THE EFFECT OF IONIC LIQUID ON THE PROPERTIES OF ELECTROSPUN POLYACRYLONITRILE MEMBRANES

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Adding conductive additives to the electrospinning solutions has been proven to increase the conductivity of the electrospun membranes. The aim of this study was to learn the effect of ionic liquids (ILs) on the polyacrylonitrile (PAN) membranes conductivity. Furthermore, the mechanical properties were also studied, because there has not been comprehensive studies reported in the literature covering the effect of adding ionic liquids on the mechanical properties of the membranes.

Two different ionic liquids (1-butyl-methylimidazolium chloride [C_4MImCl] and 1-ethyl-3-methylimidazolium bromide [C_2MImBr]) were used with concentration up to 10%. The influence of ILs in solutions of PAN with concentration 10% in dimethylformamide (DMF) and dimethylsulfoxide (DMSO) was investigated. Concentration of ILs up to 10% has been found to be the optimum concentration to perform electrospinning. The results have shown that membranes conductivity significantly increased with increasing concentration of added different ILs. On the other hand, with the increasing concentration of ILs the tensile stress of the membranes was decreasing, with the exception of IL C_2MImBr in solution of PAN with concentration 10% in DMSO. The highest tensile stress value achieved was 27.3 MPa. Tensile stress value with the same IL at concentration 1% is almost the same despite the usage of the solvent (DMF or DMSO). In the case of both ionic liquid, the highest conductivity of electrospun PAN membranes has been achieved with 10% of added ionic liquid. Most conductive membranes with conductivity measured 2.39 µS/cm were produced from PAN in DMSO solution with added 10% C_4MImCl [1].

References

1. N. Savest, T. Plamus, Tarasova, E., M. Viirsalu, I. Krasnou, V. Gudkova, K.-A. Küppar, A. Krumme 2016, Journal of Electrostatics, 83, 63-68.

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