Editor View of Item: Qualitative and quantitative analysis of intercalated and exfoliated silicate layers in asymmetric polyethersulfone/cloisite15A® mixed matrix membrane for CO2/CH4 separation

## Abstract

In this study, flat sheet asymmetric MMMs were prepared from polyethersulfone (PES) containing 1 (PES/C15A1) and 5wt% (PES/C15A5) loading of Cloisite15A® via phase inversion to investigate the effect of dispersion of silicate layers on the properties and performance of the MMMs for CO2/CH4 separation. The MMMs were characterized by means of WAXD, TEM, tensile test and pure gas permeation measurement. Partial intercalated and exfoliated silicate layers for MMM with 1wt% loading contributed to the enhancement of the membrane morphological and mechanical properties. The increase tortuosity in PES/C15A1 reduced the CH4 permeance with a significant enhancement for the CO2/CH4 selectivity from 22.57 to 46.89. In addition, high degree of intercalation and exfoliation of silicate layers was also corroborated by particle size measurement (PSM), particle density measurement (PDM) and free-path spacing measurement (FPSM) with the increase in aspect ratio, dispersed single silicate layers, density and formation of several tactoid classes for PES/C15A1. The properties and performance of the MMMs, determined by qualitative and quantitative measurements for PES/C15A1 was higher compared to PES/C15A5; therefore, the extent of the silicate layers dispersion has a significant role in the fabrication of asymmetric MMMs. © 2015 Elsevier B.V.