ABSTRACT

Present-day advancement calls for high efficient hybrid assembly that is assembled using both battery and capacitor-like electrodes offering high energy and power capacity. A wide range of electrode materials have been reported, out of which metal organic frameworks (MOFs) have attracted great attention owing to their porous architecture, chemical tunability and flexibility and adjustable morphology. Cerium based metal organic framework (Ce-SIP-MOF) was synthesized via hydrothermal method and its electrochemical properties were examined through electro-analytical techniques like cyclic voltammetry, Galvanostatic charge-discharge and electrochemical impedance spectroscopy using three electrode assembly as well as two electrode assembly in order to check its practical applicability. However, the structure elucidation was performed using single crystal X-ray diffraction (XRD), and Fourier transform infrared spectroscopy (FTIR). Two different electrodes were prepared by using same precursors except conductive polymer (activated carbon and polyaniline) during fabrication. Both electrodes were run under half cell assembly to investigate their redox performance. Among them, Ce-SIP-MOF@PANI electrode exhibited prominent current peak at nearly 88 mA as compare to other ones. To explore the practical application of favorable electrode, an asymmetrical assembly (Ce-SIP-MOF@PANI//AC) was designed that delivered the reversible capacity of about 97 C/g along with energy and power capacity of about 20.3 Wh/kg and 603.4 W/kg.