Tutorial on how to run "impedimetric_analysis.py"
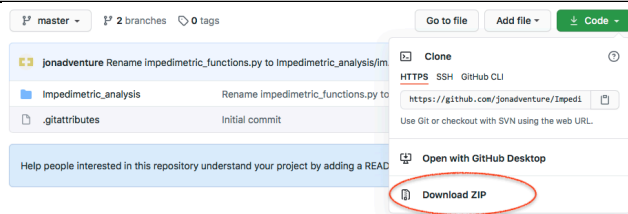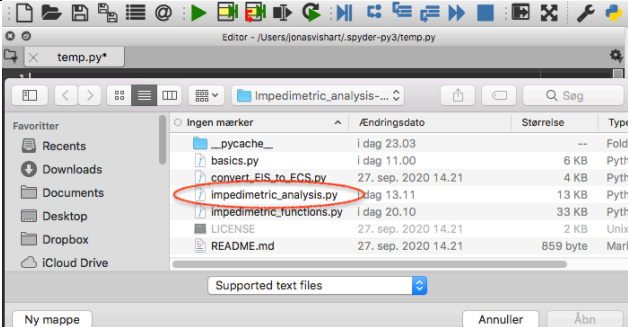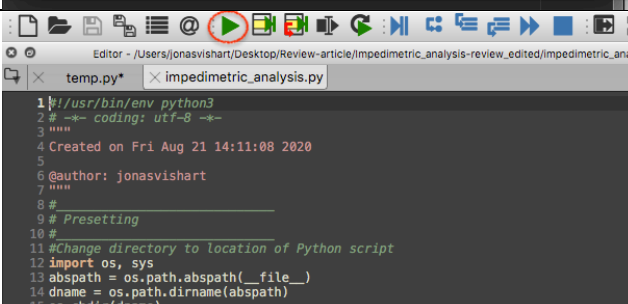
Prerequisites
- Python 3.7.0 or a newer version
- Following packages: *Matplotlib, Numpy, Openpyxl, Os, Pandas, Pylab, Re, Scikit-learn, Scipy, Sys, Tkinter (tk).*

It is highly recommended that programming beginners should use Anaconda[1], in which e.g. Spyder can be used to run Python. Anaconda is easy to install and include various packages and tools.

