



Electrochemical Property Analyzer

● ECT Series ● ERT Series



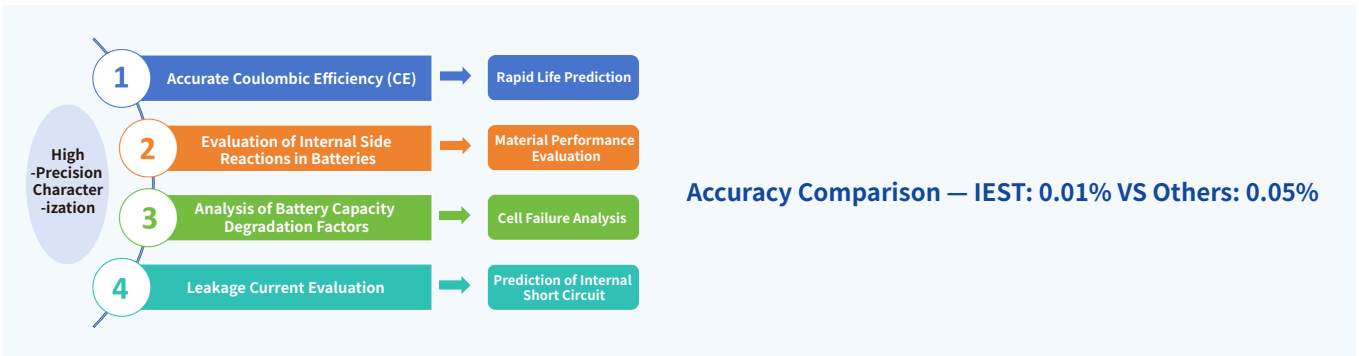
ANALYTICS BEYOND MEASURE

I . Project background

1.R&D and Industry:An electrochemical performance analyzer is a specialized device used for measuring, analyzing, and controlling electrochemical processes and reactions.

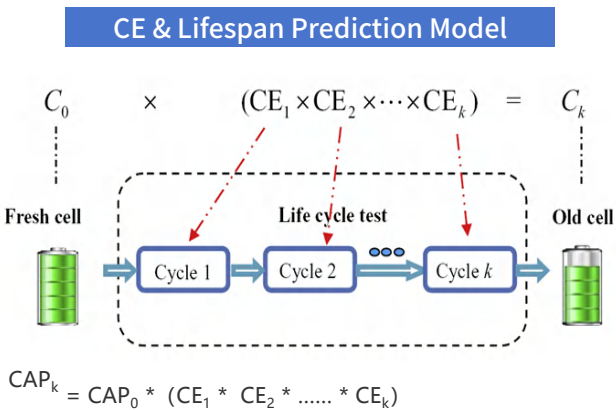
2.Tech & Industry Upgrade:Electrochemical analysis instruments are maturing, with integrated hardware, programmable software, and multifunctionality, leading to significant improvements in accuracy, resolution, and response time.

II . High-Precision Current & Voltage Characterization

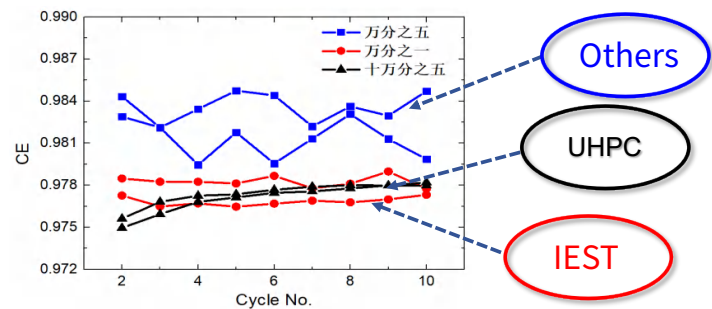


The 0.01% testing accuracy can precisely measure the specific capacity of new materials and detect subtle side reactions during the initial stages of battery cycling. This allows for a comprehensive performance evaluation and lifetime prediction of the battery in a short period.

Case1: Precise CE & Lifespan Prediction



CE Test Comparison of BTS with Varying Accuracy



For a 100Ah battery:
 With an average CE test accuracy of 99.95%, after 500 cycles, CAPk = 100*0.9995 500 = 77.88 Ah
 With an average CE test accuracy of 99.955%, after 500 cycles, CAPk = 100*0.99955 500 = 79.85 Ah
The difference is 1.97Ah, meaning the model accuracy differs by 1.97%!

