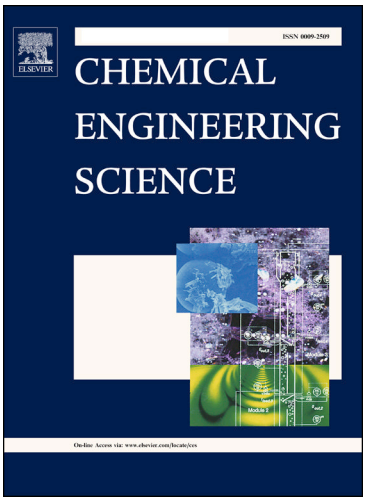

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PII: S0009-2509(18)30204-5
DOI: https://doi.org/10.1016/j.ces.2018.04.006
Reference: CES 14138

To appear in: *Chemical Engineering Science*

Received Date: 14 December 2017
Revised Date: 11 March 2018
Accepted Date: 3 April 2018

Please cite this article as: H. Rajati, A.H. Navarchian, S. Tangestaninejad, Preparation and Characterization of Mixed Matrix Membranes based on Matrimid/PVDF blend and MIL-101(Cr) as filler for CO_2/CH_4 separation, *Chemical Engineering Science* (2018), doi: https://doi.org/10.1016/j.ces.2018.04.006

Preparation and Characterization of Mixed Matrix Membranes based on Matrimid/PVDF blend and MIL-101(Cr) as filler for CO_2/CH_4 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_2/CH_4 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_2 permeability and CO_2/CH_4 selectivity, respectively, as compared to the pristine Matrimid. Furthermore, the gas permeability and CO_2/CH_4 selectivity were improved

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