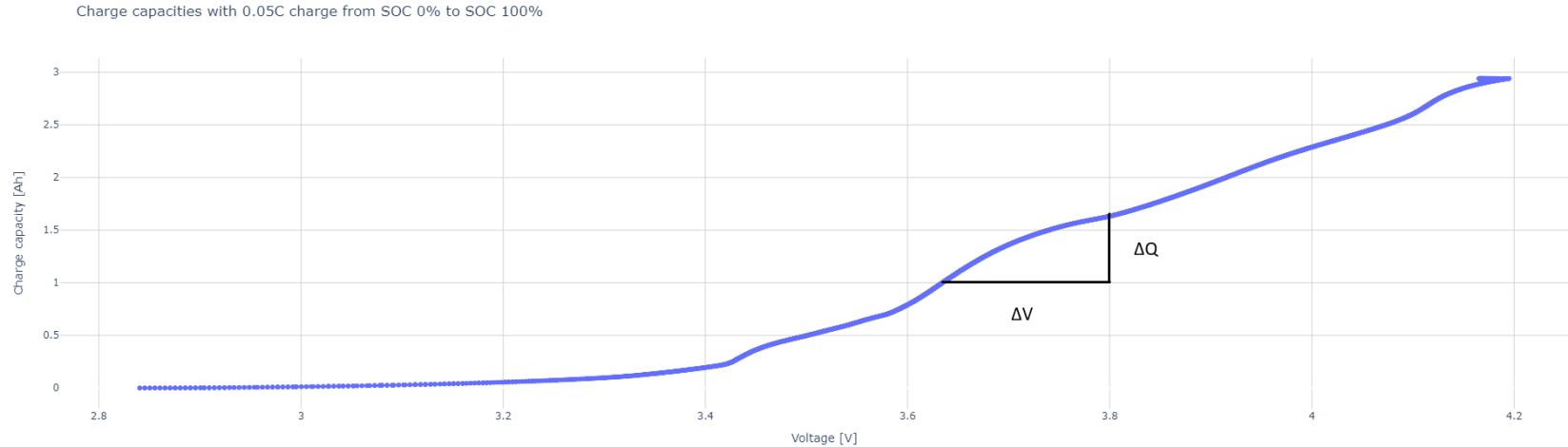# Incremental Capacity Analysis - VITO

Principle

The Incremental Capacity Analysis (ICA) and differential voltage analysis (DVA) are based on the differentiation of the battery capacity and the battery voltage for a (dis)charge of the cell/battery.

Charge capacities with 0.05C charge from SOC 0% to SOC 100%

Why is it useful ?

This technique is widely used to characterize electrochemical properties related to the intercalation processes. It also has been widely used the last years to follow cell degradation by tracking the cell aging behaviour. An important advantage of this analysis is that it's non-destructive and it may require very few electrical cycling tests.

Investigation time-scale : The analysis itself is a matter of minutes (depending on the number of files)

Maturity level : Mature

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How it works

The charging and discharging curves are used as input to an algorithm which derives them to ICA/DVA curves. Depending on the objective of the analysis several cycling inputs might be required.

What kind of sample ? This method can be applied on any type and size of battery cell.

What can be seen

An example of a dQ/dV plot is shown below (with and without filtering). The peaks that are marked on the graph represent a phase transition in the cell occurring in one of the electrodes. During the ageing process of the cell, the amplitude and position of these peaks may vary. These relative changes can give us insight in the various degradation modes of the cell and if a safety failure is to be expected.

dQ/dV plot with 0.05C