

DIFFERENTIAL THERMAL ANALYSIS

TESTING SERVICES AND SYSTEM SALES

Novonix's Differential Thermal Analysis (DTA) system enables the reliable measurement of the evolution of liquid electrolyte in lithium-ion cells and other electrochemical cells.

During battery operation, there can be substantial changes to the liquid electrolyte. The Novonix DTA system uses an in-situ, non-destructive technique to measure and monitor how the liquid electrolyte evolves over the lifetime of a battery.

The Novonix DTA system provides information about the evolution of liquid electrolyte including:

- Composition
- Amount remaining
- Salt consumption
- Solvent reactions

Novonix has a global tier-one customer base in more than 14 countries, and is always in development of new advanced cell testing technologies. Contact us to learn how Novonix can help your company enhance their research capabilities.

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NOVONIX DIFFERENTIAL THERMAL ANALYSIS

NON-DESTRUCTIVE ELECTROLYTE ANALYSIS

Lithium-ion cells degrade due to reactions between the liquid electrolyte and the electrodes. These reactions can cause sudden failure of the cell after seemingly stable performance. The lithium-ion differential thermal analysis (DTA) system is able to quantify these reactions in a non-destructive manner to understand battery failure. It is crucial to monitor how the liquid electrolyte has evolved during the lifetime of a battery.

The approach of using differential thermal analysis to study the evolution of electrolyte in a lithium-ion cell began in Dr. Jeff Dahn's lab at Dalhousie University¹ and is now patented. The technique involves freezing lithium-ion cells and measuring the temperature of the cell during melting in comparison to the temperature of a reference sample. The resulting thermal signature holds information about the composition and amount of liquid electrolyte remaining in the lithium-ion cell.

These measurements can be performed throughout the lifetime of a lithium-ion cell, such that the thermal signature, and thus the electrolyte evolution, can be understood and conclusions about the state of health of the battery can be made.

Figure 1 shows the thermal signature obtained from three cells containing varying amounts of electrolyte and demonstrates the sensitivity of the DTA system. As more electrolyte is present in the cell, the peak position remains constant, while the intensity of each peak increases.

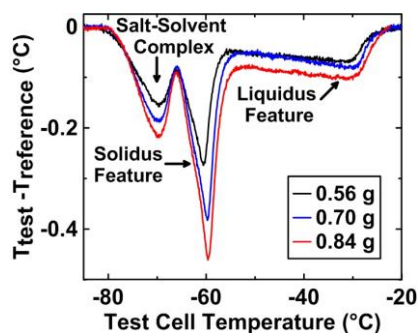


Figure 1: Thermal signature from DTA of Li-ion cells containing varying amounts of electrolyte.

The Novonix DTA system is controlled automatically with software and can be configured for testing pouch cells and cylindrical cells.

Novonix offers DTA and cell testing services in our facility, providing access to all Novonix high precision chargers, thermal chambers, and lab equipment. Contact us for more details and how we can accelerate your understanding of cell failure.



Novonix benchtop DTA system

[1] R. P. Day, J. Xia, R. Petibon, J. Rucska, H. Wang, A. T. B. Wright, and J. R. Dahn. *J. Electrochem. Soc.* **162** (14), A2577-A2581 (2015).