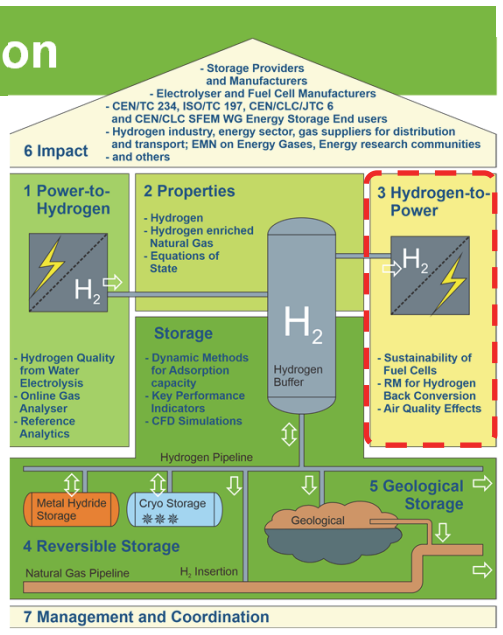
Metrology for Hydrogen Quality from Electrical Energy Storage by Hydrogen Back Conversion (Gas-to-Power) – (WP3)

MefHySto
Metrology for Advanced Hydrogen Storage Solutions

Commissariat à l'Énergie Atomique et aux Énergies Alternatives (France), Universidade da Coruña (Spain), Regasificadora del Noroeste, S.A (Spain), National Physical Laboratory (United Kingdom), Bundesanstalt für Materialforschung und -prüfung (Germany)

MefHySto Introduction

- Duration 2020–2023
- EU Funding 2.3 M€
- Coordinator BAM
- 14 Partners



- Ambitious new EU energy target of using 32 % of renewable energy by 2030
- Cannot be reached without advanced energy storage solutions, e.g., H_2 storage
- Measurement science is critical for realisation of this commitment
- Financial concerns of amount of hydrogen generated – stored – back-converted

Work Package 3 Introduction

- Impact of Impurities on Fuel Cells
- Reference Materials
- Air Quality Effects

WP lead: liten
partners: Universidade da Coruña, reganosa, NPL, BAM

Tasks

- Gas Reference Materials for fuel cell tests
- Impact of impurities on fuel cell performance; recommendations and support to standards on H_2 quality
- Give specifications for air quality sensor to monitor fuel cell performance and durability
- Validation of metrological chain for gas analysis at complete H_2 platform level

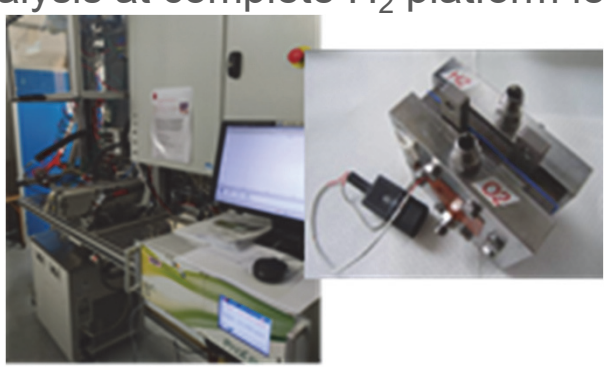


Figure 1: Fuel cell lab with analytics for FC stack and single cell (@CEA)

Impact of Hydrogen and Air Impurities

Literature review on previous/current work on hydrogen and air impurities to set specific compositions to be studied

- Synergy effects between NO_x and SO_x species has been highlighted in literature and will be further studied for air supply
- Development of analytical methods for VOC (Volatile Organohalogenated Compounds) analysis in air and sorbents qualification is ongoing

Figure 2: Example of sorbents for VOCs sampling/enrichment

Testing Facilities and Test Results

- Fuel cell single cell and stack technologies were set up and are now available
- First reference tests under both reference "pure" H_2 and air were conducted
- Preparation of Gas Mixture for fuel cell tests following the H_2 ISO 14687-2 with all contaminants at their maximum respective levels
- Fuel cell tests (performance and durability) planned with this H_2 composition

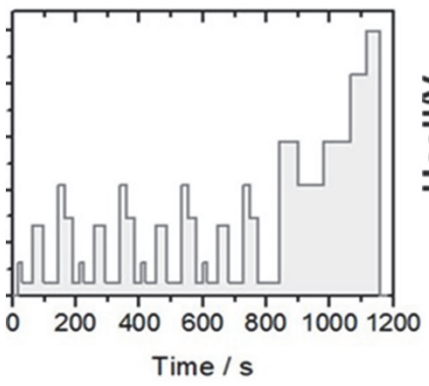


Figure 3: FC-DLC automotive load profile for ageing test

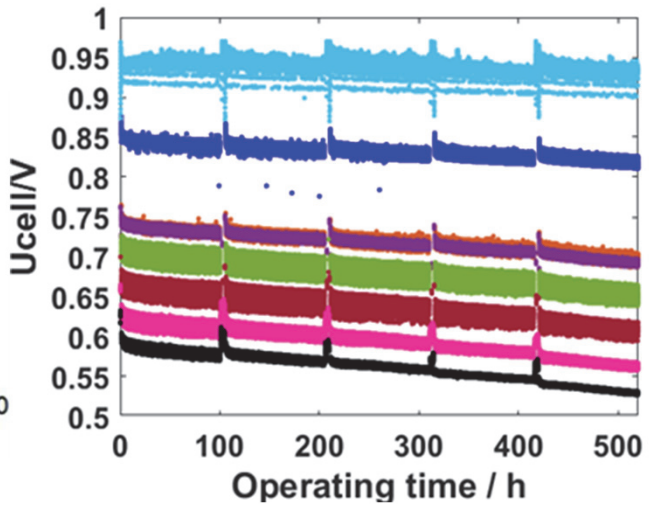


Figure 4: Cell voltage evolution during reference durability tests for 500 h using FC-DLC in 25 cm² single cell

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