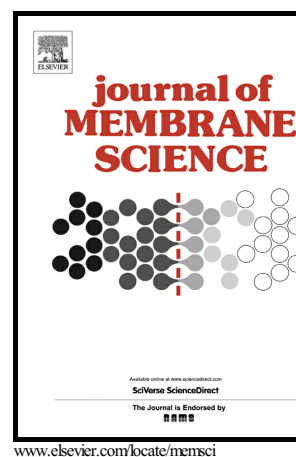


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Influence of Chromium in metallic components on oxygen permeability and microstructure of $\text{BaCo}_{0.7}\text{Fe}_{0.2}\text{Nb}_{0.1}\text{O}_{3-\delta}$ membrane

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Abstract: The influence of chromium in metal components on oxygen permeation and microstructure of $\text{BaCo}_{0.7}\text{Fe}_{0.2}\text{Nb}_{0.1}\text{O}_{3-\delta}$ (BCFNO) membrane was investigated under the condition of the oxygen-permeable membrane reactors. In presence of chromia-forming metal components, the oxygen permeation flux decreased by about 2.4% and 10% when using dry air and humidified air (4% H_2O) for 100 hours at 850°C, respectively. In presence of chromia-forming alloys on the permeate side, the oxygen permeation flux decreased by 7% within 100h. Due to the deposition of volatile Cr species from chromia-forming alloys and formation of spinel phases of BaCrO_4 and BaCr_2O_4 on the membrane surfaces, the performance of the membrane reactors deteriorated continuously as a function of time. Poisoning of chromium species is also a critical issue for the application of MIEC oxygen-permeable membrane reactors.

Key words: Oxygen-permeable membrane reactors; Chromia-forming metal components; Chromium poisoning; Oxygen permeability; Structure stability

1. Introduction

Dense ceramic mixed ionic-electronic conducting (MIEC) membranes with a cubic perovskite structure have been used for oxygen separation from air, partial oxidation of methane (POM) to syngas and solid oxide fuel cells (SOFCs) cathode [1-4]. For industrial applications, the ceramic membranes must be linked to the metal components with a proper sealing system. The most widely developed and studied metal components are the chromia-forming alloys due to their high resistance against oxidation

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