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Determination of SoH by Electrochemical Impedance Spectroscopy

Documentation to Dataset

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1. Introduction

This documentation contains information about the dataset provided to the publication „Determination of SoH by Electrochemical Impedance Spectroscopy“ by Monika Kwiecien, Julia Badeda, Moritz Huck, Kuebra Komut, Dilek Duman and Dirk Uwe Sauer. More details to the data set and the performed tests can be found in this publication.

The dataset contains data recorded with a *Digatron* test rig (MCT 10-06-12 ME), named as “Digatron-data” and the data recorded with an *EISmeter* from *Digatron*, named as “EIS-data” here. All data are provided in Matlab file format.

Furthermore Matlab scripts are provided to plot the single Matlab-files.

2. Information to the Folder Structure

The data set contains four folders with the names “TC1 hard AK3.4”, “TC2 hard AK3.4”, “TC1 soft AK3.4” and “TC2 soft AK3.4”. These folders have all data recorded on the single test cells during the aging tests *hard AK3.4* and *soft AK3.4*, respectively.

Within the folder of a test cell all performed check-ups are stored in single folders with the name “CheckUp_XXXXcycles_25deg”.

In such a folder for one check-up following data can be found:

- EISData: containing all EIS measurements performed during the check-up. The name of every single EIS-data provide information at which phase (either _XXper for the SoC in % or _aftCHA/ _aftCyc to indicate that the EIS was performed after charging or cycling phase) the EIS measurement was performed and with which DC-current (_X120)
- Pdf-files: containing the test procedures, which was programed for the Digatron and EISmeter test rig
 - For the EISmeter only the program *EISslave* was required
 - All other files contain programs for Digatron test rig
 - The date in the name of the files is the starting date of the test
- Matlab-file: this file contain the Digatron-data and its name consists of the name of the test and the starting date

3. Information to the Digatron-Data

The Digatron-data contain the measured voltage, current and temperature data of the corresponding test cell. Every file corresponds to one run of the test procedure with the check-up process and the cycling phase.

4. Information to the EIS-Data

The EIS-data were recorded by the EISmeter and one file contains only one impedance spectrum. The information at which condition the EIS was performed can be found in the name of the file. “_XXper” at the end of the name specifies the SoC. “_aftCyc” means that the EIS was performed after the cycling test. The SoC at this phase of the test is imprecise. EIS-data with “_aftCHA” in the name was recorded after a charging phase, but without the setting of a defined SoC. The DC-currents are given relative to the I_{20} current rate. This current discharges the nominal capacity within 20 hours. Here $1I_{20}$ corresponds to 0.5 A. The “+” sign before the current indicates a charging current and the “-” sign a discharging current. The number in the name after the DC-current rate (either 1 or 2) indicates the number mini-cycle during EIS.

5. Usage of the Matlab-Scripts

To the data set three Matlab-files can be found:

File name	Description
plotDigatron.m	After a file with Digatron-data is loaded to workspace the script can be started to plot the current, voltage and temperature data over time.
PlotEIS.m	After a file with EIS-data is loaded to workspace the script can be started to plot the spectrum as Nyquist diagram. Additionally the data are verified using zHit and the verification results are plotted in the diagram, too.
zHit.m	This is a function to do the zHit verification of the impedance spectrum. The function is used in the <i>plotEIS</i> script.

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