

## EPFL Valais/Wallis SEMINAR

20. 11. 2019, 10:30 - 11:30, EPFL Valais/Wallis in Sion, 4<sup>th</sup> floor, Zeuzier Room

### Effect of Electrical Current on the Evolution Corrosion of Ferritic Stainless-Steel Interconnects in Intermediate Temperature Solid Oxide Fuel Cells

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High temperature corrosion of ferritic stainless steel (FSS) interconnects in Solid Oxide Fuel Cells (SOFCs) operating at intermediate temperature (IT) is one of the two major degradation mechanisms of cell degradation. When the SOFC is under operating conditions, a current is generated in the interconnect, inducing an ohmic polarization [1]. The influence of aging time, ohmic polarization and coating on the corrosion evolution of the oxide scale formed at the interface FSS/Manganese Cobalt Oxide (MCO) coating and at FSS/ $La_{0.6}Sr_{0.4}CoO_{3-\delta}$  (LSC) have been investigated, by aging coated and uncoated FSS for up to three weeks at 700 °C, with and without a current passage. Rigorous experiments conducted suggest that interconnects without coating and being subject to an electrical load tend to show higher oxidation rate. In addition, strontium migration from the cathode to the oxide scale [2] is observed mostly in uncoated interconnects and even in coated interconnects aged for more than two weeks with the application of electrical current.

#### References:

- [1] Ryter, J., Amendola, R., McCleary, M., Shong, W. J., Liu, C. K., Spotorno, R., & Piccardo, P. Effect of electrical current on the oxidation behavior of electroless nickel-plated ferritic stainless steel in solid oxide fuel cell operating conditions. *Int. J. Hydrogen Energ.*, 43(1), 426–434.
- [2] Chen, L., Magdefrau, N., Sun, E., Yamanis, J., Frame, D., & Burila, C. Strontium transport and conductivity of  $Mn_{1.5}Co_{1.5}O_4$  coated Haynes 230 and Crofer 22 APU under simulated solid oxide fuel cell condition. *Solid State Ionics*,



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