

The membraneless flow electrolyzer

Client	ENTRANCE, Centre Expertise Energy
Related project	REMO lab project
Start date	2023-2024
Suitable for training course(s)	Master EMRE, but also possibilities for students from any (technical) background
Learning Community	

Assignment description

Membraneless electrolyzers are an exciting emerging technology for efficient electrochemical production of hydrogen and other chemicals relevant for the energy transition. Unlike conventional electrolyzers, which employ an ion-conducting, impermeable membrane between the electrodes to separate the produced gases, membraneless electrolyser designs achieve gas separation with fluid-dynamic forces.

Within the REMO lab project a buoyancy-driven flow-cell is planned to be used to electrolyze the digestate solution from a biogas installation.

Assignment

The assignment in the broad sense is to investigate the best flow cell design for a membraneless electrolyzer and to study the electrochemical processes that are taking place on the electrode surfaces.

Computational fluid dynamics could be performed to investigate the behavior of a digestate solution in a such a cell taking in account that the electrolyte (the digestate solution in this specific case) contains some small solid particles, gas bubbles and foam on the top beside then highly viscous liquid. What is the best cell design to achieve a robust electrolyte level control while pumping the viscous solution through the system? What design and safety precautions should be implemented to avoid the electrocution of the operating personnel? How could be the mixing of the produced gases on the electrodes and the flooding of the gas lines with foam be avoided? What voltage and current intensity ranges are the most suitable to perform electrolysis in such a system? What is the best control strategy to build an autonomous electrolyzer

The assignment is open to the ideas of the students and we can alter the research direction to accommodate your personal interests. Both master and bachelor graduation projects could be incorporated in this research.

General information

Final Product	
Location	ENTRANCE, Zernikelaan 17, Groningen
Parties involved	
Contact person	Andras Perl a.perl@pl.hanze.nl
Guidance	
Details	

What are we and where can you find us?

ENTRANCE is a learning knowledge community, in which students and teacher researchers from various programmes work together with researchers, companies, governments and civil society organisations to accelerate the energy transition.

ENTRANCE is the place where, as a student, you work together with lecturers, researchers, businesses, governments and/or civil society organisations on complex issues. We do this at the following locations:

- Location Proeftuin, Zernikelaan 17
- Location Energy Academy Europe, Nijenborgh 6.

What do we offer?

ENTRANCE offers you a multidisciplinary, inspiring learning, working and research environment in which you can develop the competencies needed to shape and accelerate the energy transition. There is room for collaboration with professors, researchers, lecturers and the professional field. In addition, you will be supervised by professionals who are part of the ENTRANCE Learning Communities (ELC).

Contact us

Are you interested in the vacancy? Do you have questions or would you like to apply directly?

- Jacqueline Joosse, Coordinator ENTRANCE Learning Communities.
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