Protostack

Start date:	1-1-2023
Runtime:	36 months
End date:	31-12-2025
EC Funding:	HORIZON-JU-RIA
Coordinator:	SINTEF AS
Demcon:	DHTS Eindhoven

General information:

The project aims to demonstrate the competitive advantage of Pressurized Proton Ceramic Electrolysis (PCCEL) technology. The central concept of PROTOSTACK is a new stack technology with tolerance for high pressure operation, and experimentally demonstrate its operation up to 30 bar in a 5kW stack panel.

The stack design is based on a tubular cell architecture, which is inherently better suited for pressurized operation compared to planar stacks and offers possibility for operation under differential pressures. The novel compact and modular technology will be based on a ca. 400W stack, which can be easily replicated and assembled in multiple stack panels to build up capacity.

The project will demonstrate capacity of 5kW. Each stack will consist of up to six Single Repeating Units (SRU), electrically connected in series using a specialized interconnect and integrated glass ceramic sealant. Each SRU will contain 6 tubular proton ceramic-based cells and other key enabling technologies (KETs) such as interconnects and seals.

The short length of the individual cells and a specialized current collector system integrated with each electrode will alleviate current collection challenges encountered in tubular systems. All processes will be aligned with a sustainable value chain for stack manufacturing based on eco-design principles targeting reduced emissions and consumption of energy and critical raw materials.

This novel technology will create innovations in electrochemical stack design, stack components, processing methods for stack assembly and hands-on knowledge on pressurized PCCEL technology.

Vision and impact:

The project outcomes aim at the following aspects:

* Demonstration on stack level of a pressurized steam electrolysis solution by 2025.
* Reduction of CAPEX to 2000 €/(kg/d) and OPEX to 130 €/(kg/d)/y.
* Reduction of the life-cycle environmental footprint of electrolysers Improved performance, achieving current density of 0.5 A/cm2, Faradaic operation of at least 90% and pressure at stack level of 30 bar.

Project Website:

https://protostack.eu/

Protostack has received funding from the European Union's HORIZON-JTI-CLEANH2-2022-1 call