Preparation and characterization of polysulfone-based composite membranes

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A large quantity of greenhouse gases in atmosphere, such as CO_2 emitted from industries, causes serious global warming problems, so that CO_2 separation has become one of the important solutions to greenhouse gas control. Compared to traditional CO_2 capture technology, membrane processes offer simple maintenance, stability and low cost of operations [1].

Polysulfone (PSF) is largely applied in membrane preparation due to its amazing features, including thermal and mechanical properties, chemical stability, film-forming properties thus allowing it use in wide range of applications, especially for long-term gas separation [2]. Meanwhile, ionic liquids have attracted more and more attention in the field of gas separation, because of excellent CO_2 absorption capacity [3]. So combining polysulfone and ionic liquids in the composite membrane will allow us to obtain a membrane with improved CO_2 separation properties. The scheme of composite membrane is shown in Figure 1.

In this work, PSF-based composite membranes containing imidazolium-based ionic liquids (vinyl imidazolium trifluoromethane sulfonate ([Vim][$TFSO_3$]) and methyl imidazolium trifluoromethane sulfonate ([Meim][$TFSO_3$])) were elaborated by solution casting technique. The samples were analyzed by DSC, FTIR, TGA, microscope and mechanical property. DSC characterization showed that the glass transition temperature decreased with increasing IL loading, revealing a plasticizing effect of ILs.

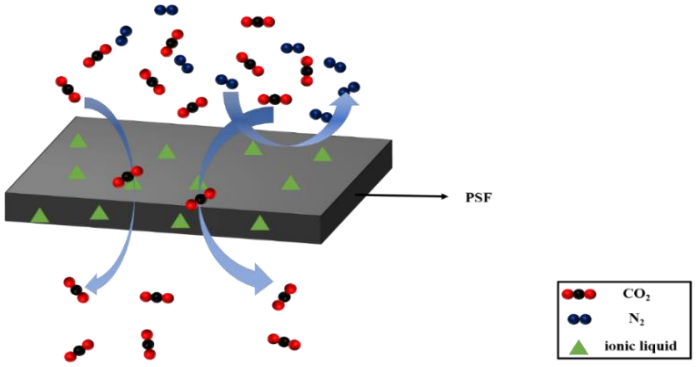

Figure 1 Scheme of the PSF/IL composite membrane.

References

[1] Dai, Z.; Noble, R. D.; Gin, D. L.; Zhang, X.; Deng, L. *Journal of Membrane Science*, **2016**, *Vol 497*, 1.

[2] Xu, Z.; Liao, J.; Tang, H.; Li, N. *Journal of Membrane Science*, **2018**, *Vol 548*, 481.

[3] Yan, X.; Anguille, S.; Bendahan, M.; Moulin, P. *Separation and Purification Technology*, **2019**, *Vol 222*, 230.