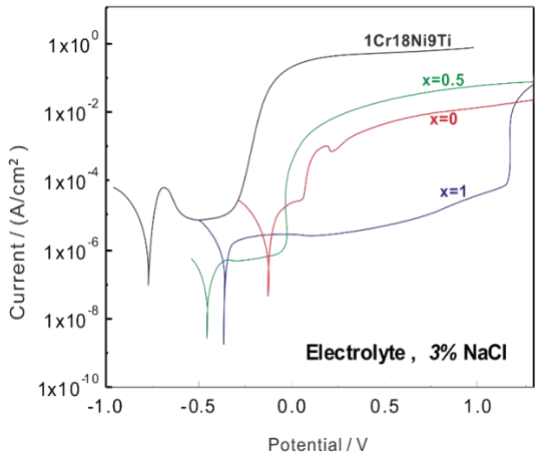
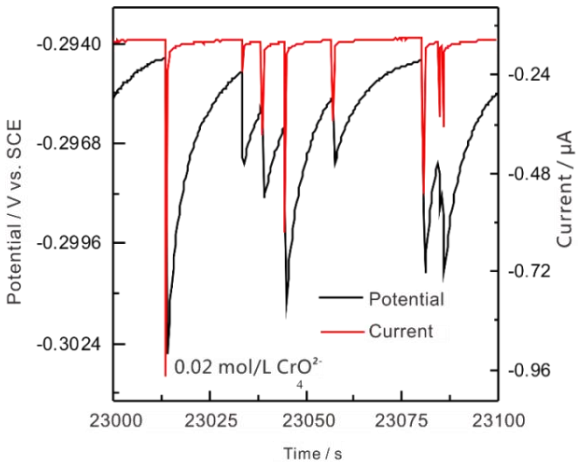
Corrtest potentiostat /galvanostat / electrochemical workstation consists of DDS arbitrary function generator, high power potentiostat/galvanostat, dual-channel correlation analyzer, dual-channel high-speed 16bit/high-precision 24bit AD converter and extension interfaces. It has more than 40 electrochemical methods including built-in EIS (frequency range 10μHz~1MHz). Max. current is ±2A, potential range is ±10V. It can be used for various electrochemical fields such as corrosion, energy, material and electroanalysis. The current can be boosted up to 20A with a current booster, and compliance voltage can be expanded up to 30V, which can meet the needs of power batteries electrolysis and electrodeposition field.

Application

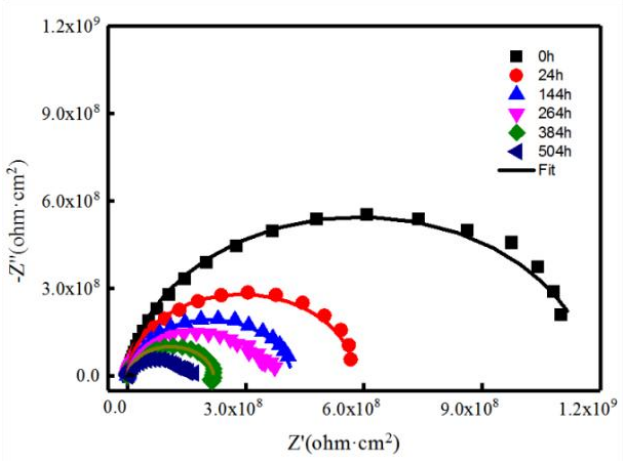
Corrosion: Corrtest potentiostat includes all the electrochemical techniques for corrosion measurement such as OCP, polarization curve (potentiodynamic), EIS, Cyclic polarization CPP (passivation curve), Electrochemical Potentiokinetic Reactivation (EPR), Hydrogen diffusion test, ZRA, Electrochemical noise, etc. It can be used to study metal corrosion mechanism and corrosion resistance, and evaluate the coating durability and sacrificial anode current efficiency. It can also be used for rapid screening of corrosion inhibitors, fungicides, etc.



