Abstract

CuZn-MOF is successfully synthesized using solvothermal method and ZnO@CuZn-MOF is synthesized by co-precipitation method. XRD, SEM, FTIR and UV spectroscopy were employed. 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 ZnO@CuZn-MOF, which is attributed to defects and oxygen vacancies introduced by the presence of ZnO. 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 nano-flake morphology of ZnO@CuZn-MOF, confirming effective composite formation. ZnO@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 ZnO substantially improved the performance of CuZn-MOF achieving a specific capacitance of $116 Fg^{-1}$ at a current density of $1 Ag^{-1}$, exceeding the $100 Fg^{-1}$ observed for the CuZn-MOF. The exceptional electrochemical properties exhibited by the ZnO@CuZn MOF indicate their potential suitability as electrode materials in energy storage applications, including supercapacitors.