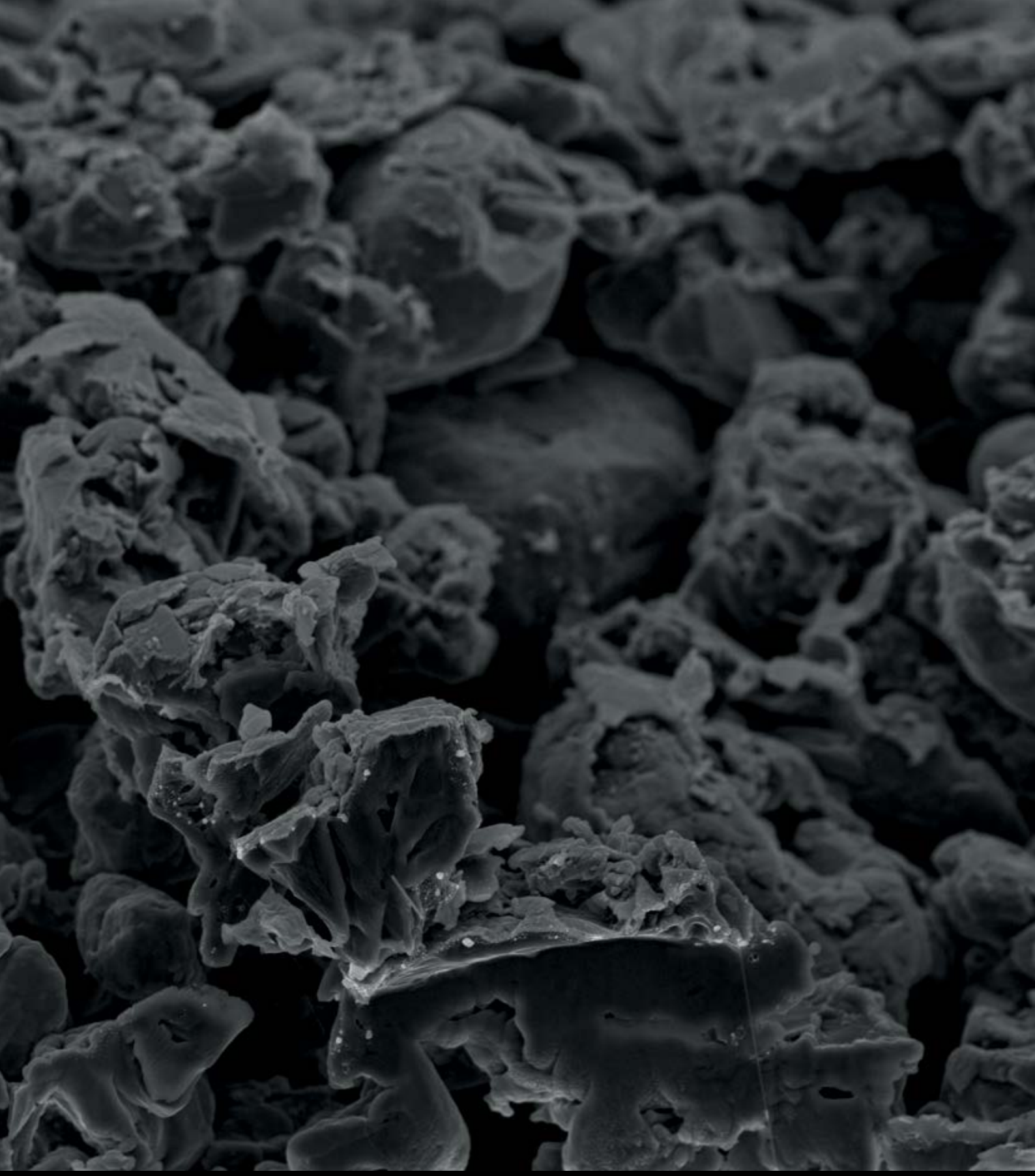

LAXOR

SEM COATING
MADE SMART
AND EASY

C

LUXOR

LUXOR is a brand of
APTCO TECHNOLOGIES NV

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WHO WE ARE

LUXOR is a brand under Aptco Technologies, a Belgium-based company that specializes in designing, manufacturing, and supplying laboratory instruments, including equipment for sample preparation and testing. With our in-house hardware and software development, we create tailored solutions for specific applications and markets.

Driven by continuous innovation in both hardware and software, we developed the LUXOR^{Au}, LUXOR^{Pt}, and LUXOR^{C} coaters—each tailored to meet the specific demands of floor model SEMs, desktop SEMs, and high-resolution FEG-SEMs.

LUXOR coaters are available globally through a network of dedicated sales partners and distributors, ensuring reliable local technical and application support.

Part of Aptco Group

Aptco Technologies is part of the Aptco Group, an international technology group of companies engaged in the distribution, manufacturing, servicing, and calibration of scientific instruments and equipment for industrial, medical, and academic laboratories.