Polarization curves of Ti-alloy& stainless steel in 3%NaCl solution



EN of low-carbon steel in 0.05mol/LCl+0.1mol/LNaHCO3

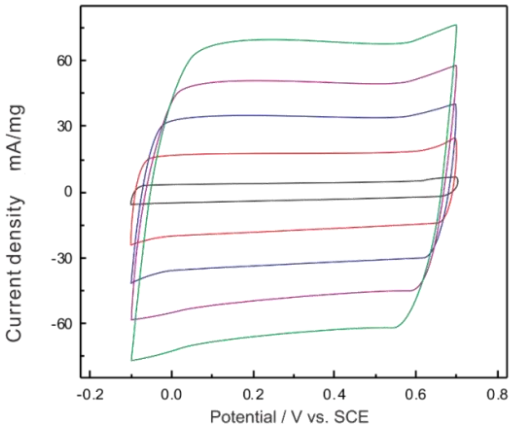


It uses correlation integral algorithm and dual-channel over-sampling technique, and has strong anti-interference ability. The internal resistance of the instrument is up to 1013Ω. It's suitable for EIS measurements of high-impedance system (such as coating, concrete etc.)

Salt spray aging test of high impedance coating

Energy

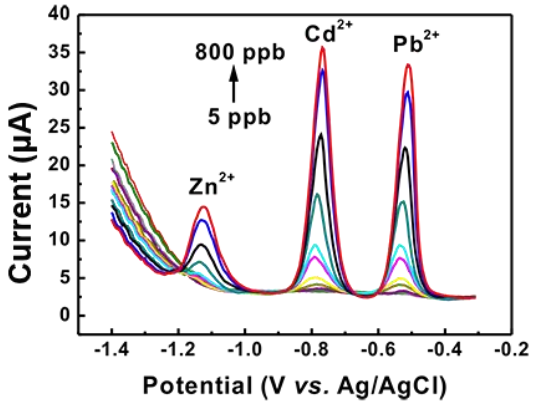
With techniques LSV, CV, galvanostatic charge and discharge (GCD), Constant potential/ current EIS, and precise IR compensation circuit, Corrtest potentiostats are widely used in supercapacitor, Li-ion batteries, sodium-ion batteries, fuel cell, Li-S batteries, solar cell, solid-state batteries, flow batteries, metal-air batteries etc. It is an excellent scientific tool for researchers in the fields of energy and materials.



CV curve of PPy supercapacitor in 0.5 mol/L H2SO4 solution

Electroanalysis

Corrtest potentiostat includes all the voltammetric methods such as NPV, DNPV, SWV, ACV, and can be used for fast analysis of the trace elements in the solution. Voltammetry stripping methods can do the Quantitative analysis according to the stripping peak current.



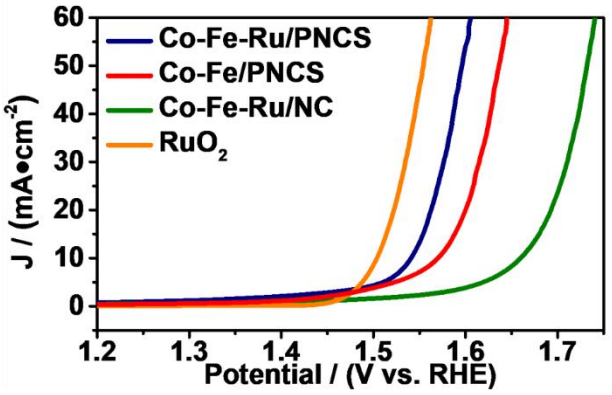
Stripping voltametric curves in solution of different Pb2+, Cd 2+,Zn2+ concentration

Electrocatalysis

- Corrtest potentiostat can measure the half-wave potential (ORR), overpotential (HER, OER) of the catalyst, and has the function of peak power density and energy density calculation.

- Long-term cyclic measurement for ORR, OER, HER, CO2RR by techniques such as cyclic voltammetry, potentiostatic, galvanostatic. Faraday efficiency can be measured with a bipotentiostat.

- Maximum current can be 20A and compliance voltage can be 30V, and with IR compensation technique, Corrtest potentiostat can precisely measure the overpotential of the electrode, which is a big advantage in electrocatalysis field.



LSV curve of catalysts in alkaline solution

Sensors

Corrtest potentiostat can be used in the field of biosensors and chemical sensors, and many others.
Besides benchtop type, you can also consider our handheld potentiostat model CS100 (maximum current output ±45mA, potential range ±10V) for sensors study. With the size of a mobile phone, it can be carried easily for lab and on-site use. Potential resolution is 3μV, and current resolution can be 1pA.

