

Polymer–Ceramic composite Gel polymer electrolytes for Lithium–ion battery with enhanced electrochemical performance

이지혜, 김재광[†]

청주대학교

(jaekwang@cju.ac.kr[†])

In this study, polyacrylonitrile was composite with TiO₂, AlO₃, and BaTiO₃ to manufacture composite gel polymer electrolyte by electrospinning. In the present study, a simple electrospinning technique is adopted to prepare highly porous PAN-based membranes with a higher concentration of TiO₂, AlO₃, and BaTiO₃. The ceramic composite GPE has high liquid electrolyte wettability because electrolytes are absorbed through pores made between polymers and ceramics, in addition to pores made by polymeric fibers. The thinner fiber diameter and electrochemical stability, and open resistance with electrodes are improved and electrochemical properties are improved. The effect of ceramic fillers on the morphology of the porous membranes is demonstrated through FE-SEM. The interaction between GPE and ceramic filler was investigated by FT-IR and FT-Raman. The influence of ceramic nanoparticles was evaluated through the morphology of the membrane, the ionic conductivity, and the performance in the Li/GPE/NCM811 cell. The results show that nano-sized ceramic fillers have a significant contribution to the improved electrochemical properties of gel polymer electrolytes in lithium-Ion batteries.