



	Experiment title: in-situ investigation of the depth resolved strain field and interface kinetics in solid oxide fuel cells	Experiment number: ME663
Beamline:	Date of experiment: from: 04/02/2004 to: 11/02/2004	Date of report: 31/01/2008
Shifts:	Local contact(s): V. Honkimäki	<i>Received at ESRF:</i>
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Report:

Abstract [1]

The stability of Ni-YSZ anodes as part of solid oxide fuel cells (SOFCs) towards redox cycling is an important issue for successfully introducing the technology. Detailed knowledge of the NiO-Ni transitions and their impact on the mechanical integrity of the whole system is necessary to improve the overall stability. In the present paper, a unique in-situ X-ray diffraction setup is presented which allows monitoring of the local structural changes during processing of SOFCs. With this setup technological SOFCs – a half cell and a full cell – were studied with respect to NiO-Ni transitions in repeated reduction-oxidation cycles, under conditions relevant for SOFC application. It was found that the redox kinetics is a function of the sample depth. Ni particles further away from the surface were reduced/oxidized at a slower rate than particles close to the surface.

[1] A.Hagen, H.F. Poulsen, T. Klemmsø, R.V. Martins, V. Honkimäki, T. Buslaps, and R. Feidenhans'l: *A Depth-Resolved In-Situ Study of the Reduction and Oxidation of Ni-Based Anodes in SolidOxide Fuel Cells*, FUEL CELLS 06, 2006, No. 5, 361–366