

Research and Development Laboratory Nanores

Offer dedicated to
Electronic, Semiconductors and Batteries Industry

Nanores Sp. z o.o. Sp.k.
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ABOUT NANORES



Nanores is a hi-tech, independent research and development laboratory, set to provide the highest quality service and improve standards of cooperation between science and business. Through the use of state of the art equipment and by creating a team of specialists in various fields (physics, mathematics, chemistry, materials science), we are able to efficiently identify needs and provide the best solutions for our partners.

We are specialized in analysis and modification of structure of hard materials, both conductive and non-conductive. Our laboratory is equipped with electron and ion Dual Beam microscopes (SEM/PFIB, SEM/FIB), and Atomic Forces Microscope (AFM) with multiple advanced 2d and 3d imaging modalities. We offer unique ability of surface and volume imaging and analysis in nanometric scale including the identification of the atomic composition. Beforementioned services allow to reveal manufacturing micro and nano defects along with verification of their causes, supporting production optimization processes. We provide services for the production and design of micro and nano prototypes of photonic, mechanical, electronic and other structures.

OUR EQUIPMENT



1. DualBeam SEM/Xe-PFIB system (1st in Poland, 2nd in Europe) FEI Helios PFIB
2. DualBeam SEM/Ga-FIB system FEI Helios NanoLab 600i
3. AFM Nanosurf FLEX Axiom
4. EDS detector Bruker XFlash 630 mini
5. High vacuum coater Quorum Technologies Q150T E
6. Plasma Cleaner PDC-32G-2

OUR OFFER

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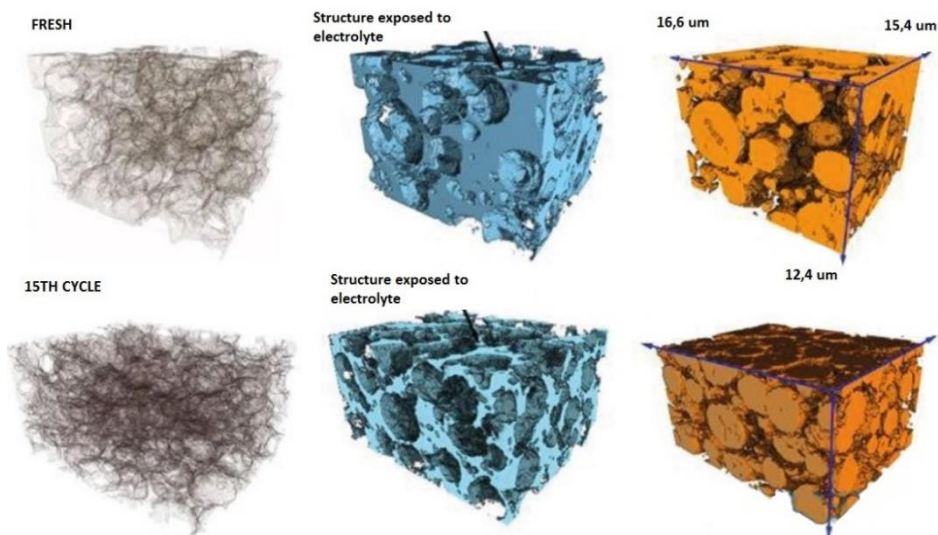


NANORES FOR SEMICONDUCTORS AND MICROTECHNOLOGY

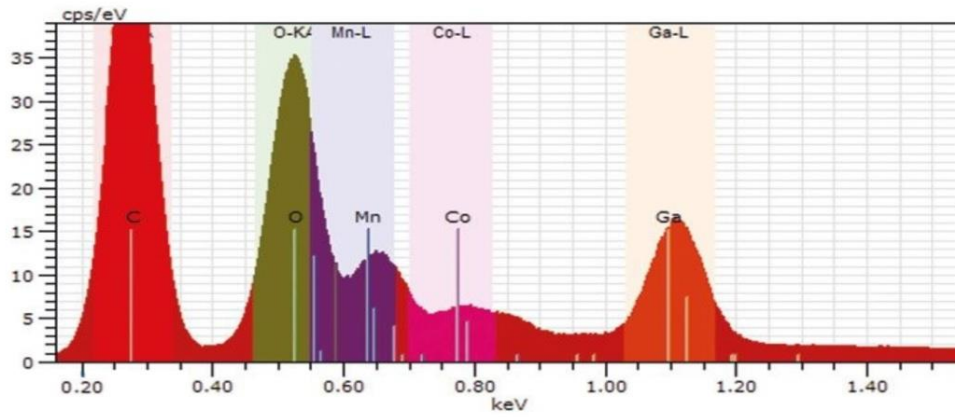
Semiconductor industry is engaged in a relentless race where the aim is high integration, high density and miniaturisation of logic devices. This has resulted in the development of new technologies such as 3D ICs that make it possible to integrate extensive functionality into even smaller, faster and lower power consumption devices. However, more complicated integrated circuits require more sophisticated tools for development and prototyping, inspection and failure analysis in order to analyse or reach the areas of interest. Scanning electron microscopy (SEM), in combination with focused ion beam (FIB), is an ideal technique for keeping up with the rapid evolution of the semiconductor industry by offering analytical capabilities with high levels of precision.

