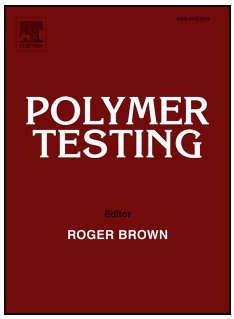

Recognition of polymer-particle interfacial morphology in mixed matrix membranes through ideal permeation predictive models

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Recognition of polymer-particle interfacial morphology in mixed matrix membranes through ideal permeation predictive models

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Abstract

Interfacial properties play an important role in determining characteristics and performance of composite materials, especially in membrane gas separation applications. Formation of any undesirable defect at polymer-particle interface can directly influence on membrane permeability and selectivity in addition to unwanted effects on the other mechanical/physical properties. For achieving a quick insight about the role and nature of interfacial morphologies in mixed matrix membranes (MMMs) and their effects on gas transport properties, a new technique mainly in terms of mathematical modeling was developed. Based on the proposed approach, although ideal models often failed in predicting MMMs performance, these models can provide guidelines for discernment of the types of formed interfacial morphology, like current methods in characterization.

Keywords: Mixed matrix membranes, Interfacial morphology, Gas separation, Mathematical modeling.

1. Introduction

Polymeric membranes have been significantly applied due to their potential in gas separation. Despite their economical features, the tradeoff between permeability and selectivity effect on their performance. In this regard, MMMs made up of distributed inorganic particles in a polymer matrix are exploited to overcome the trade-off [1]. Successful application of membrane gas separation processes, largely depends