FCH JU Grant Agreement number: 325368  
Project acronym: DeMStack  

**Deliverable 1.2:** Annual assessment of management and proposal improvement.

**Name, title and organisation of the scientific representative of the project’s coordinator:**  
Dr. Stylianos Neophytides  
Stadiou str., Platani, Rio-Patras, 26504, Greece

**Tel:** 0030 2610 965 265  
**Fax:** 0030 2610 965 223  
**E-mail:** neoph@iceht.forth.gr  
**Project website address:** [http://demstack.iceht.forth.gr](http://demstack.iceht.forth.gr)
The management system operated well and according to the plan. No conflicts between partners arose during the first half of the project. Any disagreements were solved amicably at the lowest level. Therefore, the Steering Committee did not have to interfere.

The project management involved a number of activities carried out:

- The **Consortium Agreement** including arrangements (representation, delegation etc) was agreed and signed by all contractors. The signatures were collected from all partners and the completed and signed version of the consortium agreement was distributed.
- **Grant Agreement**: The GPFs of all partners were collected and submitted to FCH JU. The signed GA and the additional files were distributed to the partners. As a note, during the negotiations and before the signing of the GA, Forth replaced the initial coordinator of the project, Advent (as was set during the submission of the proposal).
- No amendments to the GA were made within the reporting period.
- The communication between partners was also established and overseen. Forth is also the contact link between the consortium and JTI. Any information or requests from JTI are directly forwarded to all partners.
- The project started on 01/05/2013. The **pre-financing** obtained was distributed fully to the partners according to 50% of their total FCH JU contribution, with the exception of Helbio that was pre-financed by about 6% of their total FCH JU contribution. The financial office of EU had concluded that HELBIO’s financial check was weak - due to concerns on their financial ratios – and their pre-financing was limited to the amount of 10000 Euro. The budget of all partners was lowered by the 4% project fee based on the full FCH JU contribution for the project that, though not considered eligible cost, had to be paid to New IG.
- The consortium meets every 6 months. So far, these half-yearly meetings played an important role in the communication strategy between the partners, the coherency between the work packages, the progress monitoring and the refinement of the objectives and the proper evolution of the work. For each meeting the preparations included the finalization of the date (doodle) and place (discussion during the previously held meeting), organizing lunches, meeting room and accommodation, drafting the agenda was (jointly by the coordinator and the host) etc. Before the meeting the coordinator collected the executive reports and prepared a presentation/overview of the progress. After each meeting, the coordinator updated the content of the website by uploading the presentations and minutes. The **technical meetings** that took place are listed below:
  - Kick-off meeting, 14 June 2013, ICEHT/FORTH,
  - 6th month meeting, 15 November 2013, Prototech,
  - 1st year meeting, 15 May 2014, IK4-CIDETEC, and
  - 18th month meeting, 31 October 2014, JRC Petten.
- Despite the project meetings, scientific discussions were carried out by telephone conversations, as well as emails. Progress was monitored via the semi-annual **executive reports** (uploaded on the website).
Any request of partners regarding administrative issues were addressed by phone and email and, if required, discussed with the project officer. DeMStack participated to the FCH JU Program Review Days 2013 and 2014. Reports and Posters were created on time for both the Program Review Days. The coordinator participated in the events, presented the posters and attended the presentations of the other projects.

Reporting. Every six months the partners provided a short technical executive report. In this way, the follow up of the progress was facilitated. Using these, the coordinator made a presentation/overview at the beginning of each technical meeting. As mentioned, all presentations and reports are uploaded on the website.

For the deliverable reports and the present midterm report, the coordinator provided in time instructions (in a ppt format) for the reporting. The contribution of each partner was collected and integrated into a complete document. Finally, for the financial reports, instructions (also from the FCHJU) were also distributed to the partners.

A domain was created: demstack.iceht.forth.gr for all the project documentation (deliverables, publications, research experimental data, regular reports and minutes, etc.) as a common tool for communication. The implementation and maintenance is done by the coordinator. The content of the database is regularly updated. A part of the website is restricted by secure access control to consortium members and EC representatives.

