

Fabrication of hierarchical porous transport layers for anion exchange membrane electrolyzers.

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Ni felts are conventionally used as anode porous transport layers (PTL) in anion exchange membrane (AEM) electrolyzers. However, a better distributed contact between the PTL and the AEM can help reduce mechanical strain and current constriction in the AEM, thereby enabling higher differential pressure operation and improved performance. On the other hand, high degree of porosity and large pore sizes are desirable within the main body of the PTL to promote mass transport. PTLs with hierarchical porosity can encompass both requirements. In this work, tape casting of NiO, with average particle size ranging from 20 nm to 15 μm and reductive sintering of the NiO tapes is pursued as a novel Ni PTL production method that can help reduce production steps, energy consumption, and time. Reduction temperatures of 300-700 $^{\circ}\text{C}$ and sintering temperatures of 600-1000 $^{\circ}\text{C}$ are explored in order to find an optimum profile to achieve desired porosity (60-80%) and mechanical strength. Ni PTLs with a footprint larger than 25 cm^2 and hierarchical porosity are fabricated using the optimized reduction-sintering profile. Sintered Ni PTLs are analysed for porosity, microstructure and electrochemical performance.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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