

Fabrication and characterization of Pd-Ni porous membrane for hydrogen separation

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We demonstrate for the first time the fabrication of Pd on porous nickel rod type membrane with mechanical treatment for H₂ separation. porous nickel membrane has so small and uniform pore size to be the support of dense Pd membrane. However, small nickel cluster on surface caused defects on Pd membrane supported by porous Ni rod because porous Ni rod is made by uniaxial pressing. The effect of mechanical treatment was found to have a significant effect on surface to get rid of small nickel cluster as well as selectivity to reduce pore size. After 10 cycles electroless plating, as-deposited Pd film is uniform and defect-free. The gas permeation properties of Pd membrane was characterized by permeation experiments with H₂, N₂, CO and CO₂ gases at temperature 623K and pressure 1~4 bar. It was clarified that the surface condition of porous nickel rod is very important to the H₂ gas permeation and selectivity H₂ was contributed by solution diffusion mechanism.