

Experimental Investigation of Electrochemical Hydrogen Compression Single Cell

Task description

The compression process is a key element of the hydrogen value chain that still poses major challenges. Current state-of-the-art compression technologies like reciprocating piston compressors or metal membrane compressors suffer from low efficiencies, high maintenance efforts and elevated noise emissions. Thus, the development of alternative technologies is gaining momentum. The Electrochemical Hydrogen Compressor (EHC) represents a promising solution, particularly for compression processes with low input-pressures. Nevertheless, several research questions remain including the selection of favourable cell material combinations. In order to take the next development step, several parameters like membrane types, thicknesses, catalyst loadings and gas diffusion layers shall be investigated via ex-situ characterisation and in-situ single cell tests at the HERON testbench (Fig.1) of HyCentA. These tests comprise e.g. ion-conductivity and permeation tests of membranes, polarization curves, electrochemical impedance spectroscopy (EIS) and cyclic-voltammetry. Single cell tests shall be conducted for various pressure levels to define the material applicability and possible limitations. A comprehensive statistical data analysis rounds off the work.

Assignment

- Literature research & summary on experimental results of EHC (1 month)
- Screening of in-house cell materials & definition of test plan (0,5 months)
- Conduction of ex-situ tests of materials and in-situ single cell tests (2,5 months)
- Data analysis with statistical evaluation and interpretation (1 month)
- Writing of thesis report (1 month)

Start: as of now
Duration: approximately 6 months

Paid Master Thesis

Contact: DI Michael Richter
 +43 (316) 873-9520, richter@hycenta.at
 DI Dr. techn. Alexander Trattner
 +43 (316) 873-9502, trattner@hycenta.at

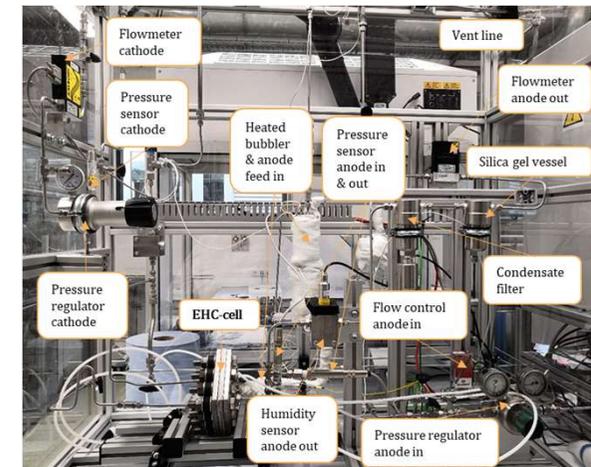


Fig. 1: HERON testbench for EHC single cells



Fig. 2: Catalyst coated membrane (CCM)