A Mid-Term Assessment report on the progress of the research and the partners’ plans is submitted before at the end of the 20th month from the date of commencement. The project coordinator and the FCH JU agreed and organized the Mid-Term assessment meeting (January 23rd 2015) with all partners and the Commission’s representative.
For the project monitoring, the key intermediate targets and deadlines toward the construction of the final prototype are:

<table>
<thead>
<tr>
<th>Target</th>
<th>Date (Month)</th>
<th>Achieved (Y, N or N/A)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling up of crosslinked polymer electrolytes</td>
<td>18</td>
<td>N</td>
<td>In a lab scale the synthesis and characterization was successful. Scaling up was not successful up to M18 following the proposed work in the DoW. Nevertheless, efforts are still in progress. More importantly, there is a crosslinked structure developed and scaled up in parallel to DeMStack that can be used.</td>
</tr>
<tr>
<td>Scaling up synthesis of electrocatalyst</td>
<td>18</td>
<td>Y</td>
<td>Scaled up to 5 g with no complications. Now aiming at a 50 g scale.</td>
</tr>
<tr>
<td>Overall cost reduction by a factor of 2</td>
<td>18</td>
<td>Y</td>
<td>Significant reduction of the MEA’s cost has been achieved due to the lower Pt loading.</td>
</tr>
<tr>
<td>Operation over a wide range of reformates, (H2=50-100%, CO=0-4%, steam = 0-30%).</td>
<td>30</td>
<td>Y</td>
<td>Using the new developed and scaled up electrocatalyst, the performance in a single cell level has been validated.</td>
</tr>
<tr>
<td>Stability of the electrocatalyst (dissolution, loss of interface etc)</td>
<td>30</td>
<td>N/A</td>
<td>In-situ results have shown a very stable performance. Post mortem analysis is under way. Cycling tests have been scheduled at JRC premises.</td>
</tr>
<tr>
<td>MEA performance of 0.14W/cm² under H2/O2 at 180°C</td>
<td>30</td>
<td>Y</td>
<td>A mean value of 674mV (at 0.2A/cm²) was observed for reformate/air compared to 697mV for H2/Air. For H2/Air this correspond to a power output of 139.4mW/cm², while for reformate/air 135mW/cm².</td>
</tr>
<tr>
<td>Identification of sealant and coolant materials</td>
<td>27</td>
<td>N/A</td>
<td>The materials have been identified and preliminary ex-situ tests are close to completion. As it seems there will be no delay or complication.</td>
</tr>
<tr>
<td>Design and construction of a 1 kW Stack</td>
<td>30</td>
<td>N/A</td>
<td>So far: 1- The MEA performance has been validated. 2- Two stacks will be constructed with different approaches that increase the possibilities for success. 3- Designs and selection of materials are complete according to plan. It seems that there will be no delay or failure.</td>
</tr>
<tr>
<td>Design and construction of fuel processor</td>
<td>25</td>
<td>N/A</td>
<td>The work is progressing with no deviations.</td>
</tr>
</tbody>
</table>

* N/A if is not yet reached, but this target is not due yet.

Each target and the work toward its achievement are being reviewed every 6-months, in order to evaluate the progress and if needed to re-schedule or alter the approach. During the Mid-Term Assessment the reviewers identified additional potential risks and provided
remarks and suggestions. The consortium went through the comments very carefully and will adopt them in the remaining 18 months.

So far, there are two noteworthy deviations/alterations from the DoW.
1- The proposed work in the DoW did not result in a scalable crosslinked polymer electrolyte. Initial delivery time was M18. Other approaches will be further explored in the 2nd half of the project. A parallel work towards the scalability of crosslinked materials was executed within another FCH-JU project named IRMFC. For DeMStack purposes, we tried to prepare a large film area using the above polymer. A film of 2100 cm² was successfully obtained having excellent properties. The MEA produced from the film above showed very stable performance as described below proving that this polymer can be a material of choice for the stacks.
2- The construction of two different stacks (in the DoW only one was proposed) following different approaches. The Advent design will be based on existing technology using graphitic plates and external cooling, whereas the Prototech design will be using metallic plates with internal cooling. Advent design is considered a low risk task with great scientific and practical impact. On the other hand, the metallic plates for high temperature stacks are more challenging. Nevertheless, we considered important utilizing some of the project resources into pursuing this concept as well, given the needs of the market and the broadening of the applications of the stacks (e.g. low weight stack addressing space applications).

Final targets:
a) Fuel Cell Stack Power output of 1 kW operating on reformates with electrical efficiency exceeding 45% and operating temperature 180°C.
b) Degradation rate under reformate gas corresponding to 5 µV/h.
c) For the integrated system, power output 0.9 kW with electrical efficiency >38%.