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High performance anode supported SOFC produced by multilayer tape casting

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Abstract

Multilayer tape casting (MTC) is considered a cost-efficient method for production of planar anode supported solid oxide fuel cells (SOFC). The multilayered SOFC structure is produced by successive tape casting of anode support, anode and electrolyte layers on top of each other, followed by co-sintering of the half cell. Initial single cell testing results indicate significantly improved performance and stability of half-cells produced by multilayer tape casting, as compared to previously reported cells produced at Risø by tape casting of the support layer, and spraying of anode and electrolyte layers.

MTC half cells have been produced with different porosities, the influence of the porosity and microstructure distribution on cell performance will be presented in this work. Cell warpage (planarity), porosity and microstructure were characterized as a function of production parameters.

The porosity of the reduced Ni-YSZ cermet structure was characterized by means of mercury intrusion porosimetry. Microstructural analyses were carried out by SEM. Cell warpage was characterized by non-contact profilometry. Performance was evaluated by single cell testing. Polarization measurements and electrochemical impedance spectroscopy was used to determine the cell performance.