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Investigation of the relation between viscoelastic properties of polysulfone solutions, phase inversion process and membrane morphology: The effect of solvent power

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Abstract

This study displays that the lacy structure could be effectively formed and retained in polysulfone (PSf) membrane morphology, prepared by non-solvent induced phase inversion process, by the adoption of poorer solvent as an additive. With 2-pyrrolidone (2P) as a solvent, the PSf membrane comprised a porous skin layer, lacy structure and fewer macrovoids, while with N-methyl pyrrolidone (NMP) a dense skin layer, finger-like macrovoids and cellular structure were dominant. The addition of 2P and water to PSf/NMP solution increased the viscoelasticity of the polymer solution. When water added to the PSf/NMP solution, the fully cellular structure formed in the PSf membranes due to the enhanced viscosity of the solution and occurring the delayed liquid-liquid demixing process. The enhanced viscoelasticity of the PSf/NMP solution with the utilization of 2P at various ratio slowed down the growth rate of demixed domains during the liquid-liquid demixing process due to the formation of hydrogen

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