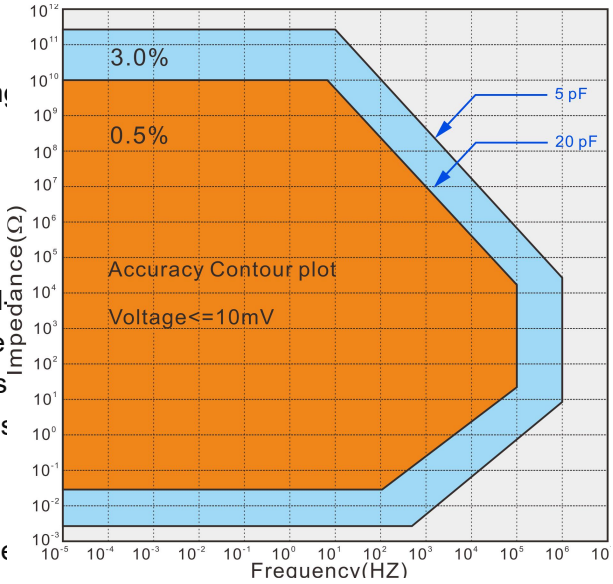
Advantages

Full floating

All Corrtest potentiostats / galvanostats are designed as full-floatin electrochemical study of working electrode connecting to earth, such as autoclave, metal part in bridge, concrete

EIS

- Corrtest potentiostat uses correlation integral algorithm and dual channel over-sampling technique, and has strong anti-interference ability. The internal resistance of the instrument is up to 1013Ω. It's suitable for EIS measurements of high-impedance system (such as coating, concrete etc.)
- With constant current carrier and DC bias technology, Corrtest potentiostat can be used for battery impedance measurement unde charge and discharge state, suitable for ultra-low resistance system (such as 18650 battery, soft pack battery, battery core...)



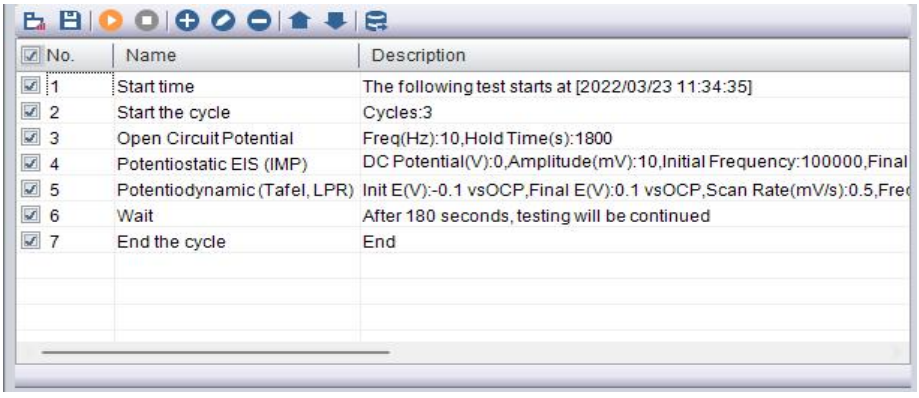
EIS Accuracy

Multi electrode system

- Support 2-, 3-, 4-electrode system, can be used to test battery internal resistance or 4-electrode thin film impedance measurement
- With Zero resistance ammeter for galvanic current measurement

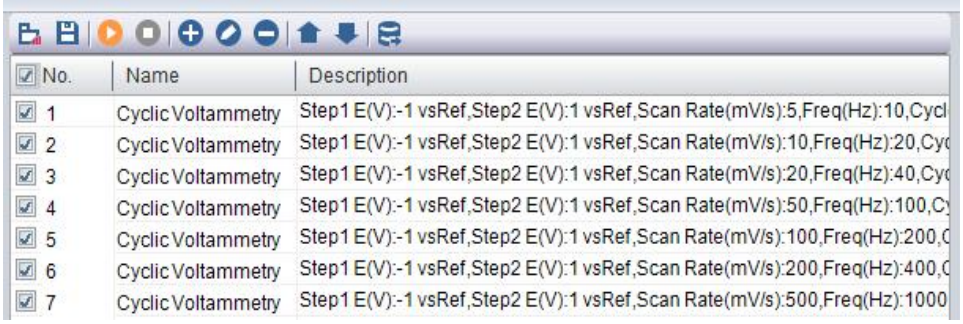
Combination test

CS studio software supports the combination test for various experiments to achieve flexible and unattended test. You can set the parameters for each experiment in advance, and set the intervals, wait time etc between each experiment.



