

Synthesis of Nickel–Manganese Layered Double Hydroxide/Carbon Nanotube/Carbon Nano-onion Nanocomposite for High Performance Supercapacitor Application

Kidie Abebaw Eshetie, Mohammad Olvianas, Ganesh Dhakal, Debananda Mohapatra, 심재진^{1,†}
Yeungnam University; ¹영남대학교
(jjshim@yu.ac.kr[†])

Layered double hydroxide (LDH) materials have an attractive electrochemical properties, such as higher theoretical specific capacitance, tunability of cations in the host layer, and an easy exchangeable properties of anions without altering the host structure. But their electrochemical performance is limited due to poor conductivity and cyclic stability. To overcome this problem, we developed a composite with combination of a 2D nickel manganese layered double hydroxide (NiMn-LDH), a 1D carbon nanotube (CNT) and 0D carbon nano onion (CNO) which delivers higher supercapacitive performance. The resulting composite material (NiMn-LDH/CNT/CNO) is a 3D flower like morphology with larger surface area. Electrochemical analysis shows that Ni₃Mn₁-LDH/CNT/CNO synthesized by hydrothermal method at 100 °C as a positive electrode delivers a maximum specific capacitance of 2200 F g⁻¹ (at 1 A g⁻¹), excellent rate capability and higher cyclic stability.