Battery research and quality assurance solutions

ZEISS eMobility Solutions and Materials Science



ZEISS Battery Workshop 2023

Learning event on Thursday, August 31st in Dublin, California



Seeing beyond

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Battery research and quality assurance solutions

Batteries play an important role in the performance and longevity of the devices in which they are used. Optimizing a battery means understanding its structure on multiple scales. Safety, service life, performance, and cost are essential to ensuring the success of battery technologies. These factors need to be addressed every step of the way, from R&D, raw material processing, production to assembly.

For the one-day event on August 31st, 2023, we will discuss practical applications of ZEISS microscopy technology to all aspects of battery research, development and production. The keynote address will be given by guest speaker Celina Mikolajczak, Chief Battery Technology Officer at Lyten, who has an extensive history of working in the automotive, stationary, and consumer electronics lithium-ion battery industries.





Why you should attend



Increase knowledge, gain productivity

Learn more about how you can improve your work in research and development or increase productivity in manufacturing by optimizing inspection processes.

See game-changing innovations

A wide range of imaging, analytic and metrology tools are needed to enable battery research and quality control in production of batteries. We aim to provide you with the relevant solutions to enable battery development, safety and performance.



Meet the experts, discover trends

Connect with our experts to learn more about the latest trends in battery development, ZEISS technologies, and manufacturing solutions. Get answers to your specific questions, consultation, and learn about trends and best practices.

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The Day's Agenda

Time	Торіс
8:00 am	Reception, greeting and refreshments
8:45 am	Welcome address
9:00 am	Keynote by Celina Mikolajczak, Chief Battery Technology Officer at Lyten Celina discusses the challenges of lithium-ion technologies for electric and hybrid vehicles in the areas of durability, reliability and performance, and safety considerations. Celina talks about the advances of new emerging battery materials, the exacting process of manufacturing battery cells, and the challenges of achieving secure and reliable supply chains in the transportation and energy sectors.
5.45 am	conce break, networking with 22135 experts
10:00 am	 Assessing batteries with 3D x-ray tomography & electron/light microscopy This presentation introduces imaging workflows for developing a better understanding of battery systems through X-ray tomography, electron microscopy, and light microscopy. Such imaging workflows can be run independently or assembled into complementary multiscale correlative microscopy evaluations to provide valuable insights on the inner workings of battery systems at multiple length scales, from macroscopic features to nanoscale details (i.e., sub-micrometer and nanometer resolution). These capabilities speed up R&D and product development times, increase cost-effectiveness, and simplify failure analysis and quality inspection of rechargeable batteries and other technologies built with emerging new energy materials. Attendees will learn: How the inspection and analysis of rechargeable cells at the R&D, production, and post-consumer level can be supported by X-ray imaging technologies. The diverse range of sample types and sizes that high-resolution (micrometer and sub-micrometer) non-destructive 3D X-ray tomography can address. How specific regions of interest can be targeted for rapid access via femtosecond laser milling. How the nanoscale structure, chemistry, and crystallography of critical battery components can be revealed with focused ion beam electron microscopy to further enhance these workflows. How an automated particle inspection workflow can size and classify contaminants found in the production process in accordance with leading industry standards.
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The Day's Agenda (continued)

Time	Торіс
10:45 am	Speeding up battery inspection by artificial intelligence powered algorithms This presentation shows how to use artificial intelligence (AI) technologies to inspect batteries with 3D X-ray microscopy (XRM) and computed tomography (CT) as well as 2D techniques like electron and light microscopy. More specifically, it illustrates how deep-learning based algorithms for CT reconstruction can be integrated into 3D X-ray inspection workflows for batteries, without the need for user expertise in AI technology. In addition, AI provides a wide range of tools for automated defect recognition (ADR) of complex components that are difficult to analyze using traditional measurement methods. Machine learning (ML) platforms can train ADR models to assess battery overhang and inclusions. In the end, using deep- learning based algorithms for CT reconstruction, such as ZEISS DeepRecon Pro, allows for 3D XRM workflows to be applied much more economically by reducing the time required for data acquisition. On the other hand, ML for defect detection provides a wide range of tools that can increase accuracy of detection and allow for ADR to work on lower quality (faster) CT images. AI-based methods can also help with automated image segmentation and material classification in electron and light microscopy techniques to accelerate battery material and electrode characterization tasks. AI-based X-ray inspection technologies will have a major impact on testing and failure analysis of batteries where non-destructive imaging is often required. Attendees will learn:
	 How the inspection and analysis of rechargeable cells at the R&D, production and post-consumer level can be supported by AI-powered algorithms. See the diverse range of sample types and sizes that high-resolution (micrometer and sub-micrometer) AI-powered microscopy can address. How evaluation can be optimized by advanced reconstruction methods, 2D automated defect detection and machine learning-based defect detection algorithms. How image segmentation tasks can be automated and accelerated using AI-based methods for faster, better insights into materials and electrode characteristics.
11:30 am	Q & A and networking with ZEISS experts
12:00 pm	Lunch provided by ZEISS
1:00 pm	Overview of ZEISS technology solutions
1:30 pm	Technology station visits See individual battery inspection solution areas with ZEISS electron microscopes, ZEISS Xradia XRM systems and ZEISS light microscopes. Image: Comparison of the system of
3:30 pm	Tour of the ZEISS Innovation Center
4:30 pm	Event wrap-up



ZEISS Innovation Center California in Dublin

The center encompasses 208,650 square feet over three floors, bringing together hundreds of ZEISS employees and key functions. Research laboratories, technical service centers, production facilities, customer experience and demonstration centers showcasing ZEISS innovations are in one building.

5300 Central Pkwy Dublin, CA 94568

Located in the East Bay, we are near the San Francisco, Oakland and San Jose airports. Public transit via Bay Area Rapid Transit (BART) train is available from SFO and OAK to the Dublin/ Pleasanton Station (www.bart.gov).



If you are coming from out of town, we recommend <u>Hyatt Place Dublin/Pleasanton</u> and <u>Aloft Dublin-Pleasanton</u>.

Ready to sign up? Register online today!

Seating is limited. Register today for the ZEISS Battery Workshop on the 31st of August, 2023 in Dublin, California.







Seeing beyond