

MODELLING REVERSE ELECTRODIALYSIS WITH NATURAL CONDITIONS

Type of project: Thesis / Internship
Location: Wetsus, Leeuwarden, The Netherlands (adjustable)
Starting date: January 2022 (adjustable)

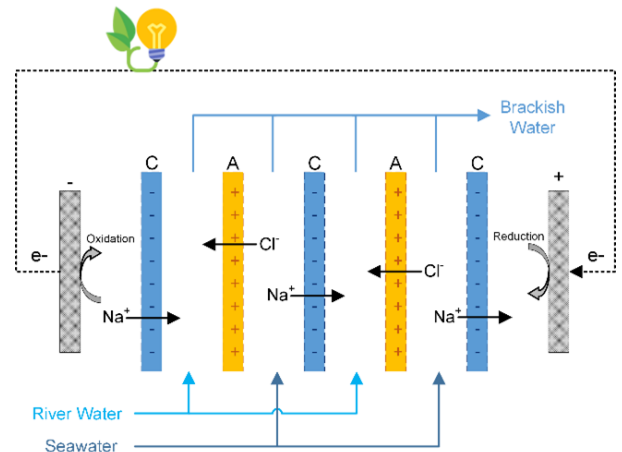
Project description:

New renewable energy sources are investigated to meet the world energy demand sustainably. Salinity gradient energy (SGE) has gained attention during the past decade, showing an increased potential. SGE is the available energy from mixing seawater and river water. Reverse Electrodialysis (RED), an electro-membrane process (figure), is used to harvest the energy.

As a result of Wetsus research, RED has been brought from idea to a pilot scale at the Afsluitdijk, where the IJsselmeer and the Wadden sea meet. Henceforth studies can be conducted regarding the scale-up and new concepts in real-life conditions.

RED models developed up to today can predict the process behaviour in laboratory conditions with mono- and divalent ions. However, translating the prediction behaviour when feeding natural waters and account for fouling (i.e. algae, humic acids) has not been done.

The project goal is to develop an existing model^{1,2,3} further to predict RED with natural waters. Besides modelling, this includes measuring membranes characteristics at the laboratory.



Tasks:

- Modelling a RED system and compare with data from natural waters (preferred software: Python, other software might be used upon agreement)
- Predict the influence of natural conditions in RED through modelling
- Measure membrane characteristics (electrical resistance, permselectivity)

Requirements:

- Experience programming in Python or MATLAB
- Background in chemical engineering, process engineering, environmental engineering or a related field. Knowledge in electrochemistry and modelling are beneficial for the application
- Be enrolled in an undergraduate (BSc) or graduate (MSc) program
- Fluent in English (good writing and communication skills) and willing to work in an international environment

Benefits and how to apply:

You will work in a highly-skilled environment for water research and contact with different topics and people. We offer a monthly allowance of 175 € if you do not have a scholarship (i.e. Erasmus +).

To apply to the project, send an email to catarina.simoese@wetsus.nl (indicate the preference for internship or thesis); please include an updated curriculum vitae and a motivation letter (max one A4 page, specific to the project).

Please note, Non-EU students need to be enrolled at a Dutch university to be eligible for this project.

References:

- [1] C. Simões, D. Pintossi et al, Desalination. 492 (2020) 114604. doi:10.1016/j.desal.2020.114604.
- [2] C. Simões et al, Adv. Appl. Energy. (2021). doi:10.1016/j.adapen.2021.100023.
- [3] D. Pintossi et al, Energy Convers. Manag. 243 (2021). doi:10.1016/j.enconman.2021.114369.