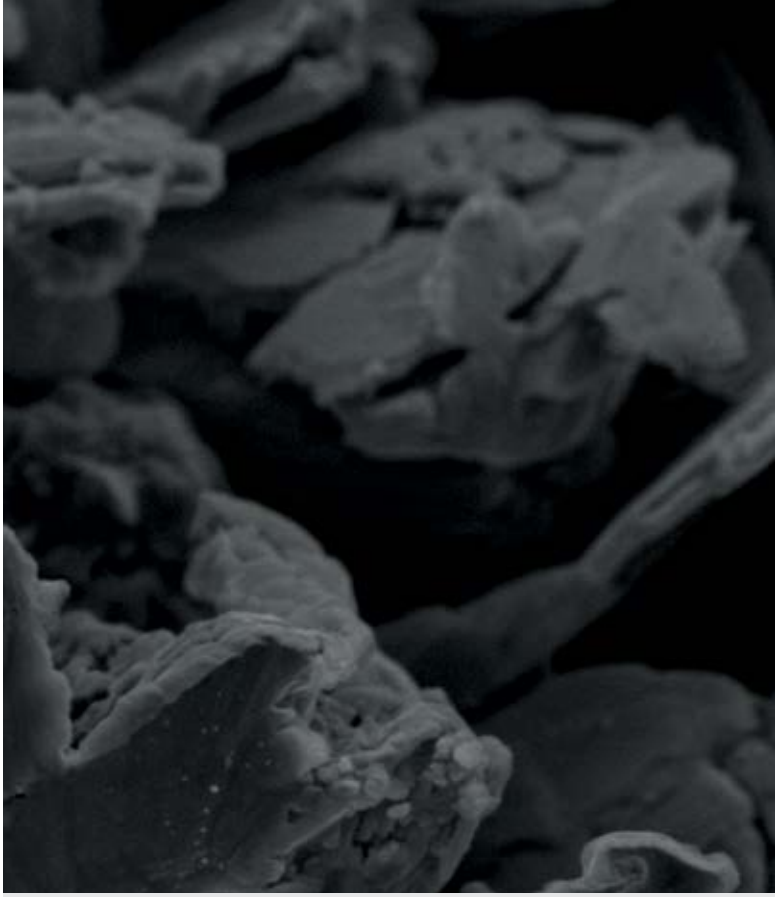
Why coat your SEM samples?

In an electron microscope, samples are placed in a vacuum chamber and exposed to an electron beam. Non-conductive or weakly conductive samples can become electrically charged during this process, leading to abnormal contrast and “overexposed” images.

This issue can be mitigated by applying a thin layer of a conductive material, typically gold, platinum, or carbon, to the sample’s surface. The most common methods for this coating include thermal evaporation for carbon and plasma sputter coating for gold and platinum. This preparation technique is commonly referred to as SEM coating.

Why choose LUXOR?

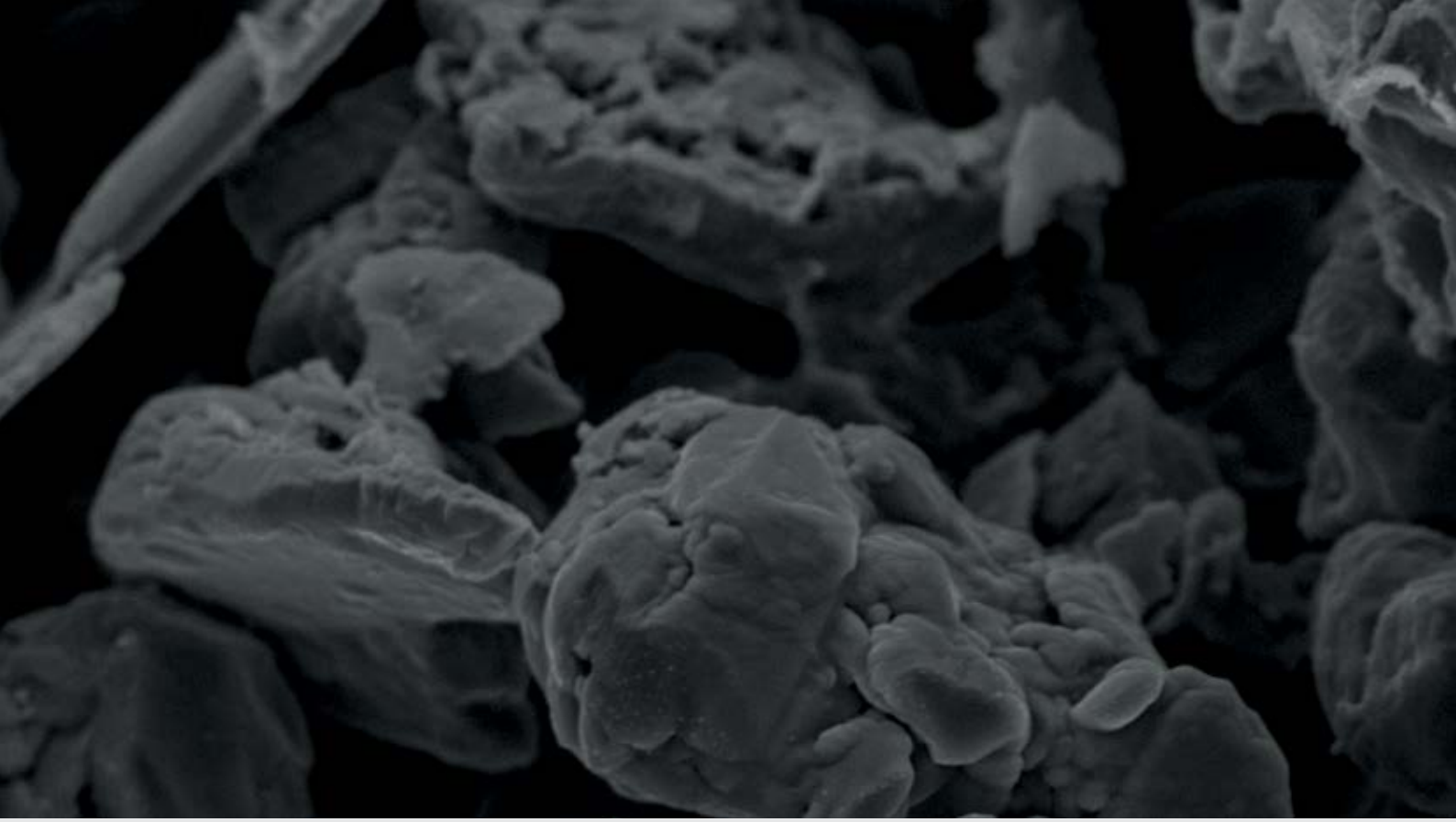
At LUXOR, we believe that the best and most reliable sputter coating for SEM imaging can be achieved through innovative technology and smart design. We aim to make this level of innovation and user-friendly design accessible to everyone. That’s why we have developed a series of advanced, fully *au*tomated sputter coaters specifically for SEM sample preparation. Our mission is to make SEM coating smart and straightforward for all users.



