Abstract

The solution combustion method was used to synthesize nickel oxide-based composite with activated carbon (AC) for energy storage purposes. X-ray diffraction (XRD), diffused reflectance spectroscopy (DRS), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM) were used to investigate the structural, optical, chemical and morphological properties of prepared material, respectively. XRD revealed the hexagonal crystal structure of Ni_2O_3 and formation of nanocomposite with AC. DRS sufficed the band gap energy 3.74 eV. FTIR confirmed the formation of metal oxide bond and presence of C-O, O-H functional groups. SEM analysis showed the aggregation of nanoparticles with porous structure. Using galvanometric charge discharge (GCD) and cyclic voltammetry (CV) methods, the electrochemical properties of the electrodes were studied. Both CV and GCD indicated that the (Ca,Co)@Ni_2O_3/AC electrode material exhibits greater specific capacitance 124.79 F/g and 334.52 F/g, respectively, as compare to pure Ni_2O_3. The nanocomposite system displayed good electrochemical performance, making it a promising electrode material for applications involving energy storage devices.