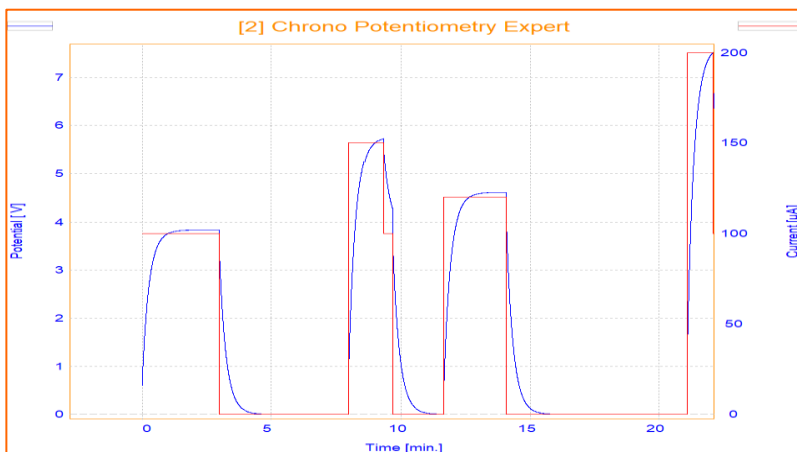## General Electrochemistry
AP-GE07

Chrono Potentiometry Expert

This Application Note describes how the Chrono Potentiometry Expert method works by giving an example with a "r + R//C" cell:

- r = 5.6 KΩ
- R = 33 KΩ
- C = 470 µF

Introduction

Chrono Potentiometry Expert is a very useful and easy method in OrigaMaster 5 software. In single chrono potentiometry, a single current step is imposed. The potential is recorded while the WORK current is maintained at a constant value. Information about the properties of different samples like different kind of capacitors can be obtained then.

In Chrono Potentiometry Expert, there are more than one steps (maximum 8 steps) which can be defined with different parameters (Figure 1). In each steps the positive or negative current can be imposed in different durations. All the defined steps can be repeated through definition of numbers of cycles as many time as user wants.

Figure 1: Chrono Potentiometry Expert

Parameters

The Parameters of the Chrono Potentiometry Expert is shown in figure 2.

Figure 2: The parameters

By clicking on Current Steps, the «current steps» window will be opened, and different steps of currents can be defined in this window (figure 3). It can be performed as single chrono if only one step be chosen.

Figure 3: In « Current Steps » window, different steps of current can be defined

By the following parameters, the 8 steps (levels) of chrono potentiometry is defined:

- In Level 1, the imposed current is 100 µA in **3 minutes**.
- In Level 2, the imposed current is 0 in **5 minutes**.
- In Level 3, the imposed current is 150 µA in **80 seconds**.
- In Level 4, the imposed current is 100 µA in **20 seconds**.
- In Level 5, the imposed current is 0 in **2 minutes**.
- In Level 6, the imposed current is 120 µA in **145 seconds**.
- In Level 7, the imposed current is 0 in **7 minutes**.
- In Level 8, the imposed current is 200 µA in **1 minutes**.

NOTE: Duration of imposed current can be defined as **milli second** too, but it must be payed attention that the **Meas. Period** must be less than the duration, for example 0,0005 second is appropriate.

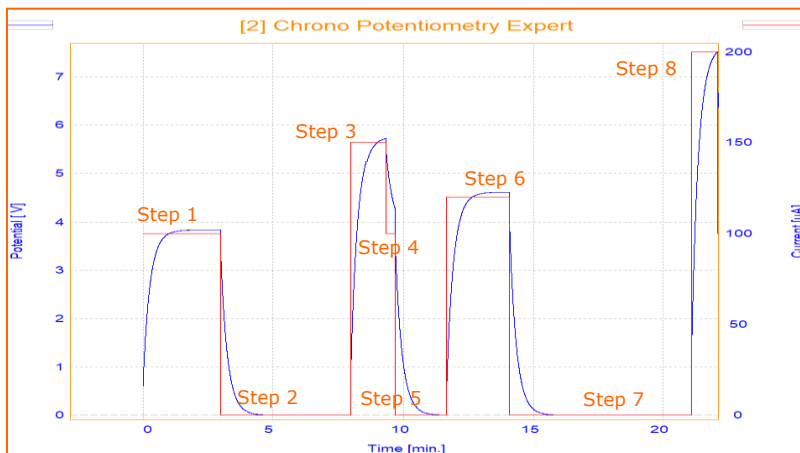Figure 4 shows the result of the test. 8 steps Chrono Potentiometry are achieved.

Figure 4: 8 steps Chrono Potentiometry

All the steps can also be repeated by defining the cycle number. Figure 5 shows another Chrono Potentiometry Expert's curve which is repeated in 5 cycles.
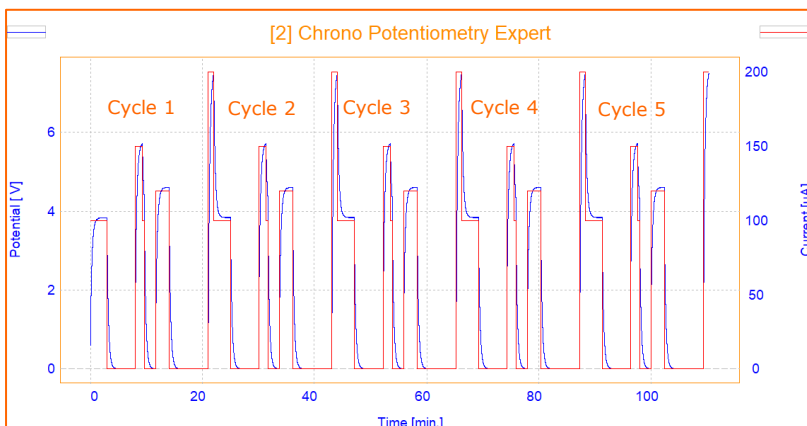

Figure 5: 5 cycles of Chrono Potentiometry done by Chrono Expert Method

> **NOTE:** If the user wants to run this test on battery sample, it is very important to define the potential limits in "Start" box.
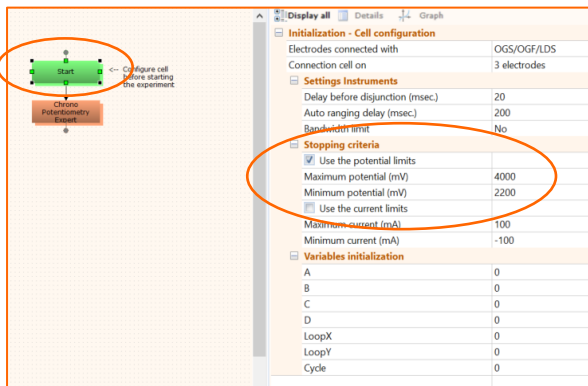> For more information, please read the application note of "Expert Charge Discharge".

Figure 6: Defining the potential limit in Start menu
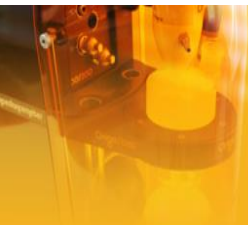
Instrument and Electrodes

Figure 7: OrigaFlex OGF500

Electrode setup

Sample	Capacitor (35 V, 470 µF) Two resistors: 5.6 KΩ and 33 KΩ
Instrument	OrigaFlex OGF500
Software	OrigaMaster

Figure 8: Sample