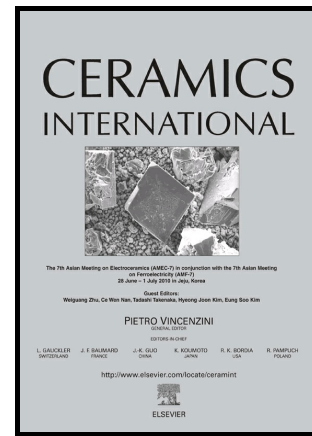


# Author's Accepted Manuscript

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CO<sub>2</sub>-tolerant Ni-La<sub>5.5</sub>WO<sub>11.25-δ</sub> dual-phase membranes with enhanced H<sub>2</sub> permeability

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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<sub>2</sub>-tolerant hydrogen permeable membranes with better hydrogen permeability, Ni-La<sub>5.5</sub>WO<sub>11.25-δ</sub> (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<sub>2</sub>-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·min<sup>-1</sup>·cm<sup>-2</sup> at 1000 °C when the feed gas contains 50 % H<sub>2</sub>.

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