OUR PRODUCT PORTFOLIO

LUXOR^{Au}

- Fully automated sputter coater designed for desktop and floor model SEM applications with magnification capabilities of up to 50,000x
- Coats samples with gold (Au) or gold/palladium (Au/Pd) in either air or argon environments
- Features A² technology for advanced 3D coating
- Can simultaneously coat up to 7 x 12 mm stubs
- Designed with an upside-down configuration



LUXOR^{C}

- Fully automated coater specifically for chemical analysis in SEM applications
- Coats samples with carbon (C) in air
- Utilizes a Bradley-type carbon rod evaporation source
- Capable of simultaneously coating up to 7 x 12 mm stubs
- Designed with an upside-down configuration

LUXOR^{Pt}

- Fully automated sputter coater tailored for high-resolution applications in floor models and field emission scanning electron microscopy (FE-SEM) with magnification capabilities starting from 50,000x
- Coats samples with gold (Au), gold/palladium (Au/Pd) in air or argon, and platinum (Pt) in argon
- Incorporates A² technology for high-resolution 3D coating
- Can simultaneously coat up to 7 x 12 mm stubs
- Designed with an upside-down configuration

LUXOR CARBON COATER

The LUXOR^{C} is primarily designed for chemical analysis applications (such as EDX and EDS) in electron microscopy, where sample charging can pose challenges. It utilizes a Bradley type carbon rod evaporation source in air to create a uniform thin carbon layer on the samples. This coating process is fully automated; once your samples are loaded, you simply select the desired coating time and press the start button. This user-friendly operation significantly reduces the likelihood of human error, allowing new operators and lab personnel to use the device after just a few minutes of basic training.

In the LUXOR^{C} coater, the target is positioned at the bottom while the samples are placed in the lid at the top. This unique "upside-down" design offers considerable advantages in terms of safety and ease of use.

The LUXOR^{C} Carbon Coater comes with all the necessary accessories and auxiliary parts. When combined with the optional vacuum pump, it creates a fully functional coating unit. Sample holders for standard pin stubs, cylindrical stubs, and resin-embedded samples are also available.

Installing a LUXOR^{C} coater is straightforward and typically takes no longer than 15 minutes. If assistance is needed, a worldwide network of LUXOR distributors is available for installation and training support. Additionally, helpful installation videos can be found on our website for reference.

Why laboratories around the world prefer LUXOR

Ease of use

- Simple and intuitive operation with minimal steps required.
- No extensive training necessary, making it ideal for labs with multiple users or rotating personnel.

Consistency & repeatability

- Delivers uniform and reproducible coating quality every time.
- Eliminates variability that can arise from manual operations.

Reduced human error

- Automated parameters and processes minimize the likelihood of mistakes.
- Particularly beneficial for new users or in high-throughput situations.

Professional results

- Provides consistently high-quality coatings that enhance SEM imaging quality.
- Ensures optimal sample conductivity without the risk of over- or under-coating.

TECHNOLOGY

Automated Bradley type carbon rod evaporation
The LUXOR^{C} coater creates a thin layer of carbon using the Bradley-type carbon rod evaporation method. During this automated coating process, the coating chamber is evacuated to a sufficient vacuum level. After achieving this vacuum, a specific current is applied to the carbon rods until they glow. At that point, the carbon evaporates from the rods and is deposited onto the sample surface. After a preset duration, the current is turned off, and the chamber is vented.

This process is controlled and refined by the LUXOR^{C} algorithms. For SEM operators, this results in more consistent and homogeneous carbon coatings, which facilitate chemical analysis using EDX/EDS and improve image quality with higher resolution and contrast utilizing the SE detector. The best part is that the coating process is fully automated, eliminating the need for manual intervention and ensuring a worry-free, seamless experience.

Luxor Coaters: innovative upside-down design for greater functionality
At Luxor, we adhere to a 'form follows function' philosophy, which is why our coaters feature a unique design where the samples and target are mounted upside down. While this may seem unconventional at first, it offers several significant advantages.

