ABSTRACT

Tungsten oxide/Bismuth molybdenum oxide (WO_3/Bi_2MoO_6) nanocomposite has been found as a promising material to be used for supercapacitor applications. In this work, the hydrothermal approach was used to synthesize the WO_3, Bi_2MoO_6 which were further used to synthesize core-shell WO_3/Bi_2MoO_6 heterostructured nanocomposite with varying amount of WO_3. X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and Scanning electron microscope (SEM techniques have used to study the structural analysis, chemical bond structure and morphological analysis of the synthesized materials respectively. All the prepared samples were regarded as highly pure crystalline in nature which is confirmed through XRD. SEM confirms the nanorods like structure for WO_3, nanosheet like morphology for Bi_2MoO_6 and sea urchin like morphology is observed for all three composite samples. In order to study the electrochemical properties, all synthesized samples were grown on nickel foam by following a binder-free approach, whereas WO_3 nanoparticles were deposited on nickel foam substrate by using a typical Polyvinylidene fluoride (PVdF) as a binder. The electrochemical properties of each sample was examined through cyclic voltammetry (CV), galvanic charging-discharging (GCD), and electrochemical impedance spectroscopy (EIS). The analysis exhibits that WO_3/Bi_2MoO_6 nanocomposite with highest WO_3 concentration shows the maximum specific capacitance of 1995 F g^{-1}, energy density and power density of 49 Wh kg^{-1}, 100 W kg^{-1} respectively.