Fabrication and characterization of electrospun PVAM/TEOS based gel polymer electrolyte for Lithium-ion batteries

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Gel polymer electrolytes (GPEs) are promising components in lithium ion batteries (LIBs) because of leak proof, longer shelf life and safety. GPE consists of a porous polymer host and liquid electrolyte saturated within and combine the advantages of both the liquid and solid components [1].

In this study, a GPE based on poly(vinyl alcohol)/maleited PVA/tetraethyl orthosilicate (PVA/PVA-MA/TEOS) polymer fibers were prepared in different weight ratios. Crosslinked nanofibrous polymer membrane for GPE was fabricated by UV-electrospinning method. Dual crosslink polymer membranes were obtained after heat treatment of as-prepared polymer nanofibers, due to the condensation of hydrolyzed TEOS. The morphology of the electrospun membranes was studied using scanning electron microscopy. Thermal properties of the membranes were investigated using thermal gravimetric analysis. The membrane has good porosity exhibits high uptake when activated with the liquid electrolyte of lithium salt in a mixture of organic solvents and also shows high liquid retention properties. Electrochemical impedance spectroscopy and linear sweep voltammetry was used to determine the conductivity and electrochemical stability of prepared GPEs. Electrochemical performance of the polymer gel electrolyte is evaluated in Li/polymer electrolyte/$LiFePO_4$ coin cell.

Acknowledgements
This research was supported by the research project “Development of safe and high performance flexible Li-ion batteries”, SOE2019004 and by the targeted state program No.BR05236524 “Innovative Materials and Systems for Energy Conversion and Storage” from the Ministry of Education and Science of the Republic of Kazakhstan for 2018-2020.

References

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