

# **State of the Art of Ceramic Membranes for Hydrogen Separation**

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## State of the Art of Ceramic Membranes for Hydrogen Separation

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### Abstract

Membrane technology can be integrated into many advanced system concepts for the production of liquid energy carriers and chemicals, for microfiltration, oxygen generation, low CO<sub>2</sub> emission power generation, hydrogen technology, and carbon dioxide capture. The separation of hydrogen by inorganic membranes for energy applications is a growing field with respect to the low efficiency losses of membrane-based processes. Inorganic hydrogen separation membranes find application in the separation of hydrogen from syngas in a fossil power plant and as an electrolyte in intermediate-temperature proton-conducting fuel cells or electrolyzers for hydrogen production. The separation can be performed by different membrane concepts. This chapter discusses the state of the art of (1) microporous ceramic membranes (amorphous and zeolitic) and (2) mixed proton-electron conducting ceramic membranes, focusing on their properties and current manufacturing and development status. The properties of each membrane type are discussed with respect to the foreseen range of applications. Finally, an outlook is given for R&D activities required in the next few years.

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