No.	Name	Description
1	Start time	The following test starts at [2022/03/23 11:34:35]
2	Start the cycle	Cycles:3
3	Open Circuit Potential	Freq(Hz):10,Hold Time(s):1800
4	Potentiostatic EIS (IMP)	DC Potential(V):0,Amplitude(mV):10,Initial Frequency:100000,Final
5	Potentiodynamic (Tafel, LPR)	Init E(V):-0.1 vsOCP,Final E(V):0.1 vsOCP,Scan Rate(mV/s):0.5,Fre
6	Wait	After 180 seconds, testing will be continued
7	End the cycle	End

Combination Test: corrosion tests



No.	Name	Description
1	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):5,Freq(Hz):10,Cycl
2	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):10,Freq(Hz):20,Cyc
3	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):20,Freq(Hz):40,Cyc
4	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):50,Freq(Hz):100,Cy
5	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):100,Freq(Hz):200,C
6	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):200,Freq(Hz):400,C
7	Cyclic Voltammetry	Step1 E(V):-1 vsRef,Step2 E(V):1 vsRef,Scan Rate(mV/s):500,Freq(Hz):1000

Combination Test: Pseudo capacitor tests

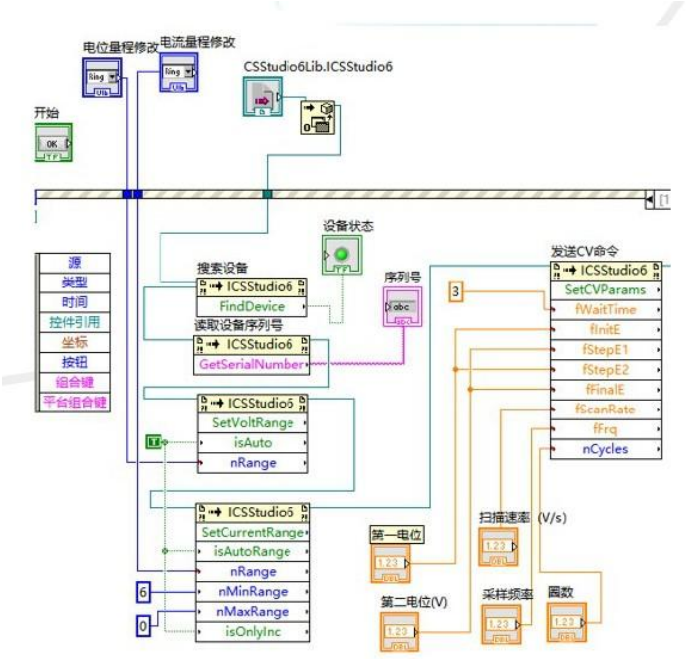
High current option

●With the booster, the current can be boosted to20A, which meets the requirement in fuel cell, power battery, electroplating, etc

●Can customize the instrument to be 30V high compliance voltage, which meets the test requirement in low-conductivity solutions (organic system, concrete system etc), especially suitable for carbon and nitrogen reduction study.

Software development kit(SDK)

We can provide secondary development interfaces, API general interfaces and development examples, and can realize data call for Labview, C, C++, C#, VC and other program, which is convenient for secondary development and test methods customization.



