Long Term Stability Investigation of Solid Oxide Electrolysis Cell with Infiltrated Porous YSZ Air Electrode Under High Current - DTU Orbit (20/10/2019)

Long Term Stability Investigation of Solid Oxide Electrolysis Cell with Infiltrated Porous YSZ Air Electrode Under High Current

The increased interest in stable and low cost electrodes for solid oxide cells (SOC) has driven the research of electrode preparation to infiltration of catalyst material into porous backbone material. The infiltration method enables a reduction of amount of catalyst material and increases its activity, due to high surface area of catalyst nano particles. Advantage of infiltration is also separate production of electrolyte backbone structure with good ionic connectivity and mechanical properties. With this study we present the results of a solid oxide cell with infiltrated porous yttria stabilised zirconia (YSZ) backbone air electrode and Ni/YSZ cermet fuel electrode. The SOC was tested at electrolysis conditions under high current (up to -1 A/cm²). The porous YSZ electrodes was infiltrated with gadolinium-doped ceria oxide (CGO), to act as a barrier layer between the catalyst and the backbone, and perovskite catalyst material. Cobalt doped lanthanum nickelate was used as the perovskite catalyst due to its excellent performance. The cell was tested in steam electrolysis for at least 2000h. This initial test indicate that a stable air electrode was formed, and that the cell performance and stability matches that of a state-of-the-art SOC.

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