

1-BUTYL-3-METHYLIMIDAZOLIUM CHLORIDE ASSISTED ELECTROSPINNING OF SAN/MWCNTS CONDUCTIVE REINFORCED COMPOSITE MEMBRANES

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In this research the impact of [Bmim]Cl and MWCNTs on the properties of SAN polymer solution and electrospun membranes was studied. We have found that the concentrations of [Bmim]Cl and MWCNTs have a direct effect on the viscosity and electrical conductivity of SAN polymer solution. MWCNTs increase viscosity of all solutions. At the same time the viscosity of [Bmim]Cl containing solutions is lower at the same MWCNTs concentrations compared to ionic liquid free solutions. The electrical conductivity of all solutions increases with the addition of MWCNTs. But the solutions with [Bmim]Cl have at least 20 times higher electrical conductivity which means that the same quantity of MWCNTs has a greater effect in ionic liquid containing solutions. Presence of [Bmim]Cl and MWCNTs and their concentration have an influence on the electrical and mechanical properties and fibre morphology. The electrical conductivity of all membranes without the ionic liquid is zero. MWCNTs do not form any conductive network in pure SAN fibres. The addition of [Bmim]Cl increases the electrical conductivity only up to 0.244 μ S/cm. But the addition of MWCNTs into the ionic liquid containing solution increases the electrical conductivity of the membrane up to 5.95 μ S/cm. Thus, [Bmim]Cl and MWCNTs create a conductive network inside the SAN fibres and yield conductive membranes. It was found that MWCNTs have a certain effect on the tensile stress of the membrane only in [Bmim]Cl containing membranes. The highest tensile stress was observed at 1.0% MWCNTs concentration. SEM investigation showed that both types of membranes, with and without [Bmim]Cl, contain beads at MWCNTs concentrations higher than 1.5%. Ionic liquid concentration has a certain effect on the average diameter of the fibres – below 1.0% of MWCNTs it reduces it and above 1.0% it increases again. The solutions without ionic liquid showed no dependence of fibre diameter on the concentration of MWCNTs.

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