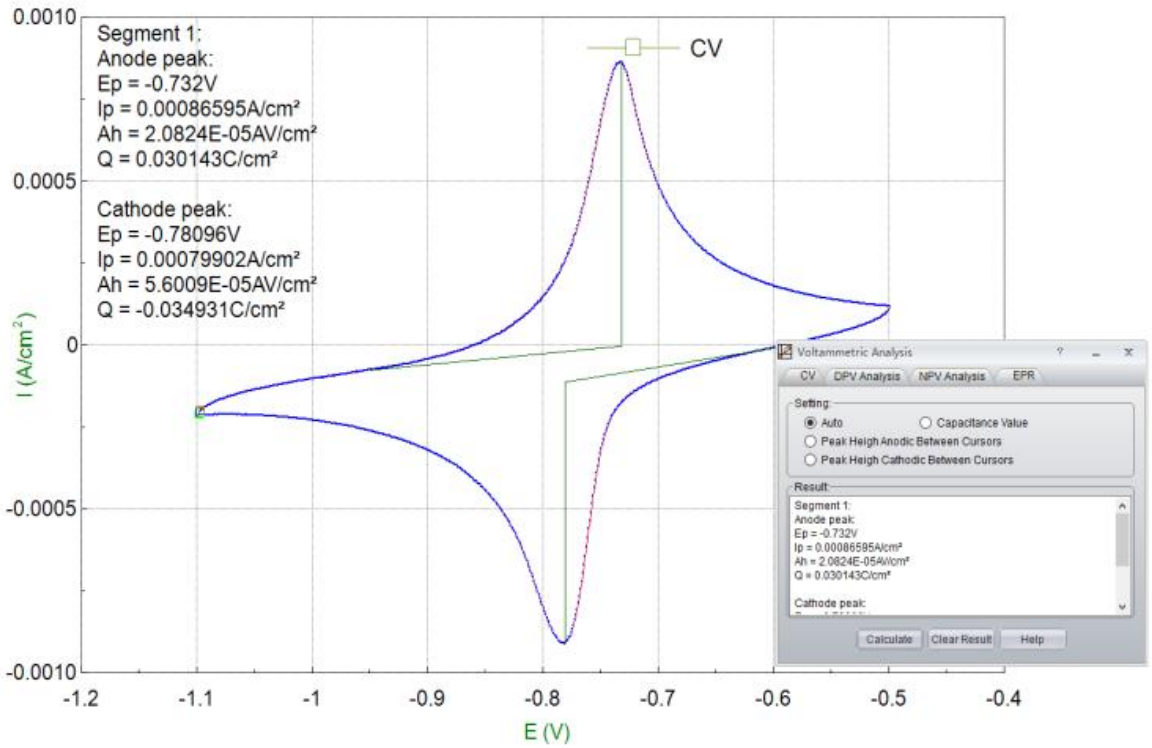
Real-time data storage

Experiment data can be stored in real time. Even if the test is interrupted by a power failure, the data will be automatically saved. The data is compatible with Excel, Origin, and can be directly opened in third-party software for data processing and curve drawing.

Versatile data analysis

CS Studio is the software for Corrtest potentiostat for experiment control and data analysis. It can do: multi-parameter Tafel curve fitting, derivation, integration and peak height analysis of voltammetric curve, EIS equivalent circuit customization and impedance spectrum fitting, etc.

- Multi-parameters Polarization curve
- EIS fitting
- Electrochemical noise analysis
- Pseudo capacitance calculation
- GCD specific capacitance, efficiency
- Mott-Schottky plot analysis
- CV analysis



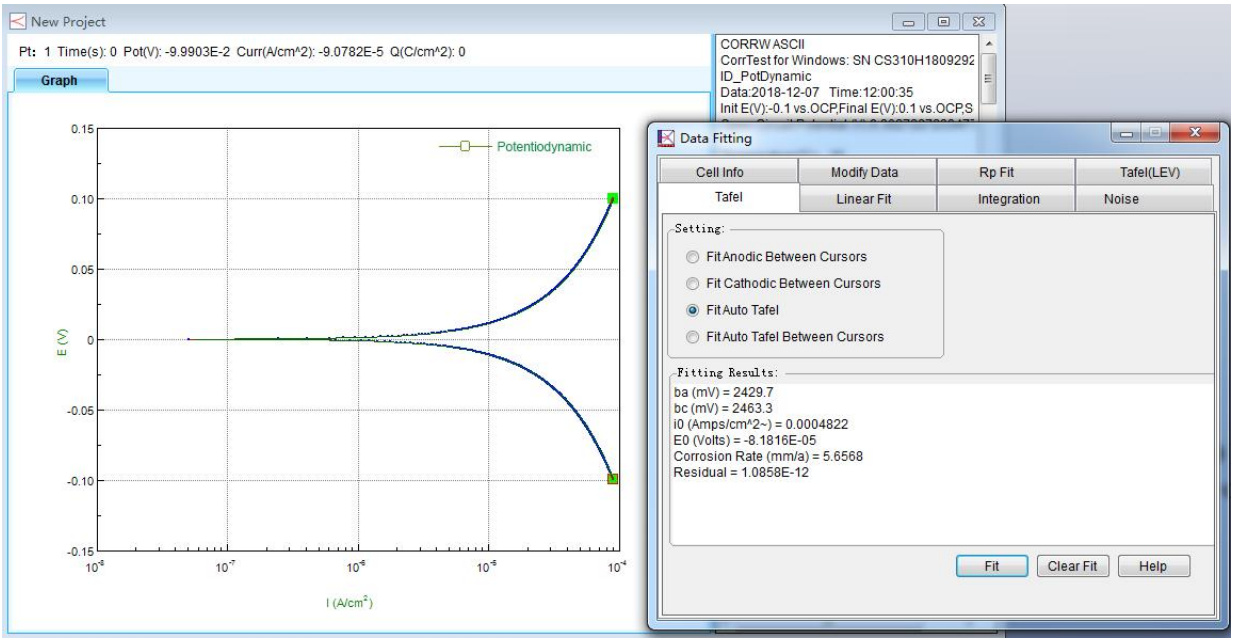
Software Features

Cyclic voltammetry:

