

## Improving Gas Separation Performance of Poly(Vinylidene Fluoride) Based Membranes Containing Ionic Liquid

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**Abstract :** Polymer based membranes are one of the low-cost technologies available for the gas separation. Three major elements required for a commercial gas separating membrane are high permeability, high selectivity, and good mechanical strength. Poly(vinylidene fluoride) (PVDF) is a commercially available fluoropolymer and a widely used membrane material in gas separation devices since it possesses remarkable thermal, chemical stability, and excellent mechanical strength. The PVDF membrane was chemically modified by soaking in different ionic liquids and dried. The thermal behavior of modified membranes was investigated by differential scanning calorimetry (DSC), and thermogravimetry (TGA), and the results clearly show the best affinity between the ionic liquid and the polymer support. The porous structure of the PVDF membranes was clearly seen in the scanning electron microscopy (SEM) images. The CO<sub>2</sub> permeability of blended membranes was explored in comparison with the unmodified matrix. The ionic liquid immobilized in the hydrophobic PVDF support exhibited good performance for separations of CO<sub>2</sub>/N<sub>2</sub>. The improved permeability of modified membrane (PVDF-IL) is attributed to the high concentration of nitrogen rich imidazolium moieties.

**Keywords :** PVDF, polymer membrane, gas permeability, CO<sub>2</sub> separation, nanotubes

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