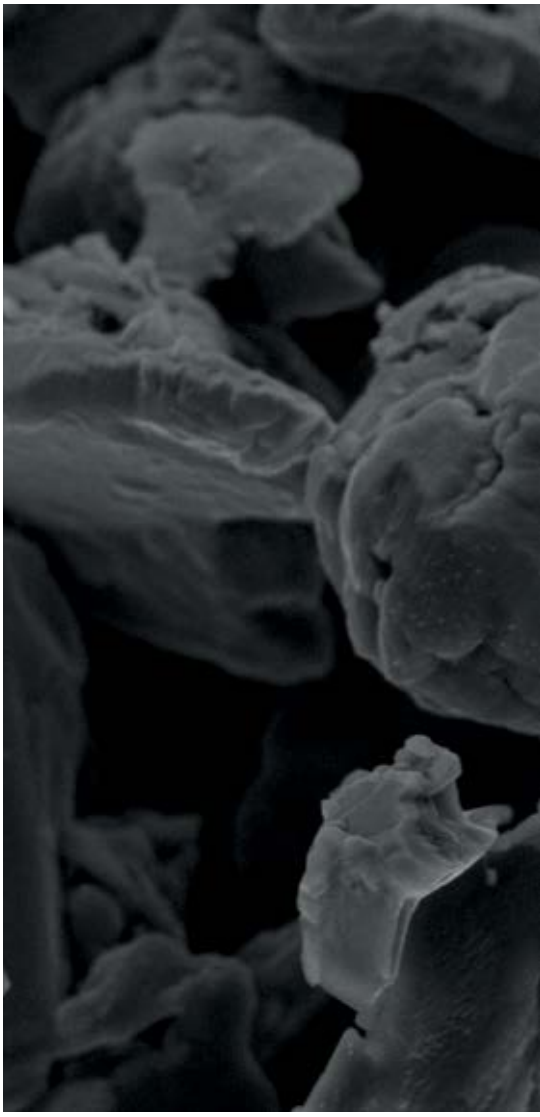
- **Safety first**
  All voltage and current wires are securely housed within the sputter device, significantly reducing the risk of electric shocks. This safety feature allows you to operate the machine with complete peace of mind.

- **Effortless sample handling**
  The upside-down design makes the lid, which doubles as a sample loading station, easily accessible. This allows you to apply or remove samples quickly, without the need for special tongs or tweezers. This simplicity not only enhances ease of use but also boosts productivity by streamlining the process.

- **Clean coating process**
  This design ensures that loose particles are removed during the coating process, helping to keep your Scanning Electron Microscope (SEM) optimally protected from debris. Consequently, this contributes to more consistent and reliable results.

- **3D coating**
  Additionally, larger particles in the plasma are drawn towards the pump rather than reaching the samples due to their weight, resulting in improved coating quality. This effect, combined with the algorithms of our A² technology, eliminates the need for a rotary or planetary table, greatly simplifying the setup for coating three-dimensional and porous samples.

Fully automated
The coating process is completely automated. Once the samples are loaded, simply select the desired coating thickness and press the start button. This user-friendly system greatly reduces the likelihood of human errors. New operators and lab personnel can learn to operate the device within just a few minutes of basic training.



UNIQUE FEATURES & BENEFITS

Enhanced safety features
Enhanced operator safety - All high-voltage wires and electrical connections are safely enclosed within the unit.

Automated operation
This feature reduces the risk of human error and minimizes the need for extensive operator training. Simply select the desired coating thickness and press “Start.”

Small footprint
With a footprint of just 340mm x 340mm (13.5” x 13.5”), the LUXOR^{C} coater fits seamlessly into any lab.

Upside-down design
The upside-down configuration allows for easy sample mounting and removal of loose particles, helping to protect the SEM column.

Avoid cross-contamination
The LUXOR^{C} is designed as a stand-alone carbon coater to avoid cross-contamination from metal sputter coating.

Increased speed and efficiency
The LUXOR^{C} can process up to 7 samples simultaneously. While the carbon coating process is highly precise, it is also very fast.

Intuitive touch-screen interface
The intuitive and easy-to-use touch-screen user interface enables quick, more comfortable, and efficient operation.