CS studio software provides users a versatile smoothing/differential/ integration kit, which can complete the calculation of peak height, peak area and peak potential of CV curves. In CV technique, during the data analysis, there is function of selecting exact cycle(s) to show. You can choose to see a cycle or some cycles as you want. You can also export data or vector graph of an exact cycle or several cycles.

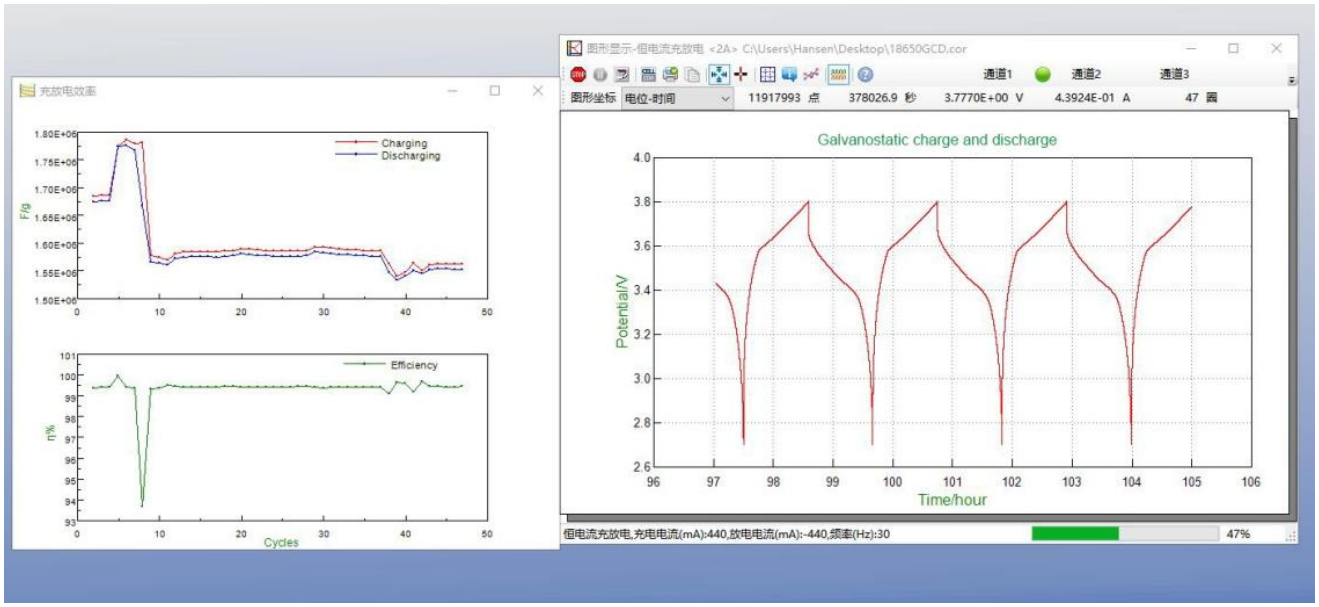
Tafel plot and corrosion rate:

CS studio also provides powerful non-linear fitting on Butler-Volmer equation of polarization curve. It can calculate Tafel slope, corrosion current density, limitation current, polarization resistance, corrosion rate. It can also calculate the power spectrum density, noise resistance and noise spectrum resistance based on the EN measurements.