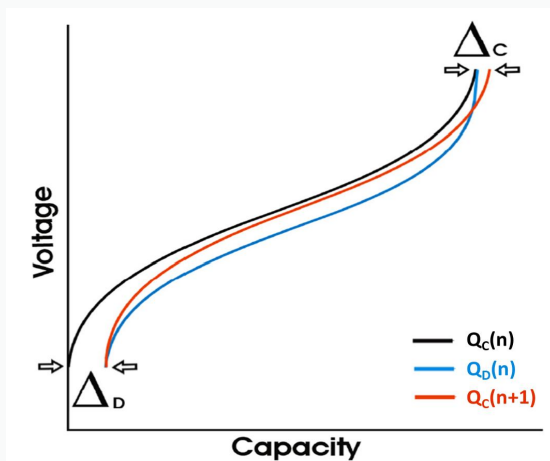
High-precision CE testing allows for early performance assessment, enabling rapid battery lifespan prediction!

Lifespan prediction requires accuracy within 0.1% and noise

Case2: Side Reaction & Material Evaluation

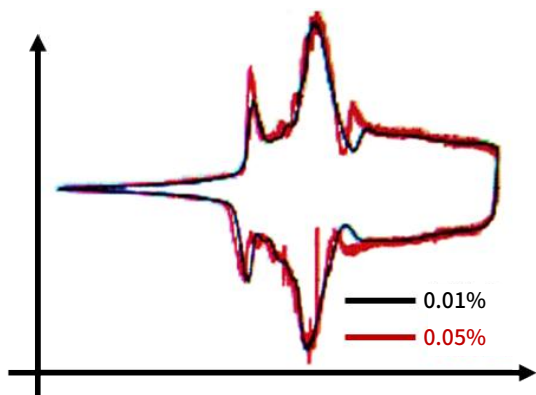
Charge Endpoint Slippage, $\Delta C = QC(n+1) - QD(n)$

Ch. End Cap.(%) = $QC(n) / QC(1) * 100\%$



ΔC or Ch. End Cap measurement requires high-precision charge-discharge equipment. Low accuracy will lead to inaccurate results.

Case3: Battery Capacity Decay Factor Analysis



dQ/dV-V Curve

Peak - Li⁺ Insertion/De-insertion

Peak Shape - Phase Transition

Peak ↑ - Polarization ↑

Peak ↓ - Battery Capacity ↓

High-precision testers ensure smooth curves and capture small phase change peaks!

Case4: Leakage Current

Charge to the target voltage, stabilize under constant voltage, and assess leakage current by the zero-current difference.

Test Plan:

1.Button Cell:

Electrodes: Ternary ($\phi 14\text{mm}$) vs. Lithium ($\phi 20\text{mm}$)

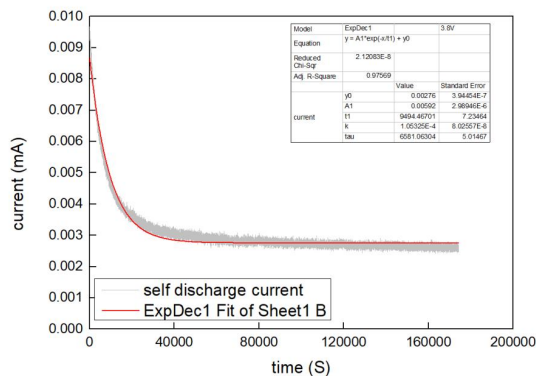
Capacity: 2mAh

Equipment: ECT6008-5V10mA

2.Test Process:

Constant current, constant voltage charging: 0.8mA,

3.8V, for 72 hours.