A package can be installed in Anaconda, follow this tutorial[2]. If using Anaconda with Python 3.7.0 or a newer version, following packages are already installed: *Matplotlib, Numpy, Os, Pandas, Re, Scikit-learn Scipy* and *sys*.
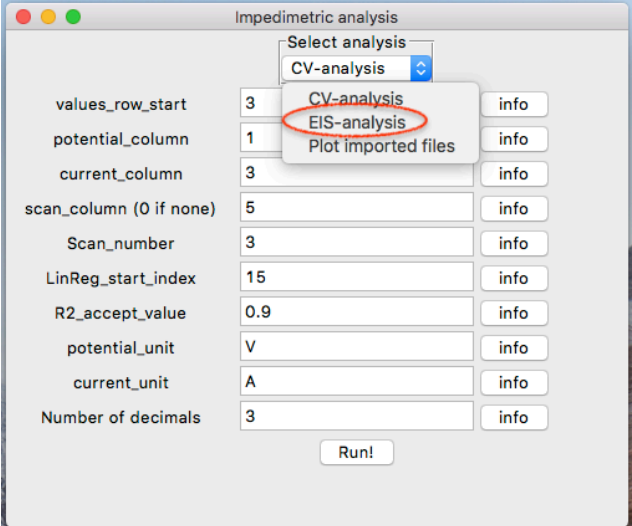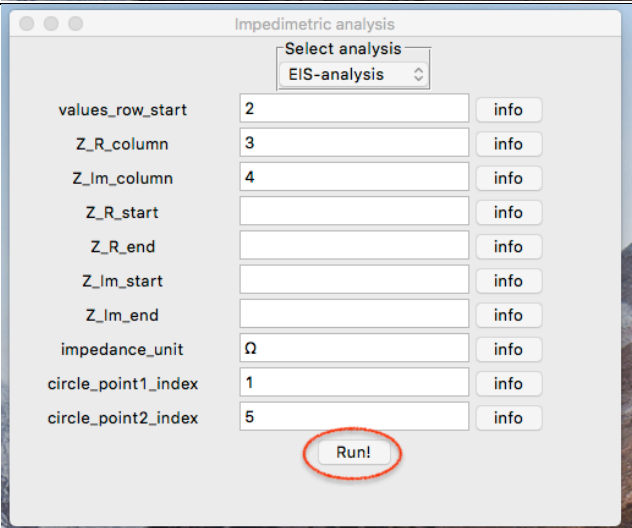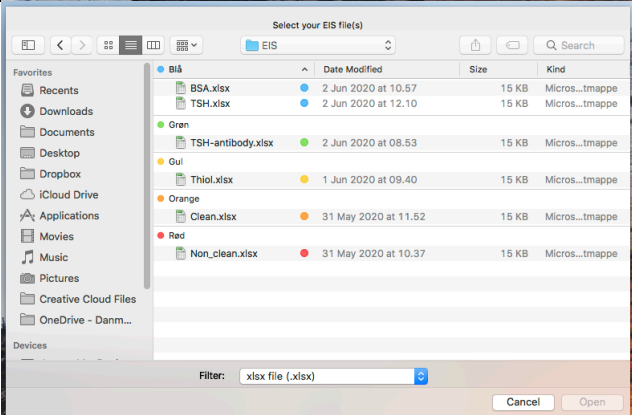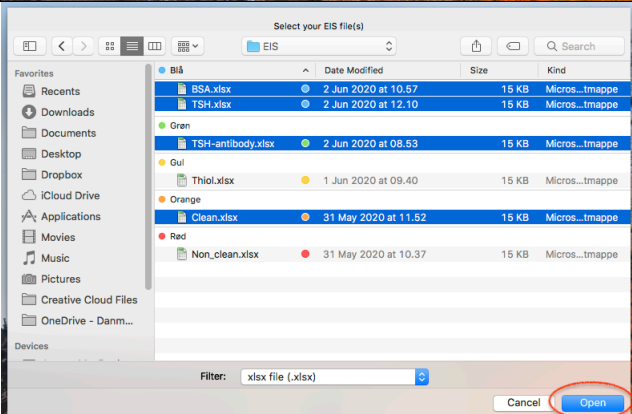
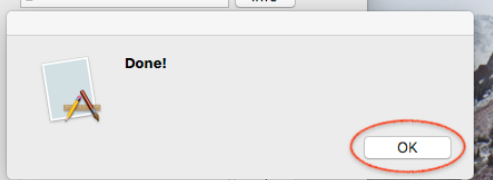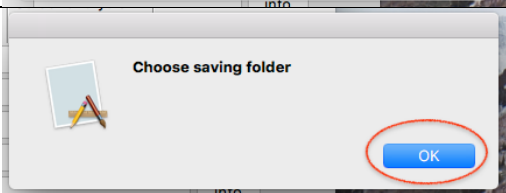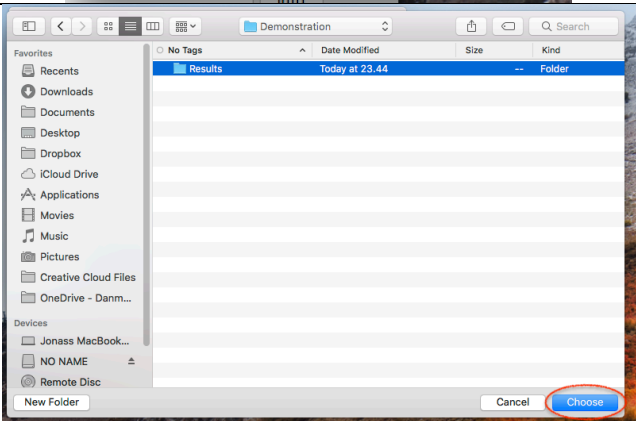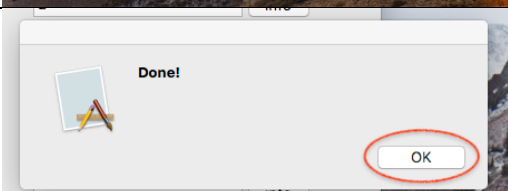To install remaining packages, open an Anaconda prompt/terminal and type following:
- conda install openpyxl
- conda install pylab
- conda install tk
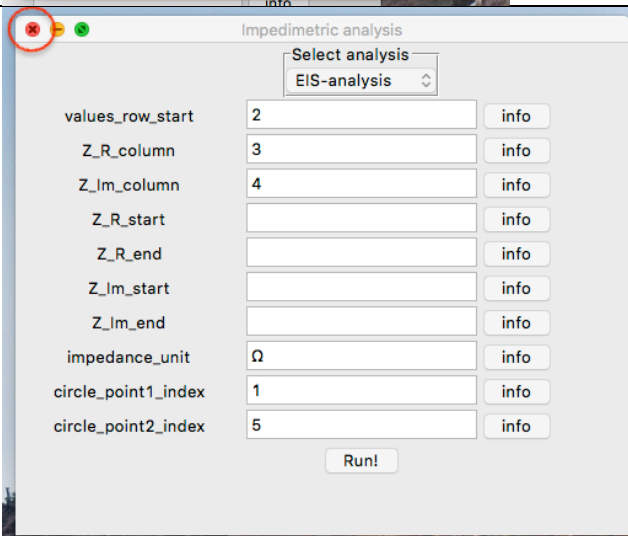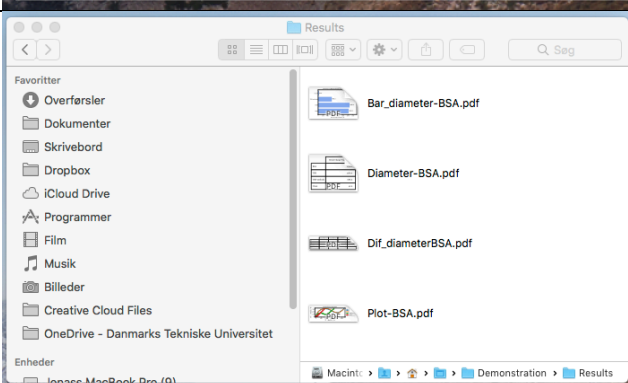
How to run "impedimetric_analysis.py"		
Step no.	**What to do**	**Image**
1	• Open Github and access "Impedimetric_analysis" repository • Click "Code" and select "Download ZIP"	
2	• Unzip the "ZIP" file and open "impedimetric_analysis.py" e.g. via Spyder	
3	• Run the code	

