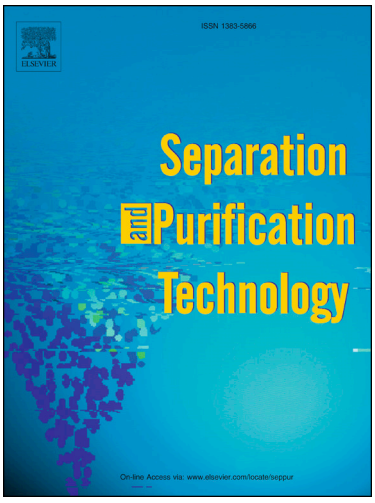

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Nanostructured membranes containing UiO-66 (Zr) and MIL-101 (Cr) for O_2/N_2 and CO_2/N_2 separation

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Abstract

Metal-Organic Frameworks (MOF) containing zirconium and chromium metals have been reported as gas materials for gas storage and separation, especially for CO_2. The high selectivity of MOF can be exploited through their dispersion in a polymer matrix, producing mixed matrix membranes for different applications in gas separation and adsorption. This study reports the use of nanostructured mixed matrix membranes (MMM), produced by dispersion of the MOFs UiO-66 (Zr) and MIL-101 (Cr) in polyurethane for O_2/N_2 and CO_2/N_2 gas separation. UiO-66 (Zr), MIL-101 (Cr) and composites comprising these particles were characterized by SEM, XRD, TGA and FTIR analyses, which indicated that the MOFS were successfully synthesized. Defect-free dense PU/UiO-66 (Zr) membranes were obtained, with increased selectivity due to the higher oxygen permeability. For the MIL-101 (Cr) membrane, no significant increases in oxygen selectivity and permeability were observed. On the other hand, best performance for CO_2/N_2 separation was observed for the MIL-101 (Cr) membrane. A significantly greater CO_2 permeability (around 220%) in comparison with polyurethane membrane was obtained. N_2 permeability was also improved, resulting in the same