Abstract

CuZn-MOF and its nanocomposite CuO@CuZn-MOF are synthesized via hydrothermal method. All the samples were extensively characterized using XRD, SEM, FTIR and UV spectroscopy. XRD analysis confirmed the crystalline structure of the synthesized samples. UV spectroscopy revealed absorption within the ultraviolet range and a decrease in the band gap for CuO@CuZn-MOF, which is attributed to defects and oxygen vacancies introduced by the presence of CuO. FTIR analysis detected functional group signatures linked to the distinctive structural properties of the composite. SEM micrographs displayed the large structures of CuZn-MOF along with the agglomeration of CuO@CuZn-MOF, confirming effective composite formation. CuO@CuZn-MOF was deposited on the nickel foam to fabricate electrodes, which were then assessed through CV, and GCD techniques. Electrochemical analysis demonstrated that incorporating CuO substantially improved the performance of CuZn-MOF achieving a specific capacitance of 890 Fg^{-1} at a current density of 5 Ag^{-1}, exceeding the 100 Fg^{-1} observed for the CuZn-MOF. This research underscores the promise of CuO@CuZn-MOF as an effective electrode material for energy storage devices such as supercapacitors.