Double functionality
- Coating mode
- High vacuum mode for sample outgassing

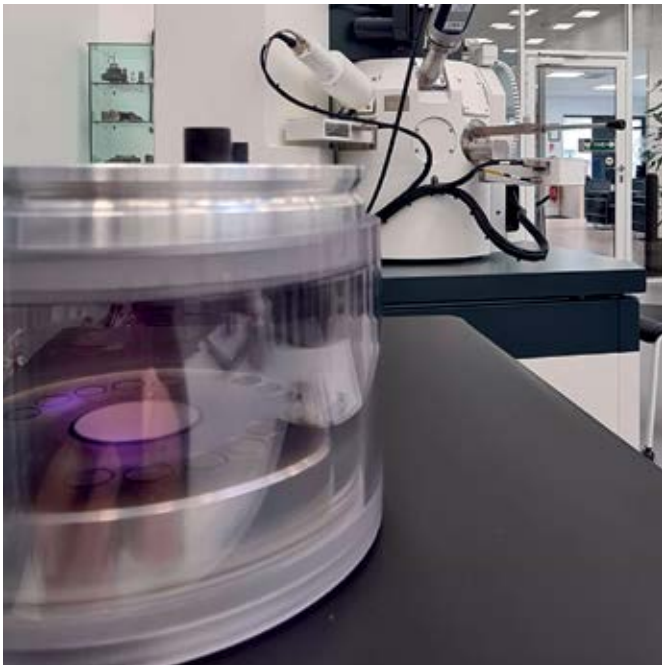
Specifications

Applications	Coating with carbon in air
Sample capacity	7 x Ø 12.5 mm or 3 x Ø 25 mm
Sample holders	For pin stubs, cylindrical stubs, resin embedded samples up to 40mm diameter
Average process time	3 minutes including outgassing and venting steps
Additional vacuum mode for outgassing of samples	
Process time	1 to 600 minutes (continuously selectable)
Coating chamber	Ø 100 mm diameter x 150 mm height
Gas supply	Environmental air (1 bar) or argon (0,6 bar)
Low energy dual stage pump	To be ordered separately
Dimensions	340 x 340 x 290 (mm, W x D x H)
Weight	23 kg

MARKETS AND APPLICATIONS

Electron microscopy techniques, such as scanning electron microscopy (SEM) and transmission electron microscopy (TEM), enable researchers to capture highly detailed, high-resolution images. However, employing an electron beam can present challenges for materials that are poorly conductive or sensitive to heat. A common solution to this issue is sputter coating, which involves applying a continuous, conductive thin film to the sample.

Materials science encompasses a broad range of disciplines and includes various materials such as polymers, filters, metals, pharmaceuticals, textiles, coatings, ceramics, electronics, and applications in life sciences. This field's applications span areas including particle characterization, micromechanical analysis, morphology visualization, root cause investigation, and the study of chemical composition and material homogeneity, among others. Modern materials science laboratories have evolved into key centers for product development, advanced quality control, and addressing customer challenges. Given the diversity of materials and the issues that can arise, these labs require testing methods that are reliable and reproducible while also being intuitive enough for operators with limited technical training. Additionally, fast and high-throughput solutions are essential to efficiently meet daily demands. This is where the LUXOR fully automated metal sputter coater becomes an ideal choice, offering ease of use, consistency, and speed to support the dynamic needs of today's materials science environments.



Here are some typical SEM applications where sputter coating is essential due to the issue of sample charging:

Microplastics and plastic pollution

Microplastics and plastic pollution are increasingly significant global challenges. They persistently accumulate in the environment, contaminating ecosystems and food chains, and pose potential risks to human health. Furthermore, there is a lack of comprehensive international regulations to manage plastic production, use, and disposal. SEM plays a crucial role in studying the presence, composition, chemical properties, and degradation of these materials.

Pharmaceutical applications

The pharmaceutical industry encounters significant challenges in drug development and must maintain strict quality control. SEM is instrumental in addressing these issues by allowing for detailed material characterization, particle analysis, and the evaluation of drug formulation homogeneity. Given the organic composition of many drugs, sputter coating is often required to achieve clear, high-resolution imaging, which facilitates accurate analysis.

Green and renewable energy

Batteries, wind turbines, and solar panels provide sustainable energy solutions, but they face challenges related to material degradation, efficiency, and longevity. SEM helps address these challenges by revealing contaminations, chemical composition, microstructural defects, wear, and failure mechanisms at the nanoscale.

Food security and sustainable agriculture

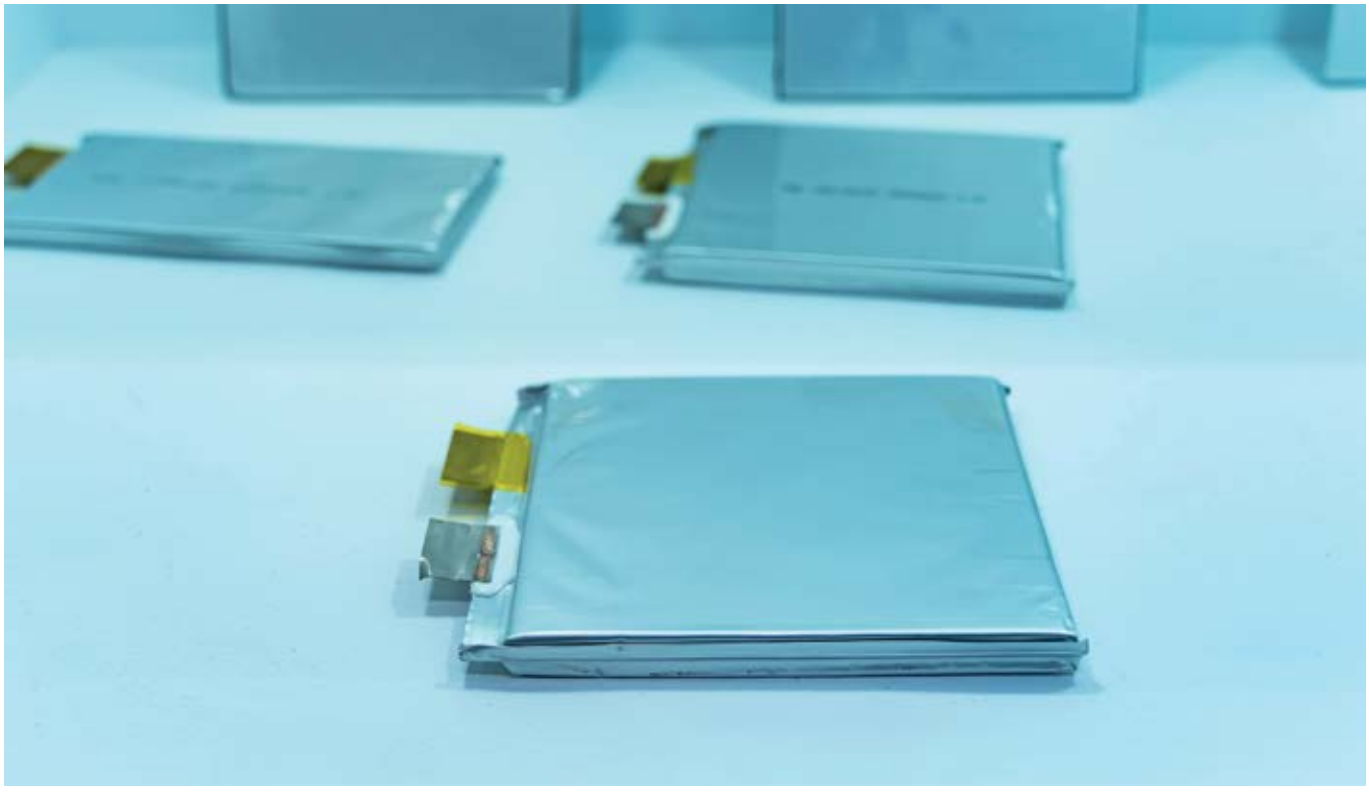
SEM can also play a crucial role in food security and sustainable agriculture by providing detailed insights into soil quality, crop diseases, and the morphology, appearance, and texture of extruded materials. Drying and sputter coating of samples are essential steps in SEM analysis, as they ensure that samples are properly prepared for imaging. This preparation prevents charging effects and allows for high-resolution imaging of fine details such as cell structures and surface morphology.

