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Poster

Oxygen Exchange Kinetics and Nonstoichiometry of Pristine La0.6Sr0.4CoO3−δ Thin Films Unaltered by Degradation

5:30pm - 6:30pm Room 1
Tue, Jan 19 (Eastern) 0028

Matthäus Siebenhofer
Vienna University of Technology

Location: Room 1

Matthäus Siebenhofer*[1], Tobias Huber[1], Gernot Friedbacher[1], Juergen Fleig[1], Markus Kubicek[1]
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Event Type

Poster

Oxygen Exchange Kinetics and Nonstoichiometry of Pristine La0.6Sr0.4CoO3−δ Thin Films Unaltered by Degradation

Main Session

Poster Session
5:30pm-6:30pm Jan 19 (Eastern) Room 1

Discussion

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Oxygen Exchange Kinetics and Nonstoichiometry of Pristine $La_{0.6}Sr_{0.4}CoO_{3-\delta}$ Thin Films Unaltered by Degradation

View Session Detail

Presentation Number:

Matthäus Siebenhofer[1], *Tobias Huber*[1], *Gernot Friedbacher*[1], *Juergen Fleig*[1], *Markus Kubicek*[1]

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Abstract Body: The mixed conducting perovskite material $La_{0.6}Sr_{0.4}CoO_{3-\delta}$ (LSC) is a promising cathode material for application in a solid oxide fuel cell (SOFC) due to its catalytic properties for the oxygen surface exchange reaction and its high electronic conductivity. However, one of the obstacles in the use of LSC is its susceptibility to surface changes due to environmental factors. To deepen the understanding of these degradation mechanisms, it is necessary to retrace the properties and the structure of LSC to a point before degradation starts.

LSC thin films grown on YSZ single crystals were investigated directly in the stage of deposition by means of In-Situ Impedance Spectroscopy during Pulsed Laser Deposition (IPLD). This method allows the investigation of dense films unaltered by degradation and provides information about the oxygen exchange kinetics as well as the defect chemistry of pristine LSC thin films.

Our measurements revealed very low surface resistance values (1.3 Ωcm^2 at 600 °C and 0.04 mbar O_2) compared to ex situ measurements (20 Ωcm^2 at 600 °C and 0.04 mbar O_2). Also, the activation energy of the surface exchange resistance at 0.04 mbar O_2 is significantly lower than at ambient conditions (1 vs. 1.3 eV) and the surface degrades slower. Mechanistic reasons for these highly active surfaces as well as the influence of columnar grain size are discussed.