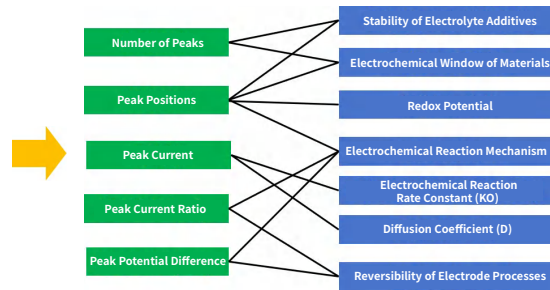
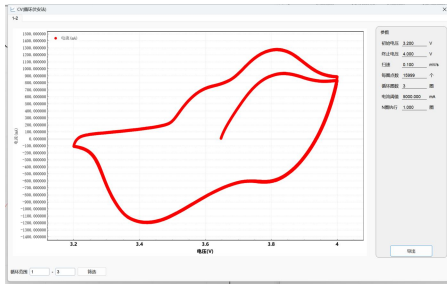


Test Result: $I_0 = 2.76\mu\text{A}$

High-precision testers ensure accurate leakage current measurement.

III. Cyclic Voltammetry (CV) Testing

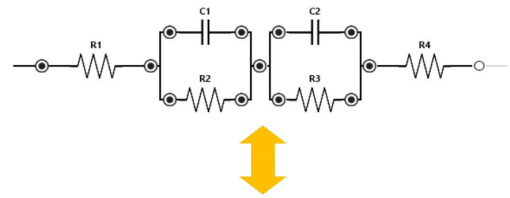
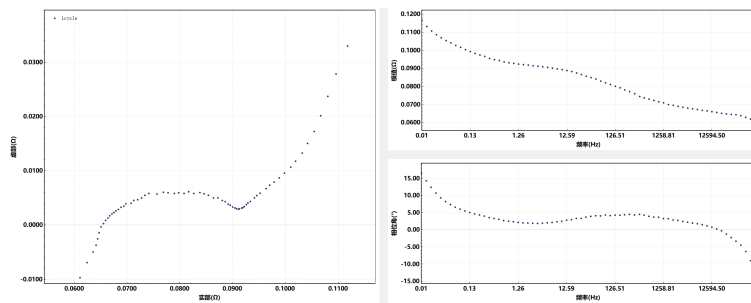
Cyclic Voltammetry (CV) reveals key details on reaction reversibility, peak potential, kinetics, active area, stability, mechanisms, and diffusion coefficients.



IEST Analyzer offers smart CV data analysis without third-party software.

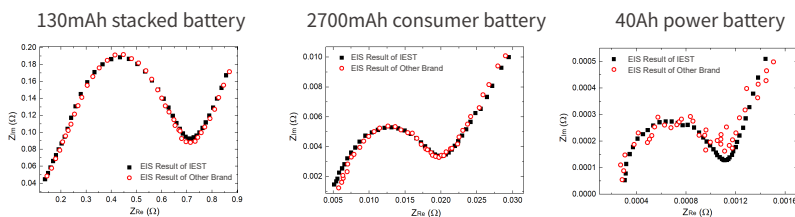
IV. EIS Test

Electrochemical impedance analysis reveals critical data on charge transfer resistance, electrolyte conductivity, diffusion impedance, interfacial properties, and material and surface layer stability.

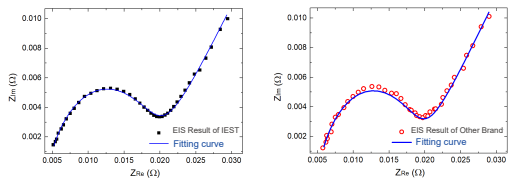


IEST Analyzer offers smart EIS data analysis without third-party software.

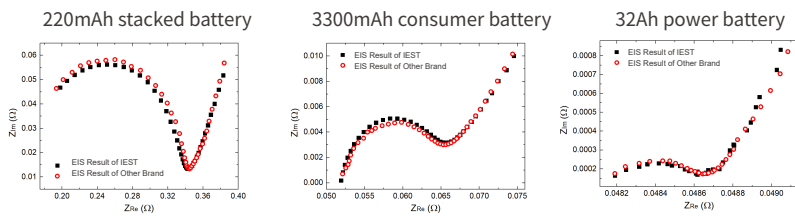
V. EIS comparison with other workstations



Equivalent circuit fitting (2700mAh cell)



