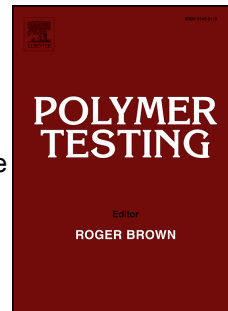


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The effect of ionic liquids on the mechanical properties of electrospun polyacrylonitrile membranes

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Abstract

Obtaining electrospun membranes with good mechanical properties is important for their various applications. Several ionic liquid-based additives (IL-based) for electrospinning solutions have been proven to increase the conductivity of electrospun membranes. The aim of this study was to analyse the dependence of the mechanical properties of electrospun membranes on the additives used. Moreover, the relationship between conductivity, specific stress and the morphology of the membranes was studied. Polyacrylonitrile (PAN) solutions were prepared in dimethylformamide (DMF) and dimethylsulfoxide (DMSO) solvents. Two different ILs (1-butyl-3-methylimidazolium chloride [BMIm]Cl and 1-ethyl-3-methylimidazolium bromide [EMIm]Br) were used at a concentration of up to 10 wt%. Overall, it can be said that, with IL [EMIm]Br, higher specific stress values were achieved. Most stable values of specific stress were achieved with membranes obtained from solutions with DMF, especially with added IL [BMIm]Cl. The highest specific stress value achieved was 87.93 ± 5.15 mN/tex.

Keywords

Conductive membrane; mechanical properties; electrospinning; ionic liquids; polyacrylonitrile

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