Research on state of the art PEM fuel cell degradation modelling

Task description

As part of the strategic research on degradation modelling within the research project „GENIE – Generation of innovative PEM fuel cells“, a collection of current state of the art PEM fuel cell degradation modelling is sought.

Hydrogen fuelled Proton Exchange Membrane (PEM) fuel cells are a promising technical solution for the decarbonization of the heavy-duty mobility sector, offering several advantages for this specific application compared to battery based electrical powertrains. Nevertheless, to allow a broad commercialization of this technology, some hurdles must still be overcome. One of these is given by the fuel cells lifetime (understood as the time to 10% reduction of the nominal power), which must still be improved to reach the broadly recognized target of 30k hours. In the last decades, degradation phenomena of the PEM fuel cell stack and their constituent components have been widely investigated, but their modelling and simulation are still a huge open chapter.

In order to test in a virtual environment possible control logics to limit fuel cell degradation phenomena, this bachelor thesis should strive to collect the current available lumped parameters (null dimensional) degradation modelling techniques and translate them into a first possible implementation draft in a Matlab/Simulink model.

Assignment

- Fundamental knowledge of PEM fuel cell (2 weeks)
- Literature research on degradation mechanisms (2 weeks)
- Literature research on degradation modelling (4 weeks)
- Concept draft of models implementation (2 weeks)
- Writing of thesis report (2 weeks)

Start: as of now

Duration: ca. 3 months

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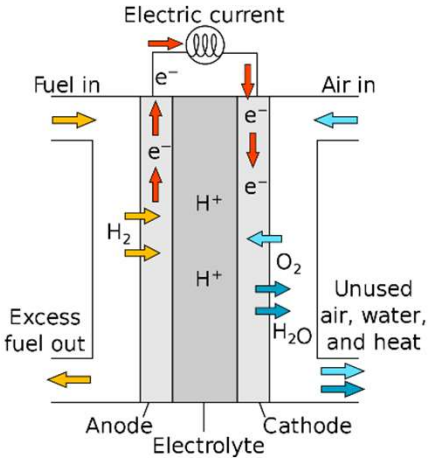

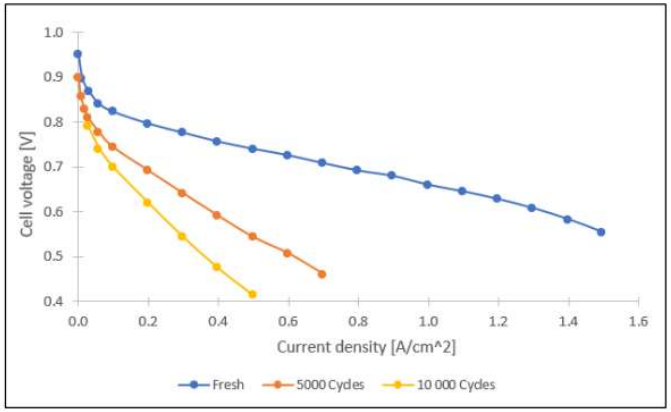

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