

Prediction and optimization of the sintering behavior of LaWO bilayer membranes for hydrogen separation

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With the growing need for sustainable energy, efficient energy generation and conversion methods are becoming increasingly important. One of these conversion methods is hydrogen separation utilising ceramic membranes. These membranes consist of a thin, dense membrane layer and a porous support layer to ensure the membrane's ability to withstand stresses is upheld. During sintering, the different porosities in the layers cause anisotropic shrinkage, resulting in the bending of the bilayer membrane. However, research on finding solutions to minimise this distortion during sintering is limited. The main objective of this numerical study is to optimise the interface between the dense membrane layer and the porous support layer and investigate adaptations to the sintering process to minimise the bending during sintering for Lanthanum Tungstate (LaWO). Experimental sintering data for each layer is combined with the Skorohod-Olevsky Viscous Sintering (SOVS) model and applied in COMSOL, where the bilayer model is then verified using experimental bilayer sintering data. After verification, the numerical model is applied to LaWO bilayer membranes with varying interfacial geometries. The numerical model provides experimentally unattainable information on the densification of the membrane and in the longer term, this work generates a platform for the design of geometries and manufacturing routines enabling the sintering of complex layered materials.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

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Invitation letter for visa

No

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