Recyclable products

Recycled products and textiles contribute to sustainability by reducing waste, saving raw materials, and lowering environmental impact. To ensure their quality, SEM is used to analyze the microstructure and surface characteristics of these materials. Since many recycled materials—especially textiles and polymers—are non-conductive, sputter coating is employed to prevent charging effects and improve image resolution. SEM often uses techniques such as Energy Dispersive X-ray Spectroscopy (EDS) to analyze elemental composition and backscattered electron imaging to reveal compositional contrast, allowing for a more comprehensive assessment of recycled material quality.

CARBON COATING OF BATTERY MATERIALS FOR ENHANCED SEM-EDS ANALYSIS

Battery materials—such as cathodes and anodes—are often composed of non-conductive or low-conductivity components, which makes them challenging to characterize using scanning electron microscopy (SEM). To obtain high-resolution images and reliable elemental analysis via energy-dispersive X-ray spectroscopy (EDS), surface conductivity is crucial. One common and effective solution is to apply a thin carbon coating to the sample surface.

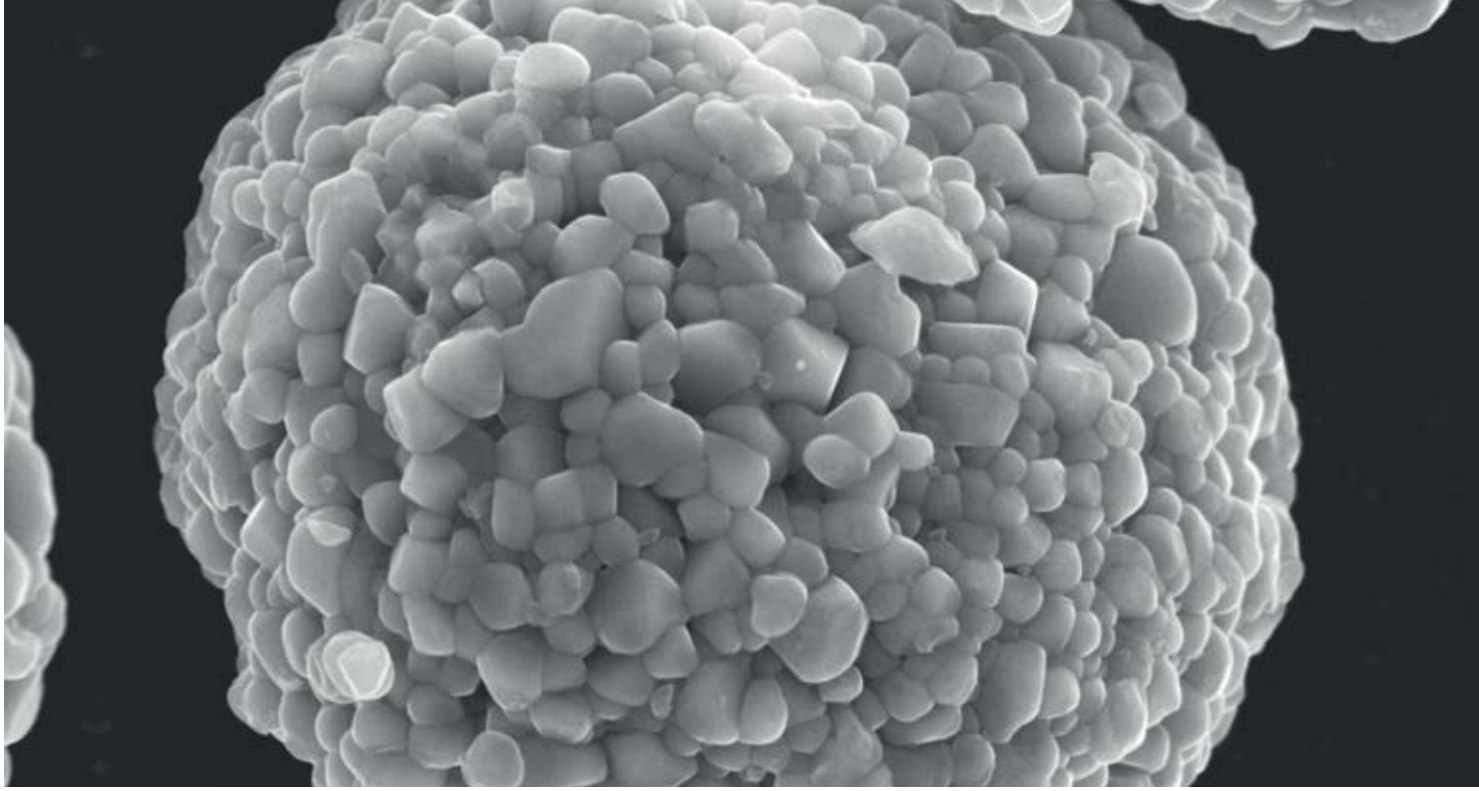


Why carbon coating?

- **Improves conductivity:** Prevents charging effects on non-conductive battery materials.
- **Preserves surface detail:** Unlike metallic coatings (e.g., gold or platinum), carbon does not obscure fine structural features in SEM imaging.
- **Compatible with EDS:** Carbon's low atomic number (Z = 6) minimally interferes with EDS analysis, especially for elements with higher atomic numbers commonly found in battery materials.

Sample preparation

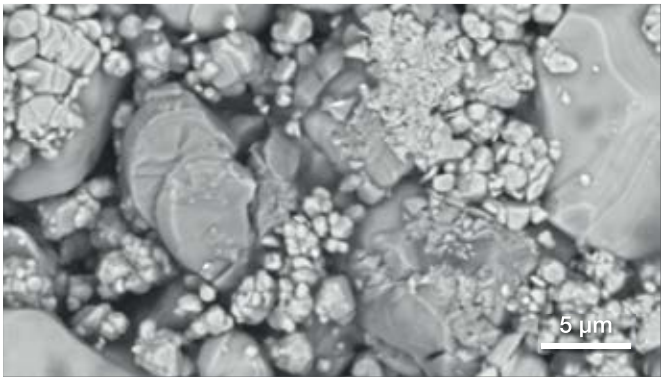
The samples are pressed and mounted onto a standard SEM stub. A carbon coating with a thickness of approximately 15-30 nm is applied using the LUXOR^{C} Carbon Coater to enhance conductivity and support EDS analysis. The coating is deposited under high vacuum conditions and typically takes 1–2 minutes.

