Preparation and Characterization of Flower-like $Li_{1.2}Ni_{0.17}Co_{0.17}Mn_{0.5}O_2$ Microstructures as Cathode Materials by Electrospining

Ji Won Min, Chul Jin Yim, and Won Bin Im*

School of Materials Science and Engineering, Chonnam National University, 300 Yongbong-dong, Buk-gu, Gwangju, 500-757, Republic of Korea

In recent years, lithium-rich layered oxides, represented by the chemical formula $xLi_2MnO_3 \cdot (1-x)LiMO_2$ (M = Co, Ni, Mn, etc.) have been extensively and intensively studied as a cathode material for power batteries in electric vehicles (EVs). Its advantages include high energy lithium-ion batteries owing to their low cost, high capacity (>250 mAh g^{-1}) and improved thermal stability. Unfortunately, lithium-rich layered cathode materials can only deliver modest capacities under high charge/discharge current densities due to the damaged electrode surface caused by the loss of oxygen and the thick solid-electrolyte interfacial layer formed at high operating voltage up to 4.8 V.[1]

In this paper, flower-like $Li_{1.2}Ni_{0.17}Co_{0.17}Mn_{0.5}O_2$ microstructures were produced as cathode material by the combination of electrospinning and heat treatment. The physical, chemical and electrochemical properties of the flower-like $Li_{1.2}Ni_{0.17}Co_{0.17}Mn_{0.5}O_2$ microstructures were investigated by X-ray diffraction, field emission-scanning electron microscopy (FE-SEM), high resolution transmission electron microscopy (HR-TEM), and galvanostatic tests.

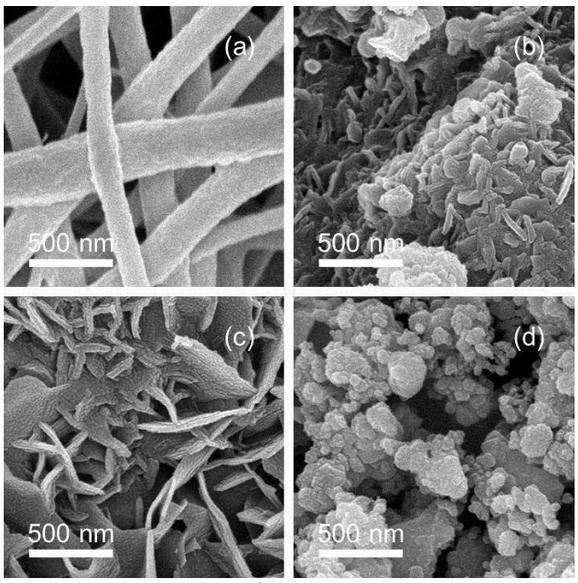

Fig. 1 SEM images of $Li_{1.2}Ni_{0.17}Co_{0.17}Mn_{0.5}O_2$/PVAc fibers (a) before with firing, firing at (b) 500°C, (c) 600°C, and (d) 700°C for 12 h in the air atmosphere.

References

1. F. Q. Cheng, Y. L. Xin, J. T. Chen, L. Lu, X. X. Zhang and H. H. Zhou, J. Mater. Chem. A, 1, 5301 (2013).