Chemical Engineering Journal 220 (2013) 185–203

Contents lists available at SciVerse ScienceDirect

Chemical Engineering Journal

journal homepage: www.elsevier.com/locate/cej

Review

Dense ceramic oxygen permeable membranes and catalytic membrane reactors

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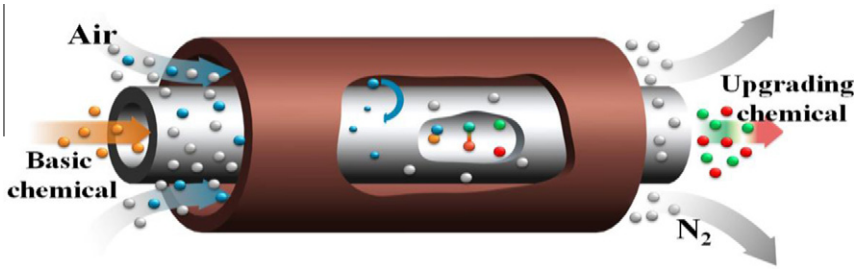
HIGHLIGHTS

- Progress of oxygen permeable membrane materials and architecture is presented.
- Membrane reactor design, applications in energy and environmental fields are given.
- Challenges related to industrialization and future research are proposed.

GRAPHICAL ABSTRACT

A dense ceramic oxygen permeable membrane reactor (OPMR) not only combines a membrane separation unit with a chemical reaction, but couples them in such a way that a synergy is created between the two units. This technical concept is expected to be a promising approach to achieve green and sustainable chemistry with less energy consumption and lower pollution.



ARTICLE INFO

Article history:
Received 6 August 2012
Received in revised form 28 December 2012
Accepted 4 January 2013
Available online 23 January 2013

Keywords:
Membrane
Mixed conductor
Oxygen permeation
Perovskite
Hollow fiber
Catalytic reaction

ABSTRACT

A dense ceramic oxygen permeable membrane reactor (OPMR) not only combines a membrane separation unit with a chemical reaction, but couples them in such a way that a synergy is created between the two units. This technical concept is expected to be a promising approach to achieve green and sustainable chemistry with less energy consumption and lower pollution. This article presents a review of the recent progress of dense ceramic OPMR, including membrane materials, membrane architecture, membrane reactor design, new applications in energy and environmental fields, current challenges related to industrialization and future research.

Contents

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http://dx.doi.org/10.1016/j.cej.2013.01.048