Novel batteries inspection

Developing the future energy storage systems, a task which continues to be one of the crucial technological challenges, requires analytical techniques capable of differentiating chemical states with high sensitivity and high spatial resolution. To this end, Nanores offers analyses such as depth profiling and elemental distribution maps to shed light on the insights of Li-ion batteries. Additionally, Helios NanoLab 600i or Helios PFIB can be used to implement FIB 3D reconstruction to investigate the evolution of the Li-ion battery electrodes during extended cycling.



3D FIB-SEM reconstructions of electrodes at different cycling stages [exemplary image]



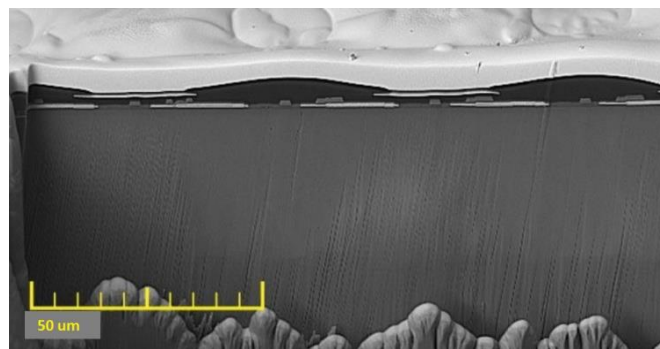
*An EDX spectrum of a Li-ion battery electrode.
[exemplary image, Results obtained by A. M. Korsunsky, et al., NanoEnergy 17, 254 (2015)]*

Display inspection

Displays are delicate structures which can be easily damaged by an electron beam. Nanores provides superb resolution using low beam energies, ideal for damage-free imaging and resolving the beam-sensitive small structures in displays without the need of using protective coatings. The FEI Helios NanoLab 600i is ideally suited to perform small area cross-sectioning of a couple of tens of microns wide in TFT. The FEI Helios PFIB – a Xenon plasma ion source FIB – is the solution for preparing large-scale cross-sections in TFT displays, and for the characterization of defects.



Large scale backside milling of TFT panel performed on Plasma FIB [exemplary image]



Cross-section of an OLED display performed on Plasma FIB [exemplary image]

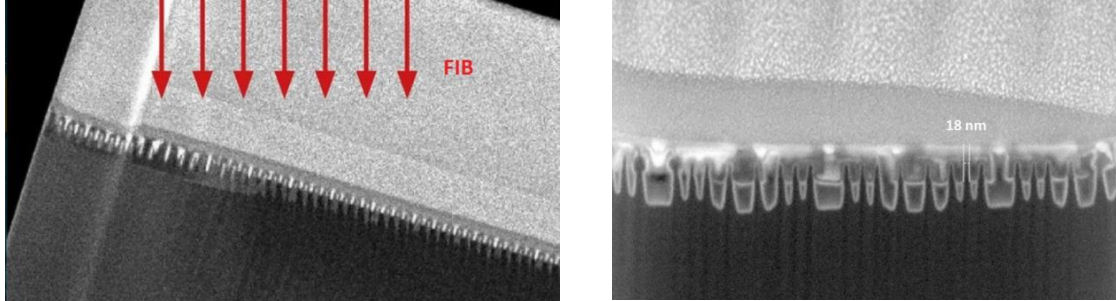
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Integrated circuits analysis

Failure analysis process of micro integrated circuits typically involves delayering and electrical nanoprobng. At Nanores, for the purpose of delayering, we will use a Xe plasma FIB equipped with immersion optics SEM. With technique of Xe plasma FIB etching, we can obtain uniform damage-free, implementation-free delayering. In the case of ultrathin lamella preparation, the process of final polishing with PFIB is much faster and low energy polishing is not required.



Examples of 14 nm node processors lamella preparation (side views) [exemplary images]

OTHER APPLICATIONS AND TECHNIQUES

APPLICATIONS	
NOVEL BATTERIES INSPECTION	YES
DISPLAY INSPECTION	YES
INTEGRATED CIRCUITS ANALYSIS	YES
WIRE BONDING INSPECTION	YES

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CORRECTIONS OF PROTOTYPE CIRCUITS	YES
BALL GRID ARRAY INSPECTION	YES
MEMS/NEMS PROTOTYPING - INVESTIGATIONS AND FABRICATION	YES
THROUGH SILICON VIAS INSPECTION	YES
TECHNIQUES	
FOCUS ION BEAM (Xe and Ga source) SCANNING ELECTRON MICROSCOPY	YES
LITHOGRAPHY SOLUTIONS FOR FIB-SEM APPLICATIONS	YES
FIB-SEM 3D RECONSTRUCTION	YES
CURTAINING-FREE POLISHING (with Xe plasma)	

	YES
UP TO 6' WAFER INSPECTION	YES

Thank you for reading our offer. Please feel free to contact us should you have any questions.

Nanores Team

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OUR PARTNERS



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4. PIK Instruments, Piaseczno, Poland
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