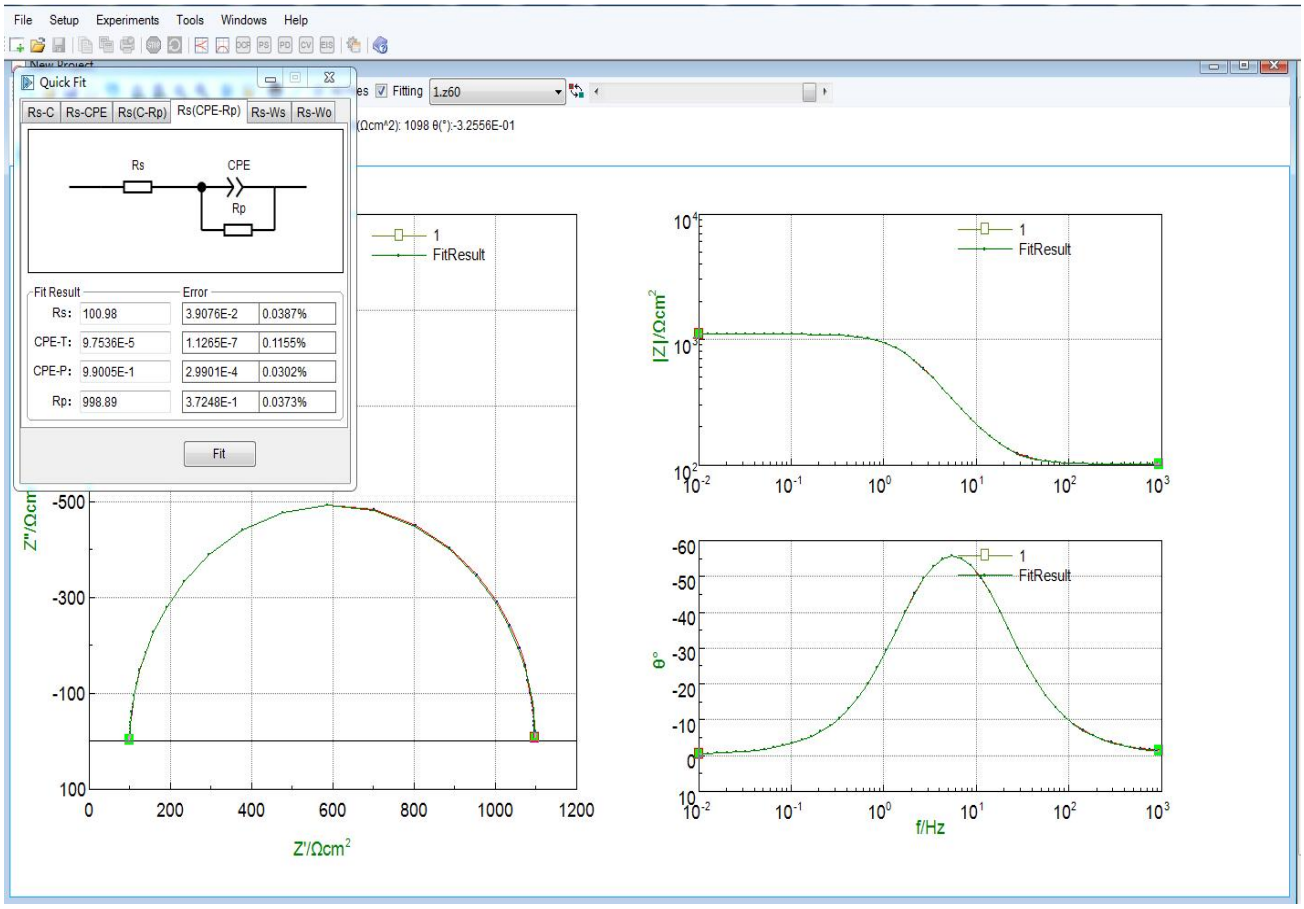
Battery Test and analysis:

charge & discharge efficiency, capacity, specific capacitance, charge & discharge energy.



EIS analysis: Bode, Nyquist, Mott-Schottky plot

During EIS data analysis, there is built-in fitting function to draw the custom equivalent circuit.



