Joining of ceramic Ba$_{0.5}$Sr$_{0.5}$Co$_{0.8}$Fe$_{0.2}$O$_3$ membranes for oxygen production to high temperature alloys - DTU Orbit (08/12/2018)

Joining of ceramic Ba$_{0.5}$Sr$_{0.5}$Co$_{0.8}$Fe$_{0.2}$O$_3$ membranes for oxygen production to high temperature alloys

The possibility of joining dense ceramic BCSF tubular membranes to metal alloys using a silver braze was investigated. Four different alloys (Crofer 22 APU (R), Kanthal APM (R), Haynes 214 (R) and EN 1.4841) were considered and the influence of their oxide scale stability/reactivity and their thermal expansion coefficient on the stability of the final joint was evaluated. Leak tight assemblies were obtained only for steels with a thermal expansion coefficient of > 16 [10(-6) K-1] and protective coating. Proof-of-concept oxygen flux measurements up to 830 degrees C were performed on these assemblies, demonstrating the functionality of the developed hot sealing. In addition a simulation of the stresses occurring in the joint assembly during use was performed for different materials and geometries. The obtained results fit well with the experimental findings. (C) 2016 Elsevier B.V. All rights reserved.

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