ABSTRACT

The emergent demands of energy, growing concerns about pollution and global warming have motivated the modern research to move towards the energy storage as well as energy conversion from numerous alternative energy sources. Different types of energy storage devices have been invented over the last decade, in response to the requirements of modern society and emerging ecological concerns. Although capacitors served the mankind through their random usage in electronic and electrical equipment for several decades, the necessity of improved capacitor technology become imperious as our world becomes progressively electrified. After great deal of research, supercapacitor, a rapidly developing technology has been invented. This energy storage device has comparatively high energy density and power density and also bridges the gap between batteries and conventional capacitors. With the introduction of conducting polymer and nanostructured materials, supercapacitors has become the most promising energy storage device of this century.

In this present study, attentions have been paid to develop superior supercapacitor electrode material based on modified/unmodified graphene and conducting polymers. A major disadvantage of conducting polymer based electrodes is their poor cyclic stability as they undergo swelling, shrinkage, cracking during charge-discharge processes. To overcome this stability problem, composites with conducting network were prepared by in situ oxidative polymerization method, as they are able to reduce mechanical stress during cyclic charging-discharging. The composites also achieved improved electrical and electrochemical properties, which allow the composite materials to be considered suitable candidate for device applications.

Keywords: *supercapacitor; graphene; polypyrrole; polyaniline; cyclic voltammetry.*