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RESEARCH PAPERS

Pd-SiO_2复合膜的氢气选择渗透特性

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摘要　Palladium membranes were prepared on an α-alumina support by metal-organic compound
chemicalvapor deposition (MOCVD) method from palladium(Ⅱ) acetate precursor. Permeation properties of hydrogen andhelium gas were studied as a function of the number of times of deposition of palladium on the peeling off phenomenonof palladium, which is common in electroless plated membrane, was observed. Silica was introduced into the pores toprevent the palladium grain from peeling off. The palladium-silica conjugated membrane does not show the peelingoff phenomenon and can withstand the high temperature up to 800℃ which is
the upper limit of our apparatus.The separation factor for hydrogen gas over carbon dioxide gas was improved with the increase of number of timesof silica coating by sacrificing the H2 permeation and finally increased to four times. The improvement on theseparation of hydrogen gas over carbon dioxide for palladium-silica conjugated membrane was evaluated and
amodel of permeation pattern (palladium and silica) was proposed. This model suggests that the separation factorfor hydrogen over carbon dioxide could be improved by introducing silica layer because the silica layer fills the poresand reduces the gas permeation without sacrificing the hydrogen permeation through the palladium region. Theseresults indicate that the introduction of silica into the palladium grain is a promising means to improve the hydrogenseparation performance of palladium based composite membranes.

关键词　gas separation　hydrogen　composite membrane　inorganic membrane　metal membrane

分类号

DOI:

Preparation of Palladium-Silica Conjugated Membrane for Selective Hydrogen Permeation

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Abstract Palladium membranes were prepared on an α-alumina support by metal-organic compound chemicalvapor deposition (MOCVD) method from palladium(Ⅱ) acetate precursor. Permeation properties of hydrogen andhelium gas were studied as a function of the number of times of deposition of palladium on the peeling off phenomenonof palladium, which is common in electroless plated membrane, was observed. Silica was introduced into the pores toprevent the palladium grain from peeling off. The palladium-silica conjugated membrane does not show the peelingoff phenomenon and can withstand the high temperature up to 800℃ which is the upper limit of our apparatus.The separation factor for hydrogen gas over carbon dioxide gas was improved with the increase of number of timesof silica coating by sacrificing the H2 permeation and finally increased to four times. The improvement on theseparation of hydrogen gas over carbon dioxide for palladium-silica conjugated membrane was evaluated and amodel of permeation pattern (palladium and silica) was proposed. This model suggests that

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Key words gas separation; hydrogen; composite membrane; inorganic membrane; metal membrane

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