Abstract

The rising demand for energy has put a lot of pressure on existing forms of energy and non-renewable resources. Such concern has urged the scientific community to look for environmental friendly renewable energy sources. The use of renewable sources is challenging because their supply is stumpy and unpredictable, and that is why there is also a need for energy storage systems. Comparing supercapacitors with other storage technologies, the former is becoming popular because of its higher power density, appropriate charge discharge capability, and better cyclic performance. Supercapacitor performance depends evidently on their electrodes. Supercapacitor materials based on MOFs have been explored as prospective electrode materials attributable to their high porosity, density of active sites, structural pliability and facile synthesis. This work aims at the improvement of the electrochemical stability and capacity of the electrode material through doping of the MOF with transition metal oxides. In particular, MnO_2@UiO-66 was prepared using the solvothermal process. Moreover, characterization analysis by XRD, FTIR, and SEM was performed to determine structure, morphology and composition of the attained material. As for the electrochemical characterization, cyclic voltammetry (CV), galvanostatic charge-discharge (GCD) and electrochemical impedance spectroscopy (EIS) were used. For the MnO_2@UiO-66 electrode, the specific capacitance value of 1235 Fg^{-1} was obtained at current density of 1 Ag^{-1}, while at current density of 4 Ag^{-1}, after 5000 cycles, the specific capacitance was remained 87.5% of its initial value. All of these results highlight the possibilities of MnO_2@UiO-66 as a promising electrode material for the supercapacitor.