

# Author's Accepted Manuscript

A novel CAU-10-H MOF membrane for hydrogen separation under hydrothermal conditions

Hua Jin, Alexander Wollbrink, Rui Yao, Yanshuo Li, Juergen Caro, Weishen Yang



PII: S0376-7388(16)30226-5  
DOI: <http://dx.doi.org/10.1016/j.memsci.2016.04.017>  
Reference: MEMSCI14417

To appear in: *Journal of Membrane Science*

Received date: 11 December 2015  
Revised date: 10 March 2016  
Accepted date: 5 April 2016

Cite this article as: Hua Jin, Alexander Wollbrink, Rui Yao, Yanshuo Li, Juergen Caro and Weishen Yang, A novel CAU-10-H MOF membrane for hydrogen separation under hydrothermal conditions, *Journal of Membrane Science* <http://dx.doi.org/10.1016/j.memsci.2016.04.017>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# A novel CAU-10-H MOF membrane for hydrogen separation under hydrothermal conditions

Hua Jin <sup>a,b</sup>, Alexander Wollbrink <sup>c</sup>, Rui Yao <sup>a,b</sup>, Yanshuo Li <sup>a,\*</sup>, Juergen Caro <sup>c</sup>, Weishen Yang <sup>a,\*</sup>

<sup>a</sup> State Key Laboratory of Catalysis, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, China

<sup>b</sup> University of Chinese Academy of Sciences, Beijing 100049, China

<sup>c</sup> Institute of Physical Chemistry and Electrochemistry, Leibniz University Hannover, Callinstr. 3, D-30167 Hannover, Germany

E-mail addresses: leeys@dicp.ac.cn

yangws@dicp.ac.cn

\*Corresponding authors.

## Abstract

Hydrogen selective membranes with excellent hydrothermal stability are highly demanded in ethanol steam reforming. For this goal, a novel CAU-10-H MOF membrane has been prepared on  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> disc for the first time by *in situ* solvothermal synthesis. The as-prepared CAU-10-H membrane shows high selectivity for H<sub>2</sub> with mixed gas separation factors of 10.5 and 74.7 for H<sub>2</sub>/CO<sub>2</sub> and H<sub>2</sub>/CH<sub>4</sub> binary mixtures, respectively, indicating the successful synthesis of CAU-10-H membrane with high-quality. The performance of the CAU-10-H membrane for hydrogen separation in the presence of steam was systematically investigated by variation of feed pressure (2-5 bar) and temperature (150-300 °C). The CAU-10-H membrane is selective for H<sub>2</sub>, with separation factors of 11.1 and 5.67 for H<sub>2</sub> over CO<sub>2</sub> and H<sub>2</sub>O, respectively. More importantly, the CAU-10-H membrane is still structure-preserving and hydrogen-selective after long-term test under hydrothermal conditions. These results demonstrate that the CAU-10-H membrane is an excellent candidate for hydrogen separation in steam reforming of ethanol in a membrane reactor.

Download English Version:

<https://daneshyari.com/en/article/632327>

Download Persian Version:

<https://daneshyari.com/article/632327>

[Daneshyari.com](https://daneshyari.com)