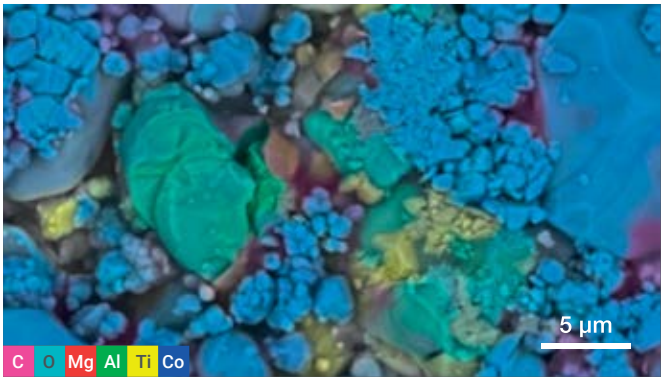


SEM-EDS analysis workflow

High-resolution SEM imaging using 20 keV accelerating voltage in Secondary Electron (SE) mode reveals surface morphology without charging artifacts, while simultaneous EDS mapping identifies the distribution of the elements that are present, with minimal carbon interference in the relevant energy ranges.

"A contamination analysis is carried out to detect the presence of foreign elements on the sample surface. Using a combination of backscattered electron (BSE) imaging and energy-dispersive X-ray spectroscopy (EDS), real-time elemental mapping enables the identification of unexpected elements such as magnesium (Mg), aluminum (Al), and titanium (Ti), even at low magnification."





Results

- **Without coating:** Charging effects, image distortion, weak EDS signals
- **With carbon coating:** Sharp, well-defined SEM images and accurate EDS maps
- **Carbon layer integrity:** Uniform coating ensures stable imaging even at higher magnifications

Conclusion

Carbon coating is an essential step for SEM and EDS characterization of battery materials. By using the LUXOR^{C} Carbon Coater, researchers can achieve fast, reproducible, and contamination-free coatings that enable high-quality microstructural and compositional analysis.

ACCESSORIES

Standard sample holder

The LUXOR standard sample holder (LU02-SHS) is included with every LUXOR^{C} sputter coater as part of the standard equipment. Designed for convenience and efficiency, the holder can accommodate either seven pin stubs with a diameter of 12.5 mm or three pin stubs with a diameter of 25 mm. It also serves as the coater's lid. The holder features an accessible surface for sample preparation and is supported by three elastomer feet for enhanced stability. This design ensures precise and reliable sample preparation. All pin stubs are securely held in place, preventing them from falling out when the holder is placed onto the coater.