Comparison with well-known foreign brand A electrochemical workstations



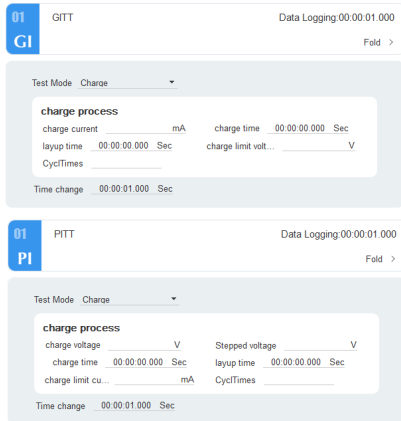
Comparison with well-known foreign brand B electrochemical workstations

| Fitting parameters | IEST | Others | COV(%) |
|--------------------|---------|---------|--------|
| Rs | 0.00444 | 0.00426 | 2.07 |
| Rct | 0.0152 | 0.0147 | 1.67 |
| CPE-T | 0.8725 | 0.8257 | 2.76 |
| CPE-P | 0.7446 | 0.7636 | 1.26 |
| Warburg Coff. | 88.27 | 88.55 | 0.15 |

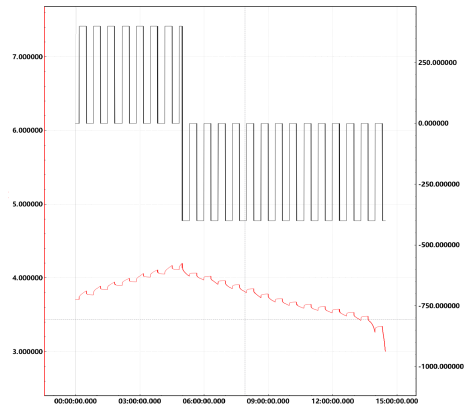
- EIS test results show COV within 2%, ensuring high reproducibility compared to other workstations.
- Better SNR in large cell testing than workstations without current amplifiers.

VI. GITT/PITT Test

GITT and PITT effectively measure the lithium ion diffusion coefficient (D).

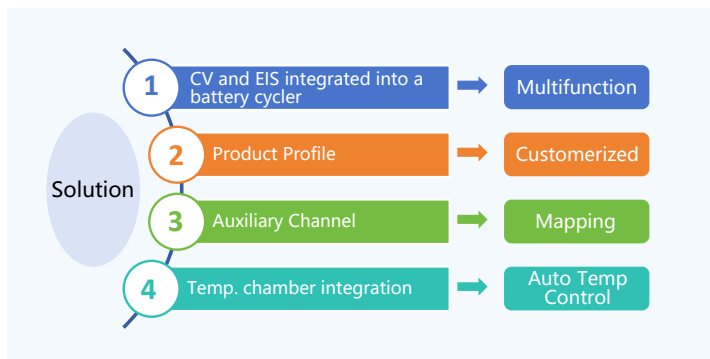


Modular schedule editor



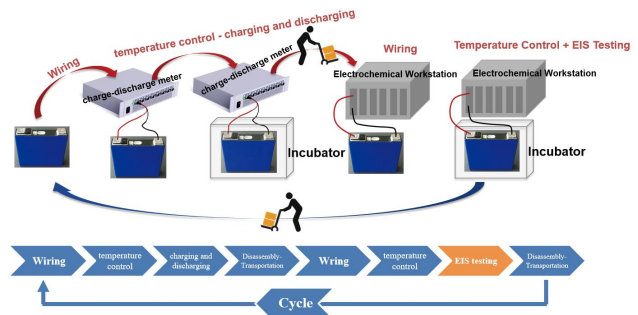
IEST analyzer enables intelligent analysis of GITT/PITT data without the need for third-party software support.

