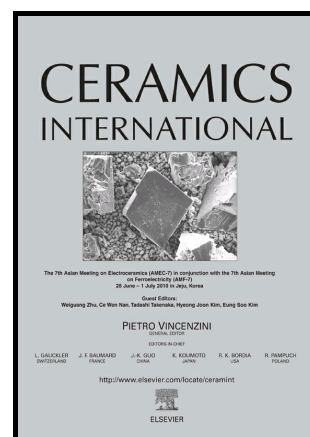


Mechanical characterization of SOFC/SOEC cells

J. Wei, T. Osipova, J. Malzbender, M. Krüger



www.elsevier.com/locate/ceri

PII: S0272-8842(18)30666-7
DOI: <https://doi.org/10.1016/j.ceramint.2018.03.103>
Reference: CERI17740

To appear in: *Ceramics International*

Received date: 16 February 2018

Revised date: 2 March 2018

Accepted date: 12 March 2018

Cite this article as: J. Wei, T. Osipova, J. Malzbender and M. Krüger, Mechanical characterization of SOFC/SOEC cells, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.03.103>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Mechanical characterization of SOFC/SOEC cells

J. Wei, T. Osipova, J. Malzbender¹, M. Krüger

Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research, IEK-2, 52425

Jülich

j.malzbender@fz-juelich.de

Abstract

Mechanical reliability is one main prerequisite for the long-term operation of Solid Oxide Fuel Cells (SOFCs) and Solid Oxide Electrolysis Cells (SOEC) in stacks and systems. Hence, key mechanical properties were derived for cells to be used in Jülich stacks and systems. Since assembling and joining is typically carried out in oxidized state, whereas operation requires reduction of the anode, mechanical characterizations are performed for cells in oxidized and reduced state with additional consideration of elevated temperature behavior as well as possible mechanical degradation due to subcritical crack growth. In particular, fracture strength, elastic modulus and residual stress for half-cells were assessed. With respect to fracture strength, also subcritical crack growth at different temperatures has been analyzed, being the basis of a derived strength-probability-time plot. Overall, the work provides parameters for determination of failure probability and lifetime prediction.

Keywords: SOFC; SOEC; Mechanical properties; Temperature; Strength; Elastic modulus;

1. Introduction

Solid Oxide Fuel Cells (SOFCs) and Solid Oxide Electrolysis Cells (SOEC) are devices that permit transfer of energy [1], being potentially important for stationary applications in context of

¹ Tel.: +49 2461 616964, fax.: +49 2461 613699.

Download English Version:

<https://daneshyari.com/en/article/7886768>

Download Persian Version:

<https://daneshyari.com/article/7886768>

[Daneshyari.com](https://daneshyari.com)