

Battery Industry Solutions

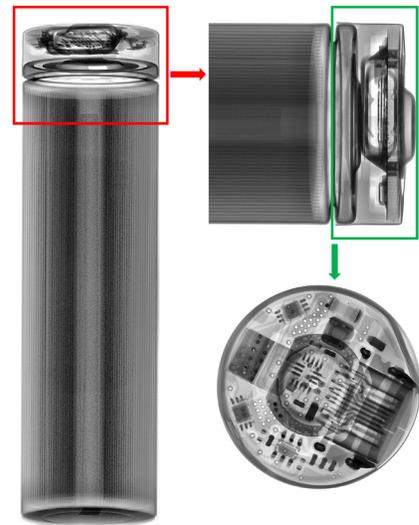
With the Covalent Platform

The pace of increasing battery applications, ranging from consumer devices to electric vehicles, is matched only by the pace of research and development into novel battery materials and chemistries. Covalent Metrology provides materials analytical solutions that accelerate our clients development process. Covalent combines a comprehensive suite of analytical instruments with industry know-how to provide solutions tailored to each client's needs.

Complete Development Process Support

From confirming raw material properties to full cell teardowns and everything in between, Covalent has you covered.

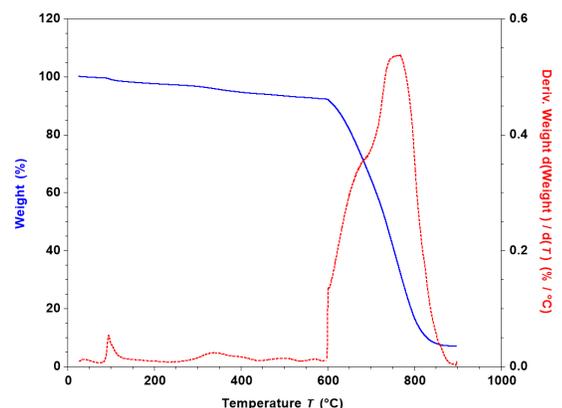
- Raw material analysis of all cell components
- Analysis of completed, as-manufactured electrodes
- Full cell teardown in glove box after cycle testing; or competitive teardowns and reverse engineering



Analysis of Raw Materials

Innovative raw materials are a key differentiator. Covalent provides the tools to help you understand exactly what goes into your cells. Analytical methods include:

- **Anode and Cathode:** particle size, coating, and morphology characterization; nano-microscopic imaging and x-ray analysis, porosimetry and BET, elemental analysis, thermal analysis, and water content analysis
- **Separator:** thermal analysis, chemical analysis, optical and electron microscopy, porometry
- **Electrolyte:** thermal analysis, chemical deconvolution, elemental analysis, diffusion analysis via NMR



Full Cell Teardown

Covalent supplies flexible solutions for robust cell characterization, whether you want to investigate how your devices age after cycle testing or to analyze a competitor's device.

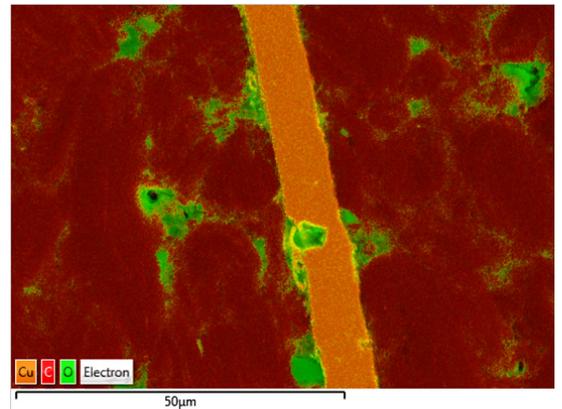
- 2D and 3D X-ray imaging performed before any deconstruction
- Disassembly in sterile glove box environment under Ar or N₂ atmosphere
- Retrieval of Anode, Cathode, Separator, and Electrolyte - includes solvent-washing of all components
- Customized, client-specific component analysis (many air-free options available)



Component Analysis

Simultaneously optimize manufactured electrodes and separators for cycle life, speed, capacity and more through analytical insight into the link between results of manufacturing processes and electrical performance.

- SEM Cross Section Analysis: visualize particle and pore structure and uniformity; investigate connection of electrode material to the current collector.
- Porosimetry: statistical analysis of the pore structure of the electrode.



Consulting Services

Cell testing is time consuming. You need the right data before testing to create the right DoEs that answer key questions. Work with Covalent experts to optimize your cycles of learning.

- Define routine analytical workflows to build your database, improving your decision making throughout the development process.
- Sometimes unexpected results happen. Integrated Covalent experts understand your unique goals, and can help you devise an analysis plan that will bring comprehension to the unexpected.



About Covalent Metrology

The right metrology partner can empower your team of scientists and engineers to design and develop advanced battery systems. Covalent delivers data, expertise, and answers when you need them to support your next research breakthrough.

Get a quote at covalentmetrology.com