Specifications

Specifications	
Support 2-, 3- or 4-electrode system	Potential and current range: Automatic
Potential control range: ±10V	Current control range: ±2A
Potential control accuracy: 0.1%×full range±1mV	Current control accuracy: 0.1%×full range
Potential resolution: 10μV (>100Hz),3μV (<10Hz)	Current sensitivity:1pA
Rise time: <1μS (<10mA), <10μS (<2A)	Reference electrode input impedance:10^{12}Ω||20pF
Current range: 2nA~2A, 10 ranges	Compliance voltage: ±21V
Maximum current output: 2A	CV and LSV scan rate: 0.001mV~10,000V/s
CA and CC pulse width: 0.0001~65,000s	Current increment during scan: 1mA@1A/ms
Potential increment during scan: 0.076mV@1V/ms	SWV frequency: 0.001~100 kHz
DPV and NPV pulse width: 0.0001~1000s	AD data acquisition:16bit@1 MHz,20bit@1 kHz
DA Resolution:16bit, setup time:1μs	Minimum potential increment in CV: 0.075mV
IMP frequency: 10μHz~1MHz	Low-pass filters: covering 8-decade
Operating System: Windows 2000/NT/XP/ 7/8/10	Interface: USB 2.0
Weight / Measurements: 6.5kg, 36.5 x 30.5 x16 cm	
EIS (Electrochemical Impedance Spectroscopy)	
Signal generator	
Frequency range:10μHz~1MHz	AC amplitude:1mV~2500mV
DC Bias: -10~+10V	Output impedance: 50Ω
Waveform: sine wave, triangular wave and square wave	Wave distortion: <1%
Scanning mode: logarithmic/linear, increase/decrease	
Signal analyzer	
Integral time: minimum:10ms or the longest time of a cycle	Maximum:10^6 cycles or 10^5s
Measurement delay: 0~10^5s	
DC offset compensation	
Potential automatic compensation range: -10V~+10V	Current compensation range: -1A~+1A
Bandwidth: 8-decade frequency range, automatic and manual setting	

Techniques

Guidance:

Hardware specs and appearance are the same for various models, difference is in software part.

Model CS350M (with built-in EIS) is the most comprehensive model, includes all methods incl. EIS. It's suitable for various applications, and also for **teaching**

Model CS310M (with built-in EIS) also includes EIS module. But it has less voltammetry methods compared with CS350M. CS310M is a cost-effective model if you need EIS. It's an ideal model for corrosion, battery studies etc.

Model CS150M (Without EIS) is the basic model incl. basic methods such as CV, LSV, charge and discharge, Tafel plot, etc

Techniques		CS150M	CS300M	CS310M	CS350M
Stable polarization	Open Circuit Potential (OCP)	√	√	√	√
	Potentiostatic (i-t curve)	√	√	√	√
	Galvanostatic	√	√	√	√
	Potentiodynamic(Tafel plot)	√	√	√	√
	Galvanodynamic	√	√	√	√
Transient polarization	Multi-Potential Steps	√	√	√	√
	Multi-Current Steps	√	√	√	√
	Potential Stair-Step (VSTEP)	√	√	√	√
	Galvanic Stair-Step (ISTEP)	√	√	√	√
Chrono methods	Chronopotentiometry (CP)	√	√	√	√
	Chronoamperometry (CA)	√	√	√	√
	Chronocoulometry (CC)	√	√	√	√
Voltammetry	Cyclic Voltammetry (CV)	√	√	√	√
	Linear Sweep Voltammetry (LSV)(i-v)	√	√	√	√
	Staircase Voltammetry (SCV) #		√		√
	Square wave voltammetry (SWV) #		√		√
	Differential Pulse Voltammetry (DPV)#		√		√
	Normal Pulse Voltammetry (NPV)#		√		√
	Differential Normal Pulse Voltammetry (DNPV)#		√		√
	AC voltammetry (ACV) #		√		√
	2nd Harmonic A.C.Voltammetry (SHACV)		√		√
Amperometry	Differential Pulse Amperometry (DPA)		√		√
	Double Differential Pulse Amperometry (DDPA)		√		√
	Triple Pulse Amperometry (TPA)		√		√
	Integrated Pulse Amperometric Detection (IPAD)		√		√
EIS	EIS vs Frequency (IMP)			√	√
	Galvanostatic EIS			√	√
	EIS vs Potential (IMPE) (Mott-Schottky)			√	√
	EIS vs Time (IMPT)			√	√
	Galvanostatic EIS vs Time			√	√
Corrosion test	Cyclic polarization curve (CPP)	√	√	√	√
	Linear polarization curve (LPR)	√	√	√	√
	Electrochemical Potentiokinetic Reactivation (EPR)	√	√	√	√
	Electrochemical Noise (EN)	√	√	√	√
	Zero resistance Ammeter (ZRA)	√	√	√	√
Battery test	Battery charge and discharge	√	√	√	√
	Galvanostatic charge and discharge (GCD)	√	√	√	√
	Potentiostatic Charging and Discharging(PCD)	√	√	√	√
	Potentiostatic Intermittent Titration Technique(PITT)	√	√	√	√
	Galvanostatic Intermittent Titration Technique(GITT)	√	√	√	√