Sample holder for resin embedded samples

The LUXOR sample holder for resin-embedded samples (LU02-SHE) is designed to accommodate various types of specimens with diameters ranging from 25 mm to 40 mm and heights between 10 mm and 50 mm. Samples are securely held in place using three screws. This versatile holder can also be used for coating larger or irregularly shaped samples that cannot be directly mounted on a stub. Additionally, it functions as the lid for the coater.

Sample holder for cylindrical stubs

The LUXOR sample holder for cylindrical stubs (LU02-SHC) is specifically designed to hold up to three cylindrical sample stubs with diameters of 9 mm, 12 mm, and 25 mm. These stub types are commonly used in HITACHI and JEOL electron microscopes. The holder features three positions, allowing various combinations of 9 mm, 12 mm, and 25 mm diameter stubs to be coated simultaneously.

LUXOR GLOBAL ASSISTANCE AND SUPPORT

At LUXOR, we are dedicated to providing you with a smooth and seamless experience. Our coaters are available for immediate delivery from stock 95% of the time. Additionally, getting your device up and running is quick and easy, and training new operators takes only a few minutes.

If you need technical or application support during installation or at any point afterward, LUXOR is here to assist you. You can contact us directly for expert help or reach out to one of our many local sales and service partners within our global distributor network. With worldwide support available, we ensure you receive prompt and efficient assistance, no matter where you are. Our team and partners are knowledgeable and experienced, ready to answer your questions and resolve any issues, enabling you to maximize the potential of your LUXOR device.

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Global network

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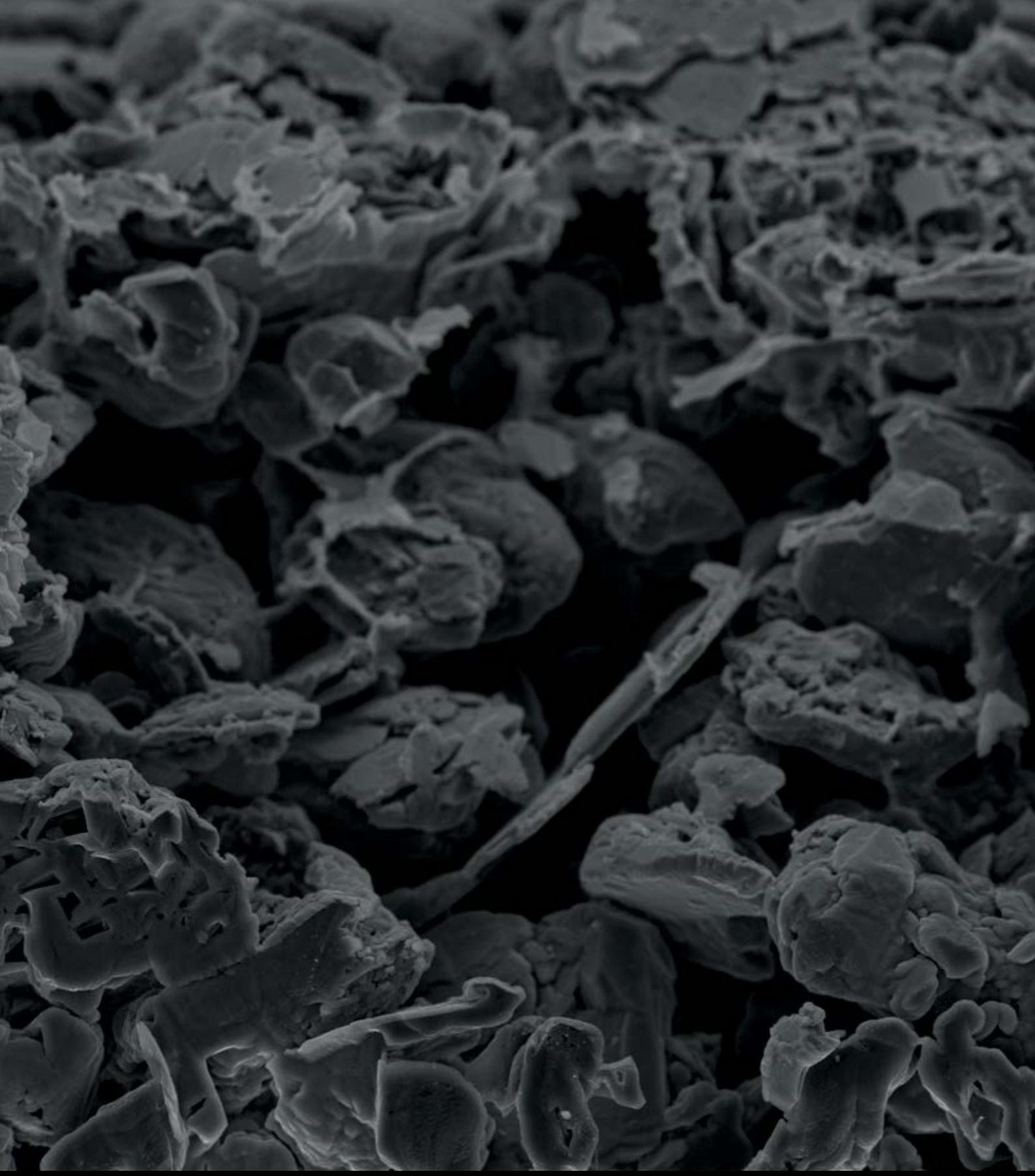

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