FEASIBILITY OF SUPPORTED IONIC LIQUIDS AS CO_2-SELECTIVE NANOPOROUS MEMBRANES

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Abstract

Nowadays, it is generally accepted that anthropogenic carbon dioxide emissions are the major cause for global temperature rise, the so-called greenhouse effect. In particular the application of fossil fuels for power generation and its use in the automotive sector leads to unacceptably high emissions of CO_2 into the atmosphere. As a consequence, extensive research programs on carbon, capture and storage (CCS) of CO_2 have been initiated to develop knowledge and technology to control and to reduce these emissions. A major issue is to have adequate capture technology available to separate CO_2 from all kind of industrial gas streams before it can safely be stored in the underground. Examples of such industrial processes, releasing large amounts of CO_2, are the well-known steam reforming and water gas shift reactions with natural gas (CH_4) yielding H_2 and CO_2.

In this presentation a novel approach to separate CO_2 from the product stream will be presented. For that purpose a meso porous membrane support, in which an ionic liquid has been confined, is used to separate CO_2 and H_2. Key parameters are selective dissolution in and fast transport through the IL for only CO_2. Extensive experimental work has been performed to select the appropriate ionic liquid for this application. In addition, solubility measurements of CO_2, H_2, CH_4 and CO in the selected ionic liquid have been performed. It will be shown that this technique is a promising approach for capturing CO_2 from industrial gas streams.

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