VII. Innovative solutions of IEST



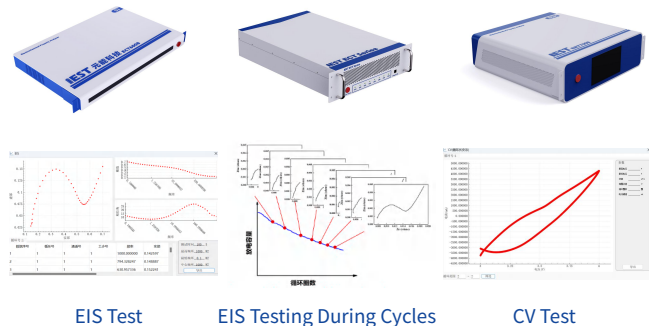
Traditional method

Cons: Time-consuming, labor-intensive



IEST solution

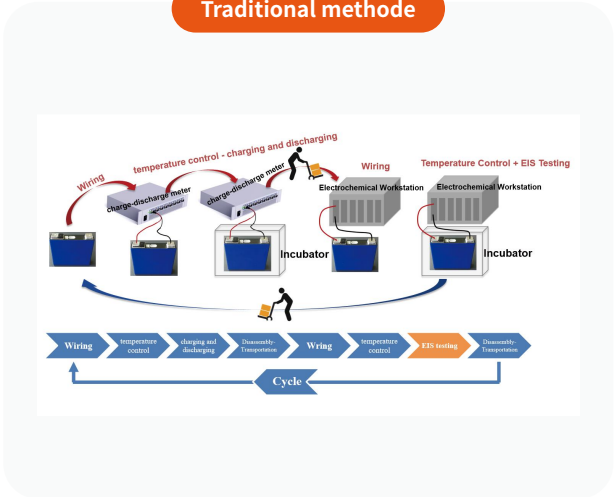
Pros: One-time setup, one-click operation



Reduces wiring, transfer, and temperature adjustment

Solution 2: Temperature box linkage

Traditional methode

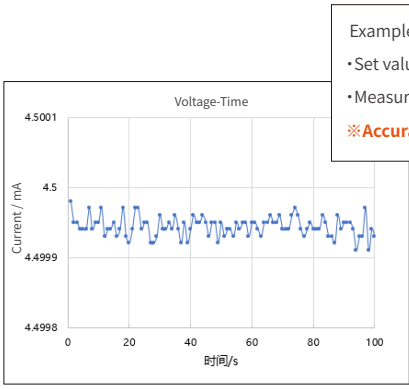


IEST solution

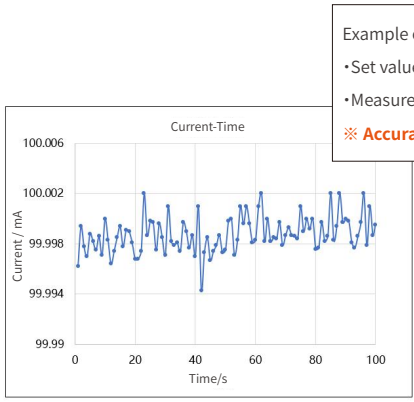


VIII.Product Profile

ECT & ERT



Example of constant voltage control
 • Set value: 4.5V
 • Measured value: 4.5V ± 100μV
 ※ Accuracy set at below 0.01%

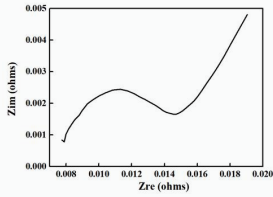


Example of Constant Current Control
 • Set value: 100mA
 • Measured value: 100mA ± 5μA
 ※ Accuracy within 0.01% of the set value

Equipped with a 24-bit ADC and 16-bit DAC, achieving high-precision voltage and current control and testing.

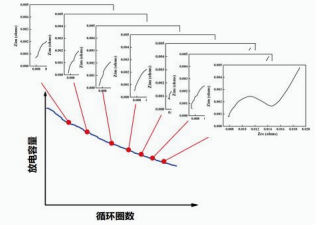
Support CV (Cyclic Voltammetry), LSV (Linear Sweep Voltammetry), EIS (Electrochemical Impedance Spectroscopy), CA (Chronoamperometry), and CP (Chronopotentiometry) test.

