Synthesis of Mesoporous Carbon-based Nanomaterials for Energy Storage Application

by Mr. Li Meng

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Abstract

High performance electrochemical capacitors are considered to be the most promising candidate to meet the increasing requirements of energy storage. Mesoporous nanomaterials with open-framework structure have received much attention in the past decade due to their ordered mesochannels, large surface areas and quantum effects in the nanoscale, making them promising for the applications of catalysts, controlled drug delivery, absorption and energy storage. In this study, two specific mesoporous carbon-based nanomaterials will be developed: ordered mesoporous carbon nanoparticles (MCNs) and mesoporous carbon decorated graphene (MCG). Both materials have good performance as electrode materials for supercapacitor. In the first part of discussion, ordered mesoporous carbon nanoparticles with well controlled morphologies from sphere to rod will be presented. A facile soft-template method was adopted to synthesize highly ordered MCN with well-controlled morphology from spherical to rod-like structures. In addition, the synthesis mechanism, characterization and electrochemical measurement of such materials will be presented. In the second part, a novel mesoporous carbon decorated graphene was fabricated as an effective electrode material for supercapacitor through a rational nanostructure design. In such carbon-based materials, mesoporous carbon layer served as an effective inhibitor of the aggregation between graphene sheets and a place of charge accumulation, while the graphene sheets acted as a highly conductive carbon frame. The electrochemical measurements of CV, galvanostatic charge/discharge and impedance spectrum were used to investigate the electrochemical performance of the as-made MCG electrodes.

Speaker Mr. Li Meng

Mr. Li Meng received his Bachelor degree in Polymer Materials Science and Engineering from Shaanxi University of Science & Technology in 2009. He is currently a PhD candidate under supervision of Dr. Xue Junmin. His research focuses on synthesis of mesoporous materials for energy storage application.