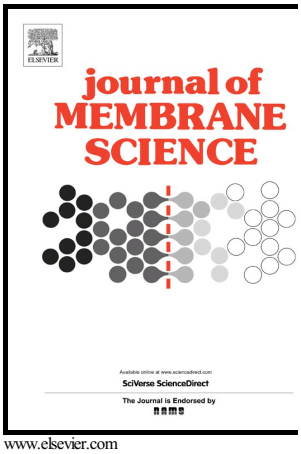

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Combination of ionic liquids with membrane technology: a new approach for CO_2 separation

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Keywords:

CO_2 capture; ionic liquids; membranes; membrane contactors.

Abstract:

This paper presents details of recent research progress on CO_2 separation membranes and membrane processes using ionic liquids (ILs) over the past few years, including supported ionic liquid membranes (SILMs), poly(ionic liquid) membranes (PILMs), poly(ionic liquid)-ionic liquid (PIL-IL) composite membranes, polymer-ionic liquid composite membranes, ion-gel membranes, and membrane absorption processes based on ILs. Descriptions of different approaches to membrane preparation, use of gas transport mechanisms, and state-of-the-art separation results are discussed in the context of breakthroughs and challenges. Furthermore, comprehensive assessment of recently improved membranes and possible future R&D prospective are also discussed.

1. Introduction

Increasing carbon dioxide (CO_2) emissions in the environment have contributed to global warming and climate change, which are issues of great concern today. Excessive greenhouse gases in the atmosphere are responsible for various environmental problems including enhancing heat stress, increasing severity of tropical storms, higher ocean acidity, rising sea levels, and the melting of glaciers, snow pack and sea ice, etc. [1]. In the foreseeable future, fossil fuels will continue to play a major role mainly in electrical power generation and industrial manufacturing in many countries. It has been reported by the International Energy Agency that the emission of the primary greenhouse gas, CO_2, increases by about 6% every