MOF Derived 2D Nanocarbon Array as Backbone for Supercapacitor Application
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Date: 27th October 2017, Friday
Time: 3:00 to 3:30 pm
Venue: E4-04-03 (FoE, NUS)

Abstract

Supercapacitors, an important class of energy storage devices, have drawn considerable research attentions due to the apparent advantages of high power density, long cycle life, and relatively low cost, while they suffer from a major problem of low energy density. A common solution is to integrate active materials, which can generate a large amount of charge through redox reactions. Direct assembling of active materials on carbon cloth (CC) is a promising way to achieve flexible electrodes for energy storage today. However, the overall surface area and electrical conductivity of such electrode are usually limited.

Metal organic frameworks (MOF) are a type of coordination polymer with tunable pore size and high surface area. They are among the most commonly used templates to develop materials with special structure and large surface area. In this work, 2D metal organic framework derived nanocarbon nanowall arrays (MOFC) have been successfully developed on carbon cloth by a facile solution + carbonization process. Upon growth of the MOFC arrays, the sites for growing of active materials have been greatly increased, and the equivalent series resistance is decreased, which contribute to the enhancement of the pristine CC substrate. After decorating ultrathin flakes of MnO$_2$ and Bi$_2$O$_3$ on the flexible CC/MOFC substrate, the hierarchical electrode materials show an abrupt improvement of areal capacitances by around 50% and 100%, respectively, compared to those of the active materials on pristine carbon cloth.

Speaker Liu Ximeng

Liu Ximeng graduated from National University of Singapore University with a Bachelor Degree in Materials Science and Engineering. He is currently pursuing his Ph.D. degree in the department of Materials Science & Engineering under Prof. John Wang. His research interests include energy storage devices.

ALL ARE WELCOME!

Host: A/P Xue Junmin