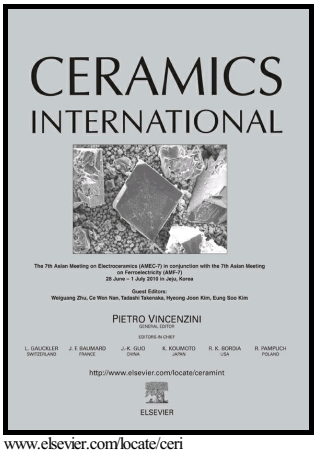

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Abstract

Enhancing the ambi-polar conductivity of the ceramic hydrogen permeable membrane by introducing an electron conductive metallic phase is quite effective, which is helpful for the hydrogen permeation flux improvement. To develop CO_2-tolerant hydrogen permeable membranes with better hydrogen permeability, Ni-$La_{5.5}WO_{11.25-\delta}$ (Ni-LWO) cermet membranes are fabricated. The alkaline earth metal-free ceramic LWO is used as the main proton-conductive phase and Ni is used as the main electron-conductive phase. The Ni-LWO membrane exhibits good chemical stability in CO_2-containing atmosphere since its hydrogen permeability maintains well in the measurement for about 180 h. Compared with the LWO ceramic membrane, the hydrogen permeability of the Ni-LWO membrane has been improved significantly. The Ni/LWO ratio has great impact on the performance of the cermet membrane. Meanwhile, among all the dual-phase Ni-LWO membranes with different Ni/LWO volume ratios, the membrane with 60 vol% Ni shows the highest hydrogen permeation flux of 0.18 $ml \cdot min^{-1} \cdot cm^{-2}$ at 1000 ^oC when the feed gas contains 50 % H_2.