



YOUR TRUSTED PARTNER IN **HIGH PURITY RAW MATERIALS**  
TESTING AND ANALYTICAL SERVICES



EAG  
Laboratories



## Material Analysis of High Purity Raw Materials for Batteries and Energy Storage

From powering the personal devices used everyday, to electric vehicles and life-saving medical devices, batteries are used in a wide variety of industries. The need for high quality testing within the battery industry is crucial for the production of high quality, long-lasting batteries.

Battery manufacturing, for instance, is a meticulous process where the integrity and performance of the final product hinge on the purity of its raw materials. Contaminants, even in trace amounts, can skew the properties of materials, making it imperative to ensure that the raw materials are thoroughly analyzed and tested for their purity. It is equally as important to test the natural raw materials before they are placed in the battery.

Eurofins EAG Laboratories (EAG), with its cutting-edge techniques and seasoned expertise, stands at the forefront of such advanced material analyses, ensuring that the battery industry gets the quality it seeks. With a team of knowledgeable scientists, EAG offers a wide array of testing techniques to support efforts in purity testing, quality assurance, and failure analysis. EAG provides thorough testing for cathodes, anodes, battery parts, and raw materials.

## Material Analysis of High Purity Raw Materials

### Purity Testing

EAG has the ability to determine trace and ultra-trace level chemical impurities of your battery raw materials.

### Quality Assurance

EAG can assure the quality of your battery raw materials.

### Glow Discharge Mass Spectrometry (GDMS)

GDMS is a very sensitive and robust analytical tool for monitoring elemental compositions and impurities in materials down to trace and ultra-trace mass fraction levels.

### Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS)

LA-ICP-MS is an analytical technique that uses direct micro-scale sampling to provide high precision elemental and stable isotope analyses of solid materials.

### Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)

ICP-OES is used to detect the presence of trace metals, playing a key role in tracking the performance of the cathode and understanding any deviations in battery performance.

### Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

ICP-MS is ideal for purity certification, cleaning validation and contamination identification for a broad range of materials and processes. It is also great for supply chain efficiency support ranging from raw materials qualification, product safety, research and development, and production control to failure analysis.

### Scanning Electron Microscopy (SEM)

SEM provides high-resolution and high-depth-of-field images of the sample surface and near-surface. SEM is one of the most widely used analytical tools, due to the extremely detailed images it can quickly provide.



## Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS)

Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) is an incredibly versatile material testing technique.

LA-ICP-MS is an analytical technique that uses direct micro-scale sampling to provide high precision elemental and stable isotope analyses of solid materials. This technique provides major and trace elemental compositions in a material sample, down to detection limits of tens of parts-per-billion (ppb).

When used, for instance, in the battery industry, LA-ICP-MS can help detect causes of failure or a decreased lifespan of a battery. This process helps to ensure your company's production of the most efficient battery.

We're entering an age where sustainability and our own awareness of the impact that materials testing makes on the world is crucial. LA-ICP-MS acts as an environmentally cleaner testing technique with the use of less reagents in the testing process which in turn produces very little waste and promotes sustainability.



## Glow Discharge Mass Spectrometry (GDMS)

Unknown or unwanted impurities in materials often cause "irritating" distractions for materials scientists or engineers. Thus, higher purity materials are preferred in order to eliminate unwanted defects, which could affect performance, reliability, lifetime and safety in general. On the other hand, intentionally added impurities into materials can introduce energy levels previously not assessable by electrons, photons, phonons, atoms and molecules, thus creating vast opportunities for discovering new phenomena for property tailoring. Glow Discharge Mass Spectrometry (GDMS) is a powerful tool for purity analysis.

GDMS is a very sensitive and robust analytical tool for monitoring elemental compositions and impurities in materials down to trace and ultra-trace mass fraction levels. It is an analytical tool that EAG has years of experience in. Based on glow discharge atomization/ionization combined with sector-field mass analyzer, this high resolution mass spectrometric technique can evaluate full survey elemental coverage as well as depth specific distribution of elements with very high sensitivity.

Within the battery production chain, GDMS can be helpful in bulk analysis of concentrates or individual cathode and anode material. For the best performing battery across industries, having high purity raw materials is of the utmost importance. At EAG, we can aid in the detection of any impurities in battery raw materials.



## Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

Inductively Coupled Plasma–Mass Spectrometry (ICP-MS) is one of the most important spectrometric techniques. It is a multi-elemental technique with extremely high sensitivity and large linear dynamic range, which allows simultaneous analysis of main components and ultra-trace elements. It is capable of analyzing elements from Li to U and can be applied to solutions and solids. Solid samples can be analyzed directly (by coupling the ICP-MS to an UV Laser Ablation system) or after dissolution or digestion using a combination of acids, heating and/or pressure.

For battery raw material analysis, ICP-MS is ideal for purity certification, cleaning validation and contamination identification for a broad range of materials and processes. For example, high purity carbon materials including graphite, high purity metal targets and advanced alloys, and other materials. It is also great for supply chain efficiency support ranging from raw materials qualification, product safety, research and development, and production control to failure analysis.

ICP-MS can analyze a wide range of elements (up to 70) in a single analysis with a high sensitivity resulting in low detection limits. At EAG, the ICP-MS analysis can be automated which enhances accuracy, precision and throughput.

## Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)

Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) can provide quantitative bulk elemental composition of a wide variety of sample types, including powders, solids, liquids and suspensions.

Some strengths of this technique include:

- A range of elements can be measured in a single analysis cycle
- The useful linear dynamic range is over several orders of magnitude
- The use of a quartz-free sample introduction system enables determination of low levels of silicon and boron
- The analysis can be automated, enhancing accuracy, precision and sample throughput
- The combination of ICP-OES and ICP-MS is very powerful for determining a wide range of elemental concentrations, from major components to trace level components (typically sub-ppb) with high accuracy and precision

For battery raw material analysis, ICP-OES is used to detect the presence of trace metals, playing a key role in tracking the performance of the cathode and understanding any deviations in battery performance.



## About Eurofins EAG Laboratories

When it comes to understanding the physical structure, performance, chemical properties and composition of materials, no other scientific services company offers the breadth of experience, diversity of analytical techniques or technical ingenuity of Eurofins EAG Laboratories. We don't just perform testing, we drive commercial success—through thoughtfully designed investigations, technically superior analyses, and expert interpretation of data.

We deliver multi-disciplinary, problem-solving expertise to help our customers accelerate innovation, ensure quality and safety, and protect intellectual property. Whether you are seeking to reduce time-to-market, solve manufacturing problems or ensure regulatory compliance, turn to Eurofins EAG. We know how to bring the power of science to every phase of your product lifecycle.

- 20+ facilities located in the US, Europe, and Asia
- 2,500+ instruments
- 1,000+ highly-educated employees
- Serving more than 5,000 clients worldwide
- Revenue sourced from more than 50 countries

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