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Improving carbon tolerance of Ni-YSZ catalytic porous membrane by palladium addition for low temperature steam methane reforming

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Abstract

Palladium was added on the Ni-YSZ catalytic porous membrane by wet impregnation and electroless plating methods. Its surface morphology characteristics and carbon deposition properties for the low temperature steam methane reforming were investigated. The addition of palladium could obviously be enhanced the catalytic activity as well as carbon tolerance of the Ni-YSZ porous membrane. The porous membranes were evaluated by scanning electron microscopy (SEM), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), H_2 temperature-programmed reduction (H_2-TPR), CH_4 temperature-programmed reduction (CH_4-TPR), and O_2 temperature-programmed oxidation (O_2-TPO). It was found that the Pd-Ni-YSZ catalytic porous membrane showed the superior stability as well as the deposition of carbon on the surface during carbon dissociation adsorption at 650 ℃ was also suppressed.