

# Further development of a real-time capable Matlab/Simulink model for quantifying the degradation of fuel cells (systems and stacks)

## Description:

Our overall scientific vision here at HyCentA is to provide the technological and strategic know-how basis for the substitution of fossil energy carriers by renewable hydrogen. One goal of the project HyLife, hosting this master thesis, is to generate a deeper understanding of degradation of fuel cells (cell, stack and system) by the use of new testing methods and the development of a diagnostic tool for degradation prediction. The content of this master thesis will be to support the further/ongoing development of such a tool, enabling degradation detection, in a way that allows passive monitoring without control unit programming, possible on all levels of integration for fuel cell testing.

The further development of the existing base version of the tool will be done in close collaboration with actual fuel cell testing on the testbed, which enables a regular validation of the tools accuracy and real time capability.

Knowledge of Matlab&Simulink as well as of some programming language like Python, C/C++ or others is valuable.

## Content:

- Orientation and Training (~1 month)
  - literature research on PEMFC degradation
  - getting to know the model
- 1 Level of model improvement: qualitative investigation (~1 month)
  - algorithm optimization & effect on the models real time capability
  - validation using testbed data
- 2 Level of model improvement: quantitative investigation (~3 months)
  - implementation of functionalities improving quantitative degradation prediction
  - validation using testbed data
- writing the thesis (~1 month)

**Start:** from July

**Duration:** ~ 6 Monate

**Compensation:** € 2.600

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