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# Preparation and Characterization of Mixed Matrix Membranes based on Matrimid/PVDF blend and MIL-101(Cr) as filler for CO<sub>2</sub>/CH<sub>4</sub> separation

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## Abstract

In this work, the effect of addition of MIL-101(Cr) metal-organic framework (MOF) and poly(vinylidene fluoride) (PVDF) on physicochemical, morphological and CO<sub>2</sub>/CH<sub>4</sub> separation properties of Matrimid was investigated. MIL-101(Cr) micron-sized particles were synthesized and dispersed as filler in Matrimid/PVDF blended matrix so that a mixed matrix membrane (MMM) was formed. X-ray diffraction (XRD), scanning electron microscopy (SEM) and Braunere-Emmette-Teller (BET) analysis were used to characterize the MIL-101(Cr) particles. The Matrimid/PVDF blend membranes were investigated by optical microscopy (OM), differential scanning calorimetry (DSC) and Fourier transform infrared-attenuated total reflectance (FTIR-ATR) spectrophotometry. SEM images were employed to characterize the morphology of membranes. Single-gas permeability measurements for prepared membranes were performed and the results showed improvement in gas permeability of fabricated membranes in comparison with the neat Matrimid membrane. The best performance of blend membrane was obtained with 3 wt.% of PVDF, leading to increase 29% and 23% in CO<sub>2</sub> permeability and CO<sub>2</sub>/CH<sub>4</sub> selectivity, respectively, as compared to the pristine Matrimid. Furthermore, the gas permeability and CO<sub>2</sub>/CH<sub>4</sub> selectivity were improved

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