ABSTRACT

The WO_3/Bi_2MoO_6/rGO ternary composites were successfully synthesized by using facile hydrothermal method with varying amounts of rGO (0, 2, 4, and 6 wt. %). The structural analysis of prepared nanocomposites was carried out using X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR) techniques. The XRD patterns indicate that all synthesized samples exhibited a crystalline nature. The XRD analysis revealed that the increase in rGO content decreased the crystallite size and lattice strain. To investigate the electrochemical properties, all the synthesized samples were deposited on a nickel foam substrate using typical polyvinylidene fluoride (PVDF) as a binder. The electrochemical behavior of each sample was investigated through cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS) techniques by using a 6M KOH electrolyte solution. The results indicate that the WO_3/Bi_2MoO_6/rGO ternary composite with the highest rGO concentration (6 wt. %) achieved the maximum specific capacitance of 319 F g^{-1} at 1 Ag^{-1}, along with energy density and power density values of 13.4 Wh kg^{-1} and 275 W kg^{-1}, respectively. The WO_3/Bi_2MoO_6/rGO ternary composite holds great promise for supercapacitor applications.