

A comprehensive review of carbon molecular sieve membranes for hydrogen production and purification

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ABSTRACT

Demand in clean alternative energy source together with fuel cells developments has attracted researchers towards utilization of hydrogen (H₂). Common production of hydrogen from fossil fuels requires further pretreatment prior to the application, which makes separation and purification technology a very crucial component. Membrane reactors for water-gas shift reaction which was used for H₂ generation by conversion of carbon monoxide revealed a good potential in shifting the reaction equilibrium. Two types of inorganic membranes widely studied for H₂ separation and purification are dense phase metal and metal alloys and porous ceramic membranes. Among these two, microporous-type membrane was found to be more advantageous at harsh temperature during water-gas shift reaction. Sol-gel method employed for synthesised of porous ceramic membranes produced membranes with high stability and durability at high temperature and at tough hydrothermal environments. This work presents the critical issues regarding the membranes based on technical and economical perspective. Discussions are made on the significance of membrane technology advancement in order to strive for a clean environment with zero power technologies.

KEYWORDS

Carbon molecular sieve membranes; Hydrogen production; Hydrogen purification; Mixed matrix membranes; zeolite membranes

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