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[1] https://www.anaconda.com
[2] https://docs.anaconda.com/anaconda/user-guide/tasks/install-packages/

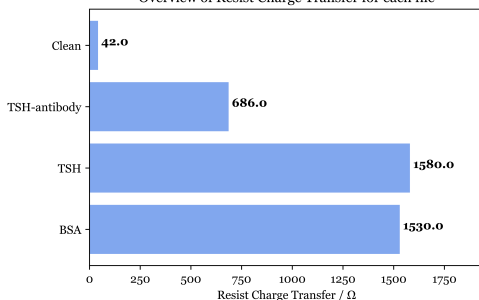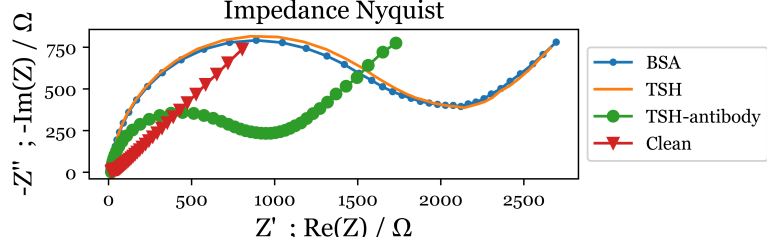|		
4	• A pop-up appears • Select the analysis method to use NOTE: For this tutorial, EIS-analysis is selected, but the procedure is the same for the other techniques.	
5	• Change the settings if relevant • Once all settings are set, click "Run!"	
6	• A pop-up appears • Select all the excel/csv files to be analyzed by this technique Note, if EIS-analysis is chosen, choose EIS-measurement files only.	
7	• When the files are selected, click "Open"	

8	• Pop-up text "Done" appears • Click "OK"	
9	• Pop-up text "Choose saving folder" appears • Click "OK"	
10	• Pop-up appears • Select the folder for which the output plots shall be saved • Once selected, click "Choose"	
11	• Pop-up text "Done" appears • Click "OK"	
12	• You can now close the initial pop-up by clicking the red cross in the upper left	
13	• The plots can be found in your selected folder	

Comments on the different plots obtained from EIS-analysis

A total of four different plots are obtained in a successful EIS analysis.
See an example below.

Plot	Comment
Overview of Resist Charge Transfer for each file — bar chart showing Clean: 42.0, TSH-antibody: 686.0, TSH: 1580.0, BSA: 1530.0 (Resist Charge Transfer / Ω)	A bar chart of the estimated semicircle diameter for each of the selected files.

	Resist Charge Transfer / Ω
BSA	1530.0
TSH	1580.0
TSH-antibody	686.0
Clean	42.0

A table of the estimated semicircle diameter for each of the selected files.

	BSA Resist Charge Transfer: 1530.0 Ω	TSH Resist Charge Transfer: 1580.0 Ω	TSH-antibody Resist Charge Transfer: 686.0 Ω	Clean Resist Charge Transfer: 42.0 Ω
BSA Resist Charge Transfer: 1530.0 Ω	0.0	50.0	-844.0	-1488.0
TSH Resist Charge Transfer: 1580.0 Ω	-50.0	0.0	-894.0	-1538.0
TSH-antibody Resist Charge Transfer: 686.0 Ω	844.0	894.0	0.0	-644.0
Clean Resist Charge Transfer: 42.0 Ω	1488.0	1538.0	644.0	0.0

A table that compares the semicircle diameter for all the files and show the differences.

Impedance Nyquist plot of -Z" ; -Im(Z) / Ω versus Z' ; Re(Z) / Ω, with legend BSA, TSH, TSH-antibody, Clean.

A plot of all the selected files.