nanores lab

about us

the state-of-the-art independent laboratory of nanotechnology in Poland

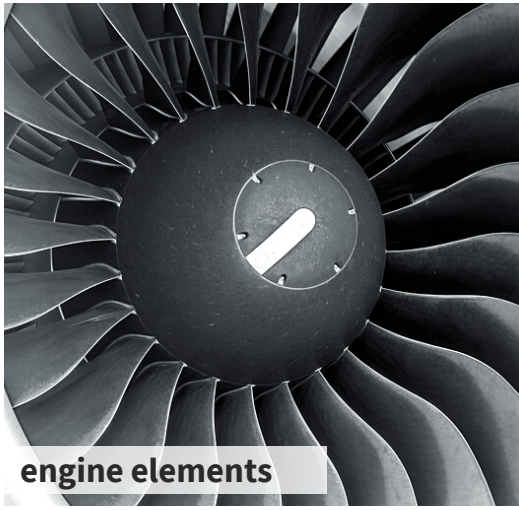
SPECIALIZED COATINGS TESTS is our specialty through a comprehensive set of resources made up of the most cutting-edge laboratory equipment, qualified researchers and engineers, as well as extensive experience.

specialized coatings

Specialized coatings are used in many industries, which is reflected in their wide range of complexity and form. Common critical feature of coatings is their thickness and chemical composition, which often have to meet the strict requirements of manufacturers. These parameters have a direct impact on the quality and reliability of the manufactured components.

Nanores Lab wants to use its experience and know-how to support manufacturers and distributors of coated workpieces in the areas of basic inspection research, R&D, quality control and expertise.

- qualified team of engineers and scientists
- most modern nanotech laboratory equipment
- highest analysis quality
- individual approach
- short testing lead times



engine elements

catalytic converters

connectors

local cross-sections

With our Xe-PFIB and Ga-FIB devices, local cross-sections can be produced with a focused ion beam that allows selective material extraction and the creation of cross-sections with a roughness of up to one nanometer. After removing the material and ion polishing it is possible to create a SEM image and a map of the element surface of the blend.

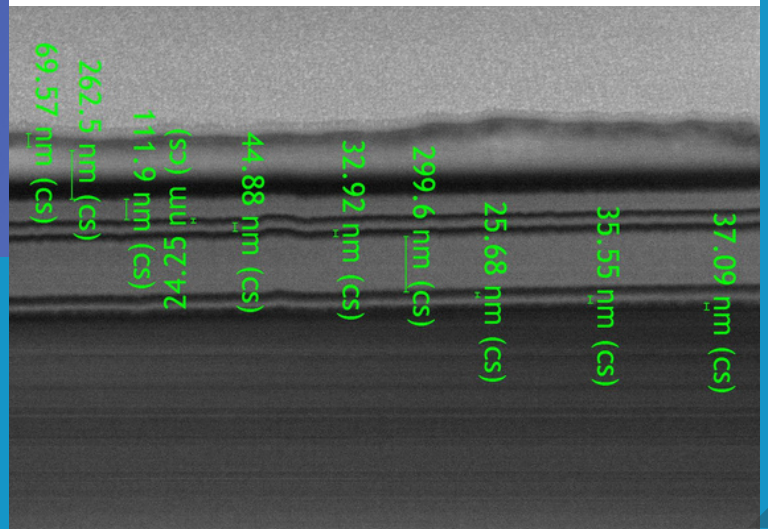
The local cross-section technique does not cause any mechanical damage to the coating that occurs during conventional metallographic preparation and could not be interpreted as defects in the coating.

Get in touch with our specialist to receive an offer matched to your individual needs.

coating thickness measurements

The thickness of the layer is not often a critical parameter that influences the usability of the manufactured elements. For special coatings made of precious and semi-precious metals, their thickness must be strictly controlled within certain intervals.

The offered layer thickness measurement allows a precise determination of the layer thickness at the location specified by the customer. The high-resolution imaging mode allows the measurement of multilayer coatings with a thickness of a few nanometers.



EDS elemental analysis

The Phenom Elemental Mapping Software from Thermo Scientific provides fast and reliable information on the distribution of chemical elements within a sample in the form of elementary point, line and surface distributions.

The software has a very good energy resolution and an extraordinary degree of efficiency. The vibration-free cooling system makes the detector one of the most advanced devices on the market for high-resolution analysis and detection of elements from 4Be to 95Am.

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quality control

Failure analysis and quality control based on high-resolution electron microscopy and spectroscopy

Modern industry relies more and more heavily on quality control and quality assurance for manufactured parts. These are indispensable elements when faced with growing complexity and ever higher standards of reliability imposed on new products. Failure analysis constitutes a critical aspect of quality oversight (FMEA), providing insights into the root cause of component/material failure, establishing manufacturing quality control metrics and enforcing 3rd-party quality requirements. As numerous small, microscopic defects often lead to component failure, observing these factors on an extensive scale and assessing them in quantitative terms is the only way to formulate an accurate description that is needed for root cause analysis and determination (RCA).

