conferenceseries.com

J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C6-108

Hybrid pseudocapacitive-EDLC miniaturized electrodes for solid state supercapacitor

Himanshu Sekhar Panda
Defence Institute of Advanced Technology, India

Supercapacitors or electrochemical capacitors have matured significantly and emerged as an alternative for developing energy storage device. Preparation of supercapacitor electrodes is a challenge to the scientific community due to their variable electrochemical properties with respect to electrode surface morphology, porosity and conductivity. Hence, carbon decorated nanocomposite electrodes are fabricated *in situ* by using successive ionic layer adsorption and reaction method. This green process tuned the metal ions concentration on carbon and offered binder-free, facile and scalable features. The structure, morphology and electrochemical performances of developed nanocomposites are characterized by using various sophisticated techniques. Elemental study suggested the substitution of metal ions with varying carbon concentration, which was correlated with change in relaxation rate of the composites. X-ray photoelectron spectroscopy confirmed the presence of divalent and trivalent cations in nanocomposite, which is additionally responsible for improving the conductivity in developed electrodes. Also, conductive atomic force microscopy supported the improvement in local conductivity. Electrodes demonstrated specific capacitance around 1811 Fg-1 at current density 0.5 mAcm-2 with excellent cyclic retention (92% even after 8000 cycles) and energy density (91 WhKg-1). Further, developed electrodes are used to fabricate asymmetric solid state supercapacitor device (capacitance around 258 Fg-1) and charged, which is effective to brighten a commercial LED.

himanshusp@diat.ac.in, hspanda3@gmail.com

Notes: