

Ceramic barrier coated Pd hydrogen membrane supported on a porous nickel support

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A highly performed Pd alloy hydrogen membrane has prepared successfully on a modified porous nickel support. The porous nickel support modified by impregnation method of Al (NO₃)₃·9H₂O (Aldrich Co.) over the nickel powder showed a strong resistance to hydrogen embrittlement and thermal stability. Plasma surface modification treatment was introduced as a pre-treatment process instead of conventional HCl wet activation.

Ceramic barrier was coated on the external surface of the prepared nickel supports to prevent intermetallic diffusion and to enhance the affinity between the support and membrane. Pd and Au were deposited at thicknesses of 4 μm and 50 nm, respectively, on a barrier-coated support by DC and RF sputtering process.

The permeation measurement was performed in pure hydrogen at 400 °C. The single gas permeation of our membrane was two times higher hydrogen permeability than that of the previous membrane which do not have ceramic barrier.