NEWELY
Next Generation Alkaline Membrane Water Electrolysers with Improved Components and Materials

Aldo Gago
German Aerospace Center (DLR)

https://newely.eu
aldo.gago@dlr.de
Project Overview

- Call year: 2019
- Call topic: FCH-02-4-2019 New Anion Exchange Membrane Electrolysers
- Project dates: 1\textsuperscript{st} January 2020 - 30\textsuperscript{th} June 2023
- % stage of implementation 01/11/2023: 100 %
- Total project budget: 2,597,414 €
- Clean Hydrogen Partnership max. contribution: 2,204,846 €
- Other financial contribution: 392,568 €
- Partners:
NEWELY project aims to redefine AEMWE, surpassing the current state of AWE and bringing it one step closer to PEMWE in terms of efficiency but at lower cost. The main developments include:

- Stable AEMs and ionomers, highly active non-PGM nanostructured catalysts, catalyst coated substrates (CCS - electrodes)

- 200 cm² active area AEMWE 5-cell stack with hydraulic compression technology and output hydrogen pressure up to 40 bar.

- The stack will reach 2 V @ 1 A cm⁻² with pure water feedstock only or diluted KOH. The targeted performance of the NEWELY prototype will be validated in a 2,000 hours endurance test with < 50 mV degradation.
Achievements - Highlights

Membranes: high conductivity, reinforcement, upscaling and stability. Commercialization of project membrane started via start-up company of project partner IMC-CAS:
Achievements - Highlights

Catalyst and Electrodes: Non-PGM, low overpotential, catalyst coated substrates (CCS)

2 V @ 1.5 A cm\(^{-2}\)
Achievements - Highlights

Single cell long term stability

The test validates the test cell hardware from the company ProPuls for its use in AEMWE.
Achievements - Highlights

Stack with hydraulic compression technology.

- Empty Buffer tank
- Stable T, CV max 2.1 V, I rising
- Voltage drop Cell 1
- N₂ empty
- Buffer tank empty
- Const 0.5 A after membrane hole

Long term test
Lessons Learned

- Small issues of availability of commercial materials at the right specification and delivery times can cause major delays.

- Covid situation did slow down the work because of the long periods when the labs were closed, and often personal interaction solves problems much faster than web meetings.

- Constant exchange of technical information among the partners greatly helps to solve the technical issues and achieve success (e.g. Tests in ProPuls cell).
Exploitation Plan/Expected Impact

**Exploitation**

- Several patents filed by partner KIST
- Star-tup company TailorMem, which sells some of the ionomers and AEMs developed in the project
- AEMWE single cell validated for commercialisation by partner ProPuls

**Impact**

- Cost reduction of electrolyser CAPEX
- Stack materials steel and PEEK are dominating materials impact
- LCA: electricity dominates the environmental impact of electrolytic hydrogen, independently of electrolyser technology
Thank you for your attention!

Aldo Gago
aldo.gago@dlr.de
https://newely.eu

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under Grant Agreement No 875118. This Joint Undertaking receives support from the European Union’s Horizon 2020 Research and Innovation program, Hydrogen Europe and Hydrogen Europe Research.