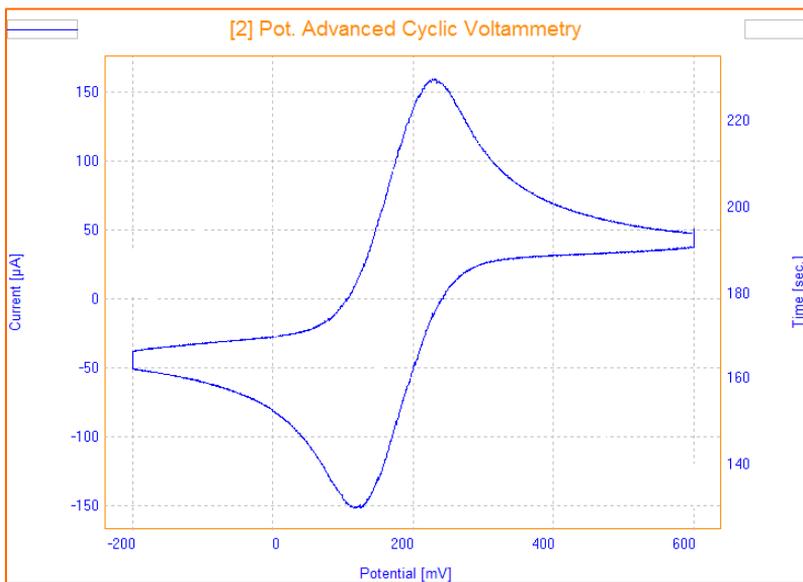


General Electrochemistry AP-GE02



Pot. Advanced Cyclic Voltammetry



This Application Note describes how the Pot. Advanced CV method works by giving an example with Ferri/Ferrate solution.



Introduction

Cyclic voltammetry (CV) is one of the most applicable electrochemical method specially for qualification analysis. In this method the potential scans through working electrode linearly versus time in cyclical phases. The rate of voltage which changes over time during each of these phases, is known as the experiment's scan rate (V/s or mV/s). For some applications, simple CV is not enough, and it is necessary to apply potential to working electrode in other form to gain more information about what happen in electrochemical cell.

In this application note a different type of performing potential scan through CV method is being discussed. This is not only a CV method but also have the ability to hold potential in each potential vertex in unlimited time duration.

Pot. Advanced Cyclic Voltammetry is an OrigaMaster 5 method accessible from the Chemistry items - Voltammetry group of the Sequence Ribbon.

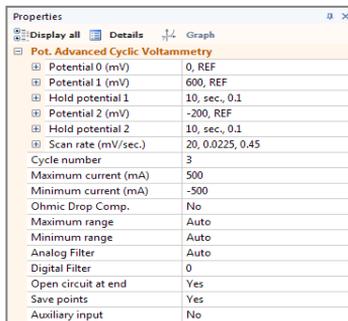
Parameters

The Parameter of the Pot. Advanced CV is shown in figure 1.

With the above default settings, the initial potential of the working electrode is set to 0 mV versus REF electrode, then scanned at 20 mV/s (scan rate) up to +600 mV versus REF (Potential 1, upper vertex). It is defined to hold potential for 10 second here. Current measurement auto ranging is performed then the potential scan will be continued up to -200 mV/s, the potential will be hold again for 10 second as defined in the method.

It is possible to hold potential for both Upper vertex (Potential 1) and lower vertex (Potential 2). Figure 2 shows that the potential is hold for 10 seconds in the +600 and -200 mV.

Thanks to flexibility of Origamaster5 software, all these parameters can be edited according to user's need. For example, the potentials can be set versus OCP, the duration of hold potential can be more or less.



Properties	
Pot. Advanced Cyclic Voltammetry	
Potential 0 (mV)	0, REF
Potential 1 (mV)	600, REF
Hold potential 1	10, sec., 0.1
Potential 2 (mV)	-200, REF
Hold potential 2	10, sec., 0.1
Scan rate (mV/sec.)	20, 0.0225, 0.45
Cycle number	3
Maximum current (mA)	500
Minimum current (mA)	-500
Ohmic Drop Comp.	No
Maximum range	Auto
Minimum range	Auto
Analog Filter	Auto
Digital Filter	0
Open circuit at end	Yes
Save points	Yes
Auxiliary input	No

Figure 1: Parameters

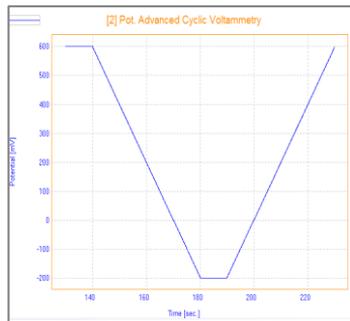


Figure 2: Curve Time vs Potential



Results

Figure 3 shows the voltammogram of this test for Fe solution. As it can be seen in the graph, in the upper vertex and lower vertex, the potential is held for 10 second (time axes).

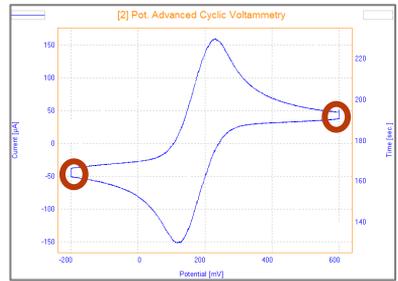


Figure 3: Final result

Instrument and Electrodes



Figure 4: OrigaFlex OGF500



Figure 5: Electrochemical cell

Electrode setup

Reference Electrode (REF)	Calomel Type: OGR003
Counter Electrode (AUX)	Platinum wire Ø1mm Type: OGV005
Working Electrode (WRK)	Platinum Ø5mm Type: EMEDTPTD5
Electrolyte	Ferri/Ferrate solution 5 x 10 ⁻³ M in KCl
Instrument	OrigaFlex OGF500
Software	OrigaMaster

REF 
Calomel

AUX 
Platinum wire Ø1 mm

WRK 
Platinum Ø5 mm

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