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Metal-organic framework doped reduced graphene oxide and polyaniline composite electrodes for supercapacitor

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Abstract

Recently, carbon-based materials such as graphene oxide or reduced graphene oxide (rGO) had been widely investigated as electrodes for supercapacitors (SCs) owing to their good electrical properties. However, drawbacks of carbon-based materials such as low specific area and hard to fabricate had hindered their applications. In order to solve these problems, researchers had concentrated on the composite materials which should combine the advantages of their components. Recently, polyaniline (PANI) have been acquired great attention as one of the potential materials for SCs application because of their good pseudo-capacitive performance as well as facile synthesis and low cost. However, PANI exhibited poor cycling stability through charge-discharge processes over long periods of time which restrain its application in SCs. In this study hybrid nanomaterial based on rGO and PANI will be prepared and electrochemical storage capacity will be enhanced by metal-organic framework (MOF). Since being introduced, the crystalline porous MOFs, in which metal ions and clusters are linked by organic units had required intensive attention from scientists. MOF materials exhibited high surface area, high stability, large pore volume and organic functionality which led to their potential application in electrochemical devices. Moreover, the availability of various kinds of metal ions and organic linkers has provided thousands of choice for MOF with many potential applications. The composite of rGO and PANI in this study will be conducted via in situ polymerization following by doping of MOF on this structure. The electrochemical properties of those composites will be studied via cyclic voltammetry (CV) and galvanostatic charge-discharge test to identify the effects of conductive polymers to the materials electrochemical properties.

Biography:

Dr. Le Quoc Bao's major is material technology. He used to focus on the development of novel organic materials aiming to the energy applications Dye-Sensitized Solar Cells. He has the experience in conducting the polymerization process such as Atom Transfer Radical Polymerization and has interest in the investigation and development of portable devices using conducting polymers and the composites which will use them as their matrix. He is a lecturer at Department of Organic Materials, Faculty of Applied Sciences, Ton Duc Thang University in Vietnam. Since Sep 2018, he has gotten the postdoctoral position at Centre of Polymer Systems of Tomas Bata University in Czech Republic. He is working at Sino-EU Joint Laboratory of New Energy Materials and Devices. Recently, his research is focused on developed the materials with high working performance applied on supercapactior.

Speaker Publications:

1. Le Quoc Bao, S. Thogiti, G. Koyyada, J. H. Kim, "Synthesis and photovoltaic performance of novel ullazine-based organic dyes for dye-sensitized solar cells", Japanese Journal of Applied Physics, 2019, 58, 012011.
2. P. Ho, S. Thogiti, Le Quoc Bao, R. Cheruku, K.-S. Ahn and J. H. Kim, "Enhanced efficiency via blocking layers at photocathode interfaces in cobalt-mediated tandem dye-sensitized solar cells", Solar Energy, 2018, 161, 9 - 16.

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