The Impact of Strong Cathodic Polarization on Ni|YSZ Microelectrodes - DTU Orbit
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This work is a study of the impact of short-term strong cathodic polarization in a Ni|YSZ model system using Ni probes as working microelectrodes in a high temperature scanning probe microscope at 650°C in humidified 9% H₂ in N₂. Impedance spectroscopy revealed one to three orders of magnitude decrease in the high frequency resistance and four to five orders of magnitude decrease in the low frequency impedance with polarization from −1.06 V to −3.06 V vs E°(O₂), indicating introduction of electronic conductivity and expansion of the reaction zone around the Ni microelectrode. The effect on the Ni|YSZ interface included formation of electronic conductance, reaction between Ni and YSZ and accumulation of impurities around the Ni|YSZ contact as verified by conductance scans of the polarized area. Cyclic voltammetry was used to compare three systems with different impurity levels and showed that the presence of silicates reduces the current, i.e. lowers the performance of the electrode reaction.

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