforts are made to design and fabricate novel electrodes. Among the range of electrode materials studied, such as metal hydroxides, metal sulfides, and metal phosphides, we have made key advances in understanding of metal hydroxides, as affected by processing parameters and the types of surfactants on their performance. We have established the influence of sulfurization process on the structure and performance of sulfo-spinels materials when used as electrodes in supercapacitors. For metal phosphides, their stability and overall performance have been studied, when sulfur and nitrogen are doped into.

Biography

Abdelnaby M. Elshahawy received his bachelor's degree in physics and Master's degree in Experimental solid state Physics (Magnetic materials) from Assiut University, Assiut, Egypt in 2013. Currently, he is conducting his doctoral research at Materials Science and Engineering Department, National University of Singapore, Singapore. His research is mainly focused on developing nanomaterials for energy storage application.