

Asymmetric supercapacitor based WO_3 and MnO_2 over the carbon cloth with high mass loading

지수현, 장우성, 백서영, 노수빈, 김도형[†]
전남대학교
(kdhh@chonnam.ac.kr[†])

The development of the asymmetric supercapacitor with high power and energy density is an important challenge to meet the requirements of advanced electronic gadgets. However, the present asymmetric supercapacitors have lower energy density due to the carbon based negative electrode. To overcome this issue, the various transition metal oxides with high theoretical capacitance have been investigated for negative electrode materials. With this motivation, we assembled the asymmetric supercapacitor device using WO_3 (5.8 mg/cm^2) and MnO_2 (4.9 mg/cm^2) as negative and positive electrode material, respectively. Both electrodes show excellent electrochemical performance in the negative and the positive potential in Na_2SO_4 electrolyte. The fabricated asymmetric supercapacitor device has the operating voltage of 1.4 V and excellent cycling stability ($\sim 135 \%$, after 7500 cycles) and rate stability. Furthermore, the optimized asymmetric device displays the volumetric capacitance of 350 mF/cm^3 and energy density of 95.28 mWh/cm^3 .