Green Industrial Hydrogen via Reversible High-Temperature Electrolysis

Results

<table>
<thead>
<tr>
<th>Project Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GrInHy</strong></td>
</tr>
<tr>
<td>Grant agreement ID: 700300</td>
</tr>
<tr>
<td>Project website [🔗]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Funded under</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2020-EU.3.3.8.2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 4 498 150</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EU contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 4 498 150</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coordinated by</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALZGITTER MANNESMANN FORSCHUNG GMBH</td>
</tr>
<tr>
<td>Germany</td>
</tr>
</tbody>
</table>

Deliverables

**Websites, patent filings, videos etc. (1)**

Launch of public website

The website will be used as a basic media tool for external communication.

**Other (3)**

Annual data reporting 1

For technology monitoring and policy analysis purposes, the data generated by the FCH2 JU projects are collected in an internal database.
Annual data reporting 2
For technology monitoring and policy analysis purposes, the data generated by the FCH2 JU projects are collected in an internal database.

Annual data reporting 3
For technology monitoring and policy analysis purposes, the data generated by the FCH2 JU projects are collected in an internal database.

Documents, reports (6)

Report on the CO₂ emission mitigation potential
Short study of CO₂ emission mitigation potential in comparison to SoA hydrogen production.

Report on results of cell and stack tests
The report will contain a comparison of performance and durability of SoA components (cells and stacks) with optimised ones which are developed within the WP3. Long-term testing will include the measurement of voltage-current data, degradation rates, and cell/stack impedance, if available. Impedance spectroscopy allows the identification of the causes of degradation. This can orient the cell and stack developers for component improvements, in order to achieve 1%/1000 h stack-voltage degradation. In addition, the influence of thermal management on stack degradation will be analysed by the tests results in a furnace done by EIFER and in a thermally self-sustaining environment done by SF.

Summary of dissemination of project results
A summary of dissemination activities will be part of the final report.

Final report on 7,000 h operational results
After 7,000 h operation the data collected by the SOC system and “ELEISA” will be analysed. The main topics will be system performance including power input/output and efficiencies as well as the hydrogen quality and the suitability of the predefined profiles. Also system degradation and its capability to operate at part load or over load conditions will be evaluated.

Investigation of natural gas and industrial process gas processing
Report on results of reforming experiments and dimensioning of the reformer.

Plan for dissemination activities
Based on the proposed dissemination plan in the Grant Agreement Annex I – Part B, an updated version will be published.
Publications

Peer reviewed articles (4)

**Electrolyte-Supported Fuel Cell: Co-Sintering Effects of Layer Deposition on Biaxial Strength**

**Author(s):** Alessia Masini, Thomas Strohbach, Filip Šiška, Zdeněk Chlup, Ivo Dlouhý  
**Published in:** Materials, Issue 12/2, 2019, Page(s) 306, ISSN 1996-1944  
**DOI:** 10.3390/ma12020306

**Design and characterization of novel glass-ceramic sealants for solid oxide electrolysis cell (SOEC) applications**

**Author(s):** Hassan Javed, Antonio Gianfranco Sabato, Kai Herbrig, Domenico Ferrero, Christian Walter, Milena Salvo, Federico Smeacetto  
**Published in:** International Journal of Applied Ceramic Technology, Issue 15/4, 2018, Page(s) 999-1010, ISSN 1546-542X  
**DOI:** 10.1111/ijac.12889

**Elastic properties of multi-layered ceramic systems for SOCs**

**Author(s):** Alessia Masini, Filip Šiška, Oldřich Ševeček, Zdeněk Chlup, Ivo Dlouhý  
**Published in:** International Journal of Applied Ceramic Technology, Issue 15/2, 2018, Page(s) 370-379, ISSN 1546-542X  
**DOI:** 10.1111/ijac.12801

**Shear Performance at Room and High Temperatures of Glass–Ceramic Sealants for Solid Oxide Electrolysis Cell Technology**

**Author(s):** Hassan Javed, Antonio Sabato, Ivo Dlouhy, Martina Halasova, Enrico Bernardo, Milena Salvo, Kai Herbrig, Christian Walter, Federico Smeacetto  
**Published in:** Materials, Issue 12/2, 2019, Page(s) 298, ISSN 1996-1944  
**DOI:** 10.3390/ma12020298

Conference proceedings (1)

**Performance Characterization of Glass-Ceramic Sealants in Dual Atmosphere Environment for Reversible Solid Oxide Cell (R-SOC) Applications**

**Author(s):** Domenico Ferrero, Antonio Gianfranco Sabato, Hassan Javed, Andrea Lanzini, Kai Herbrig, Christian Walter, Massimo Santarelli, Federico Smeacetto