3D Microstructural Characterization of Ni/YSZ Electrodes Exposed to 1 Year of Electrolysis Testing - DTU Orbit (31/03/2019)

Long-term operation strongly affects the microstructure of Ni/YSZ cermets used in state of the art fuel electrodes for solid oxide cells. The microstructural changes are considered to heavily affect the cell degradation. In this paper, the characterization of the Ni/YSZ electrode of a solid oxide electrolysis cell tested as part of a stack tested for 1 year was performed through focused ion beam-scanning electron microscopy and energy dispersive X-ray spectroscopy. A reference cell and two locations of interest in the tested cell were selected: one at the steam inlet side and the other at the outlet. Considerable microstructural changes were observed in the tested cell compared to the reference cell and between the inlet and outlet side. A decrease in Ni (from 30% in the reference cell to 24% in the tested cell), and in percolating triple phase boundaries length (from 2.83 μm/m(μm)3 in the reference cell to 0.76 μm/m(μm)3 in the tested cell) was observed in the active fuel electrode. Based on the results of this work and previous studies we hypothesize that the degradation trend between different operating conditions at the inlet and outlet of the cell is related to the current redistribution inside the cell. (C) 2019 The Electrochemical Society.

General information
State: Published
Organisations: Solid State Chemistry, Department of Energy Conversion and Storage, Continuum Modelling and Testing, Electrochemistry
Pages: F158-F167
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Journal of the Electrochemical Society
Volume: 166
Issue number: 2
ISSN (Print): 0013-4651
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.48 SJR 1.267 SNIP 1.009
Web of Science (2017): Impact factor 3.662
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.97 SJR 1.222 SNIP 0.963
Web of Science (2016): Impact factor 3.259
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.17 SJR 1.115 SNIP 1.066
Web of Science (2015): Impact factor 3.014
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.36 SJR 1.213 SNIP 1.25
Web of Science (2014): Impact factor 3.266
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.92 SJR 1.169 SNIP 1.309
Web of Science (2013): Impact factor 2.859
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.61 SJR 1.329 SNIP 1.281
Web of Science (2012): Impact factor 2.588