

Jellyroll Wettability Gravimetric Tester

▶ GDT Series



| Background and Significance

The electrolyte wetting performance of a lithium-battery jelly roll is one of the key factors that influence the cell's initial state, formation quality, and subsequent electrochemical performance. Whether the electrolyte can rapidly and uniformly penetrate the electrode sheet gaps, separator pores, and electrode coating surface after initial filling directly affects the efficiency of ion-transport pathways establishment and the consistency of interfacial reactions within the jelly roll. Insufficient or uneven initial wetting can cause localized wetting delays, which in turn compromise SEI formation quality, leading to increased internal resistance, reduced capacity utilization, lower rate capability, and accelerated cycle-life degradation. Therefore, wetting performance not only affects the cell's initial performance but also plays a critical role in its long-term stability and consistency.

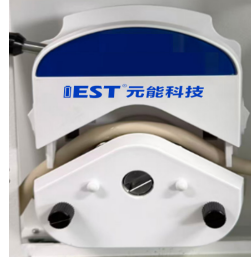
In battery manufacturing, the wetting process typically takes considerable time and is a critical factor affecting production-line takt time and work-in-progress turnover efficiency. Wetting speed can vary significantly depending on the material system, electrode compaction density, winding tension, and structural design. Without a quantitative evaluation method, manufacturers often rely on experience to set the post-filling rest (wetting) time, which can result in either excessive wetting time (reducing production efficiency) or insufficient wetting time (leading to fluctuations in subsequent formation quality and increased defect risks). Therefore, accurate and quantifiable testing and evaluation of jelly-roll wetting performance not only helps optimize the post-filling rest time and wetting process parameters, but also provides a critical insights for material development, structural design, and production-line takt-time alignment, thereby improving manufacturing efficiency, product consistency, and overall yield in lithium battery production.

| Innovative Solution

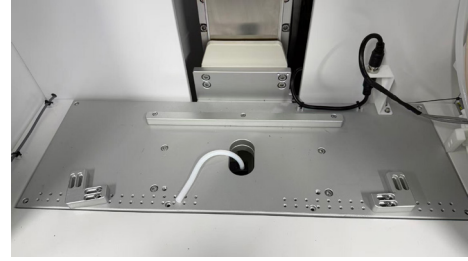
The GDT-2000 was developed specifically for evaluating the electrolyte wetting performance of lithium-ion battery jelly rolls. Compared with traditional methods that rely on manual operation and intermittent recording, this equipment substantially improves the consistency and repeatability of the testing process. The automated lifting platform, integrated with real-time weighing, reduces the influence of operator variability on test results, while the constant-liquid-level design effectively suppresses systematic errors caused by buoyancy fluctuations, allowing the mass-time curve to more accurately reflect the intrinsic wetting behavior of the jelly roll. Through automation and standardized control, the GDT-2000 delivers more stable and reliable data for comparing wetting performance across different batches, material systems, and process conditions, enhancing the comparability of test results and providing a higher-quality experimental basis for process optimization and product development.



Electrolyte Replenishment Control System

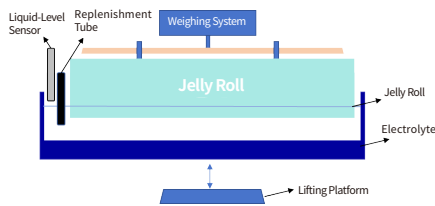


Peristaltic Replenishment Pump

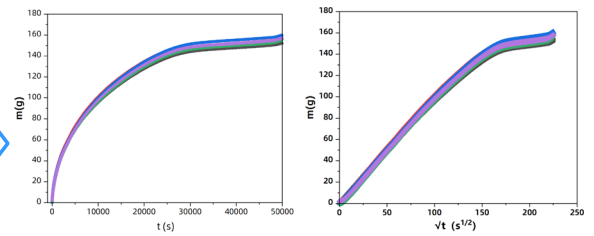


Lifting Platform

Analysis Method



The jelly roll is immersed vertically in an electrolyte bath, with the electrolyte wetting it upward from the bottom. A high-precision non-contact liquid-level sensor continuously monitors the electrolyte level in the bath, while a weighing system records the real-time mass gain of the jelly roll.



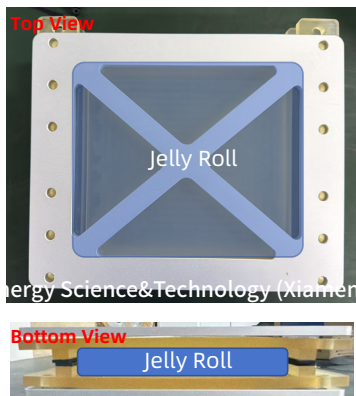
Wetting Mass-Gain Curves for Five Jelly Rolls from the Same Batch

Upgraded Technical Features

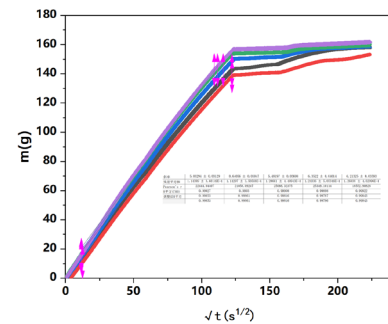
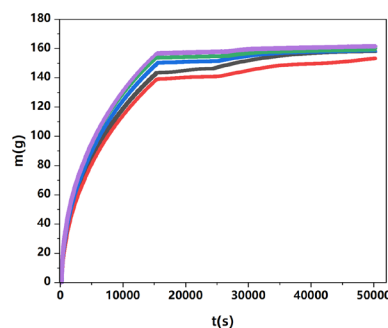
- **Liquid-Level Control System:** An electrolyte bath liquid-level control system (syringe pump + height sensor) reduces inter-group systematic error caused by liquid-level fluctuations.
- **Pressure-Applied Testing:** A surface-pressure fixture (pressure range: 0–0.4 MPa) with a pressure-film detection system is added.

Application Case

The wetting curves obtained by applying 0–0.2 MPa of external pressure to the jelly roll using a fixture are shown below:



Pressurizing Fixture and Jelly Roll Placement



Test Data

As the external pressure increases, the initial wetting rate decreases. At a pressure of 0.2 MPa, the saturated electrolyte uptake is further reduced.

Specifications

Model	GDT-2000
Equipment Dimensions	Customizable to Sample Specifications
Test Time	0~48h
Weighing Accuracy	10mg
Replenishment Rate	0-10mL/s
Liquid-Level Control Accuracy	1mL

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