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Nanores Lab offers a range of tools for monitoring consistency, based on holistic identification and investigation of defects, faults, and failures. X-ray microtomography (microCT) is used for large volume analysis. This non-destructive technique generates 3D reconstructions of samples with micrometer resolution. With the core features identical to well-known hospital CAT scanning technology, microCT provides a practical overview of the material, allowing for identifying the location of defects and isolating them. Once identified, defects may be extracted and undergo more detailed analysis using higher-resolution techniques, such as electron microscopy (EM).

identification of coating defects

Delaminations, cracks, impurities, porosities, wear or spalls are examples of effects which can be observed on the surface and cross-section of the tested elements. Each of these defectives is the result of a factor whose identification is our main goal.

Once armed with such information, engineers and researchers can introduce quality improvements at the earliest stages of defect formation.

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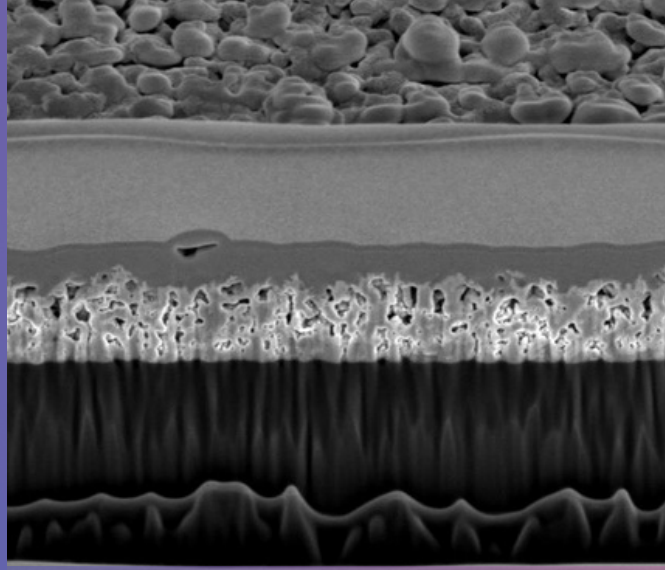
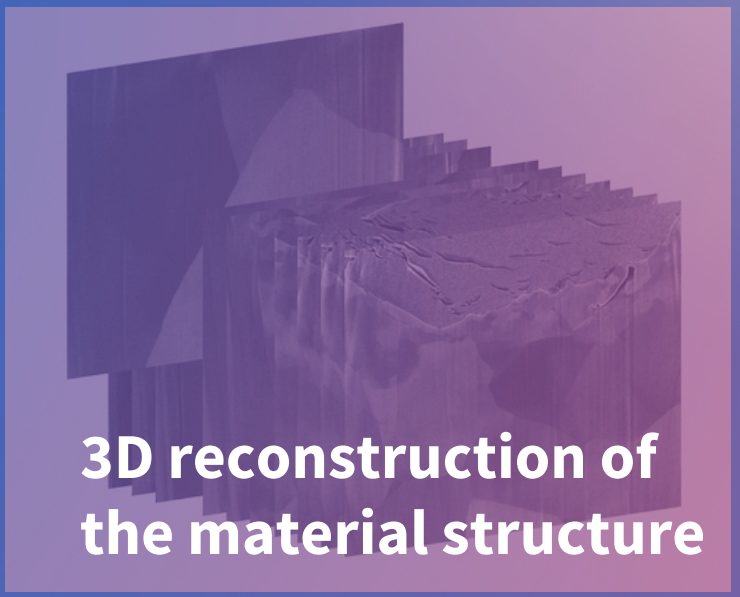


Multi-layer coating at 2 kV with numerous visible cavities. SEM imaging of coatings provides insights into the mechanisms of destruction, formation and propagation of cracks, the consistency of the coating and the identification of phases.

TECHNIQUES

surface morphology

The possibility of determining the surface morphology and the parameters that characterize it allows verification of the correct execution of the processes of ordering of all layers at each stage of production. Nanores Lab has the ability to use confocal laser microscopy, scanning electron microscopy and atomic force microscopy.



3D reconstruction of the material structure

Material development often requires multi-scale 3D characterization. DualBeam instruments enable serial sectioning of large volumes and subsequent SEM imaging at the nanometer scale. The results of this process may then later be processed into high-quality 3D reconstructions of the sample.

precision laser processing

Our femtosecond laser workstation enables cutting difficult materials such as ceramics, diamonds and tempered glass. It is suitable for micromachining and production of microcomponents. It is also widely used in the processing of optical components (photonic crystals, optical fibres, microlenses) and electromechanical microcircuits (MEMS).

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Contact our specialist to receive this offer tailored to your needs.

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