Shape distortion and thermo-mechanical properties of dense SOFC components from green tape to sintered body - DTU Orbit (29/12/2018)

Sintering of ceramic materials is a critical process, especially when the components are shaped as multilayer. Microstructural changes and stresses take place in ceramics as single layer from the green stage to the densification stage, leading to shape distortion, delamination and cracks. The characterization of thermo-mechanical properties, such as viscoelasticity, enables a prediction of microstructural stability of SOFCs. Tape-cast bi-layer structures for CGO/YSZ and CGO/ScYSZ was studied during the thermal processing. Different sintering kinetics of bi-layer tape give rise to localized tensile stresses, which develop a camber in the final sintered body. To analyze the phenomena, shrinkage of SOFC components single layers and camber development of bi-layers were measured in-situ by optical dilatometry. In addition, a thoughtful investigation of the viscoelastic properties of individual layers was carried out by thermo-mechanical analysis (TMA). The results from the different techniques were found complementary and viscous behavior of the layered ceramics was verified.

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