



Hydrogen Europe: European Hydrogen & Fuel cell Project Database

Project DeSIgn

DEGRADATION SIGNATURES IDENTIFICATION FOR STACK OPERATION DIAGNOSTICS

Today, main expectation for SOFC stationary systems competitiveness is to exceed a durability of 40 000 h, an objective which is not today reached except for very specific designs. A better understanding and detection of the failure mechanisms and the internal condition of stacks is of major importance for the introduction of the SOFC technology. If, massive SOFC stack or auxiliary failure can be easily detected by the control system, it is not currently the case for insidious abnormal operating conditions that accelerate the degradation of the SOFC stack, impacting seriously its performances other the long run and ultimately the life expectancy of the stack. These insidious phenomena can come either from within the stack itself (ex. a SRU distribution channel blocked), or from minor system failures (ex. abnormal decrease of performance of a fuel blower). DESIGN sets out on the detection of slow and hidden phenomena that nevertheless have strong and detrimental long-term effects on the performance and durability of the SOFC stack. The project proposes to study the influence of slowly-damaging conditions on measures performed on the stack sub-components: the Cells, the Single Repeating Units (SRU) and smaller stacks. Identification of characteristic signatures of these degradation phenomena at the lower level will be subsequently transposed at the stack level, to provide a way to diagnose slow degradation phenomena in a commercial SOFC stack, through appropriate data processing of measures provided by limited sensors. The main outputs of the project will be: 1. Identification of relevant sensors and signals to be monitored to diagnose degradation phenomena; 2. A data analysis methodology to be applied to measured signals; 3. A set of characteristic signatures for the different degradation phenomena at the local and stack level, to be compared with the actual sensor signal to diagnose long-term degradation conditions; 4. Recommendations for operation recovery.

Project Information

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European Union through FCH JU: [Grant agreement 256693 - CORDIS link](#)

Project partners

Coordinator :

[CEA - Commissariat à l'énergie atomique et aux énergies alternatives](#)

Partners :

[Teknologian tutkimuskeskus VTT Oy](#)

[EIFER - Europäisches Institut für Energieforschung](#)

[University of Salerno](#)

[HyGear Fuel Cell Systems B.V.](#)

[ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE](#)

[HTceramix SA](#)

[EBZ Entwicklungs- und Vertriebsgesellschaft Brennstoffzelle mbH](#)

[Sub project\(s\)](#)

Sub project 1

Country: France

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Sub project categories

Research

Project Id: 946

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