GRAPHENE STABILISED DENDRITIC STAR COPOLYMER FOR SUPERCAPACITOR SYSTEMS

Abd Almonam Baleg*, Nazeem Jahed, Priscilla Baker and Emmanuel I Iwuoha

SensorLab, Chemistry Department, University of the Western Cape, Bellville, South Africa, 7535
abaleg@gmail.com

ABSTRACT

Due to the global energy challenges, supercapacitor materials have attracted great attention owing to their high energy storage capacity, charge-discharge cycling stability, highly reversible charge storage capability, large surface area and high power density. Graphene oxide and dendritic star copolymers are fascinating materials, both scientifically and technologically, due to their exceptional properties and potential use in applications ranging from high-frequency electronics to energy storage devices. To develop an advanced supercapacitor device, an active electrode material with high storage capacity is indispensable. A new generation graphenated conducting dendritic star copolymer-nanocomposite has been successfully synthesised via *in situ* polymerization of a dendritic star copolymer with graphene oxide (GO). The synthesis procedure involves a condensation reaction between the diamino functional poly (propylene imine) dendrimer (PPI) and 2-pyrrole aldehyde to give the pyrrole functionalized PPI dendrimer. Chemical oxidative polymerization of the pyrrole functionalized PPI dendrimer (PPI-2Py) with additional pyrrole monomer and graphene oxide gave the graphenated-poly(propylene imine)-co-polypyrrole (GO-PPI-co-PPy). The formation of the composite was analyzed using X-ray diffraction, Raman spectroscopy, and Fourier transform infrared spectroscopy. Scanning electron microscopy showed sheet-like layered structures for graphene oxide surrounded by the star copolymer. Supercapacitor properties of GO-PPI-co-PPy have been interrogated using galvanostatic charge-discharge and the material was found to possess superior charge storage and charge propagation characteristics. The impedimetric studies showing that the GO-PPI-co-PPy composites are potential candidates for electrode material in supercapacitor applications, will be discussed.