Case 1: EIS test

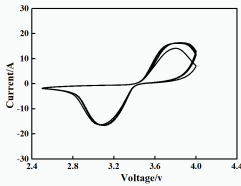


EIS test of a 2.2Ah cell
[Frequency: 100kHz to 0.01Hz]

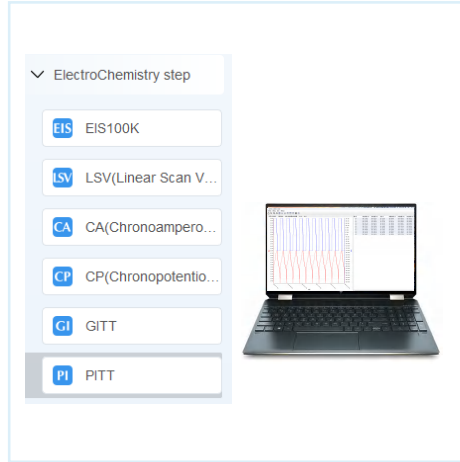
Case 2: EIS test while charging /discharging



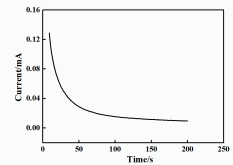
Case 3: CV test



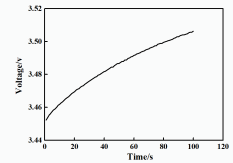
CV testing of a 120mAh cell
[Scan rate: 1mV/s]



Case 4: CA · CP test



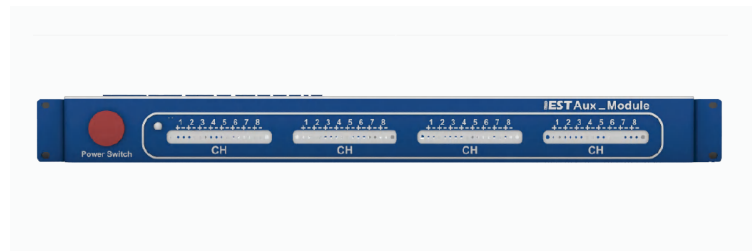
CA test



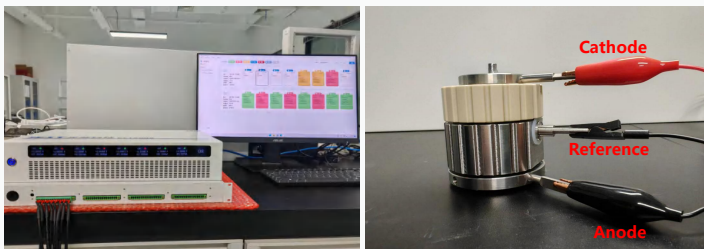
CP test

Solution 1: Auxiliary channel

| | |
|--------------------|--|
| Channel Mapping | Mapping multi-Aux. Channel to main Channel |
| Step Configuration | Step limit&data log |
| Safety | Aux. Channel for safety limit |
| Data Analyzer | Aux. Channel data analyzer |



Three-electrode using Aux. Voltage module








Auxiliary module:

Aux. Temperature: T type; PT100

Aux. Voltage: 5V; 0.01% F.S.

Aux. Pressure

IX. Model parameter table

| Product | ECT6008 | | | ERT7008 | | ERT6002 | |
|--------------------|-----------------------------|---|---|--|---|---|---|
| | Picture |  |  |  |  |  | |
| Module | ECT6008-5V10mA | ECT6008-5V100mA | ECT6008-5V6A ECT6008-5V12A | ERT7008-5V100mA | ERT7008-5V6A ERT7008-5V12A | ERT6002-5V6A ERT6002-5V12A | |
| ★Electrochemistry | CV Test | / | ✓ | ✓ | ✓ | ✓ | |
| | EIS Test | / | / | / | 0.01-100KHz | 0.01-100KHz | 0.1-1.5KHz |
| Hardware Parameter | Temperature | -20~80°C (With Temperature Chamber) | | | | | |
| | Channel | 8 | | | | 2 | |
| | Voltage range | ±5V | | | | | |
| | Current range (auto switch) | 1mA/10mA | 0.1mA/1mA/10mA/100mA | 6mA/60mA/0.6A/6A 12mA/120mA/1.2A/12A | 0.1mA/1mA/10mA/100mA | 6mA/60mA/0.6A/6A 12mA/120mA/1.2A/12A | 6mA/60mA/0.6A/6A 12mA/120mA/1.2A/12A |
| | Control&Measure Accuracy | ±0.02% F.S | ±0.01% F.S | | | | |
| | Max. Data logging | 10 SPS | 100 SPS | | | | |
| | Respond time | 5ms | 1ms | | | | |



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IEST **3** Major Business

- ◆ Special Testing Instruments
- ◆ Third-party Testing Service
- ◆ R&D Solutions



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