Training Course

X-ray techniques for materials development and process control

Non-destructive insights for advanced materials and processes

09 - 11 Mar 2026

Dresden & online

Training Chair

Prof. Dr. Ehrenfried Zschech
Brandenburg University of Technology (BTU)
Cottbus-Senftenberg

DGM

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09 Mar 10:00 - 11 Mar 2026 15:00

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Understanding materials from the macroscopic down to the atomic scale is essential for developing high-performance products and enabling robust and efficient production processes. Modern X-ray techniques provide a powerful, reliable, and non-destructive way to analyze materials. This training course provides a compact, application-oriented introduction to X-ray techniques at the laboratory scale and beyond, covering material structure, composition, and microstructural features can be efficiently characterized across all length scales. Emphasis is placed on X-ray microscopy and tomography, diffraction and spectroscopy, and how these methods provide advanced insights that support materials development and process control. New approaches to data analysis will also be covered, including AI algorithms. Participants will gain a solid, application-oriented foundation in X-ray physics and learn how to optimize experimental setups, particularly in the selection and use of X-ray tools.

Training Chair

Prof. Dr. Ehrenfried Zschech
Brandenburg University of Technology (BTU) Cottbus-Senftenberg

Lecturer

Dr. Jörg Grenzer
Helmholtz-Zentrum Dresden-Rossendorf

Prof. Dr. David Rafaja
TU Bergakademie Freiberg

Dr. Janis Timoshenko
Fritz-Haber-Institut der Max-Planck-Gesellschaft

Dr. rer. nat. Kristina Kutukova
PVA Technology Hub GmbH

Dr. Roald Tagle
Bruker Nano GmbH

Target group

The training course is best suited for:

- Scientists, engineers, and technicians involved in research and development, industrial process and quality control seeking to enhance their expertise in X-ray techniques.
- Managers and sales professionals with a technical background looking to deepen their understanding of materials science and stay ahead in the industry.
- Professionals working with X-ray techniques or related fields who wish to advance their skills and knowledge in materials characterization and analysis.
- Scientists, engineers and technicians working in research and development as well as industrial production, process and quality control as well as at synchrotron beamlines.

Goals

X-ray techniques are essential for non-destructive process control and development leading to advanced materials in (high-tech) industries.
Here are the main reasons why this course will benefit your company:

- **X-Ray Basics**: Understand the fundamentals of X-ray physics, experiments and instrumentation.
- **Core X-Ray Techniques and Analysis**: Gain in-depth knowledge on X-ray diffraction, tomography, microscopy and spectroscopy for detailed materials analysis.
- **Advanced Data Analysis**: Understand how to apply advanced concepts, including artificial intelligence algorithms, to effectively interpret X-ray data.
- **Evaluate Applicability to your Process**: Discuss the capabilities and limitations of X-ray techniques based on specific use cases from academia and industry.
- **New Developments**: Keep up to date with the latest research and industry-specific solutions in areas such as metallurgy, renewable energy and microelectronics.
- **In-Situ and Operando Studies**: In-Situ and Operando Studies:Gain knowledge about materials ageing and kinetic processes such as microcrack propagation and fracture.

Use this opportunity to advance your company's technology and gain a competitive advantage!

Organizational matters

The platform will be activated one day before the event. Please log in to the conference platform using your DGM user account. If you have forgotten your password, you can generate a new one via the "Forgot password" option. The event will be recorded and will be available as a video in the same location for up to two weeks afterward.

The instructional video for the DGM event platform shows you all available functions.

The training materials will be handed out to participants on-site at the venue. Online participants will receive the training materials in advance.

For accommodation, we recommend searching the relevant online platforms.

On the first evening of the training course, a joint dinner with the participants and the event speakers is planned.

Overview

Program

Prof. Dr. Ehrenfried Zschech
Brandenburg University of Technology (BTU) Cottbus-Senftenberg

Ehrenfried Zschech is a consultant with hands-on experience in the fields of advanced materials, nanotechnology and microelectronics as well as process control and quality assessment. He holds honorary professorships for Nanomaterials at Brandenburg University of Technology Cottbus-Senftenberg and for Nanoanalysis at Dresden University of Technology. His activities include high-resolution X-ray imaging and the development of customized solutions for a broad range of applications including package failure analysis, metrology and inspection in microelectronics. Ehrenfried Zschech received his Dr. rer. nat. degree from Dresden University of Technology. He had several management positions at Airbus, at Advanced Micro Devices, at Fraunhofer and at the start-up deepXscan. Ehrenfried Zschech is Member of the European Academy of Science (EurASc) and Member of the of the German National Academy of Science and Engineering (ACATECH). In 2019, he was awarded with the FEMS European Materials Gold Medal, in 2023 with the DGM Pioneer Award and with the Roland Mitsche Prize.

Dr. Jörg Grenzer
Helmholtz-Zentrum Dresden-Rossendorf

Jörg Grenzer is X-ray physicist and materials scientist, working at the Institute of Radiation Physics of the Helmholtz-Center Dresden-Rossendorf. His main interests are in growth processes of functional materials using laboratory X-ray or synchrotron radiation sources combining different analytical methods and, recently, the study of ultra-fast dynamical / non-equilibrium processes in materials, like laser or XFEL induced shock phenomena. He developed scientific instruments for both laboratory and synchrotron-based setups.

Dr. rer. nat. Kristina Kutukova
PVA Technology Hub GmbH

Kristina Kutukova received her PhD degree from the Brandenburg University of Technology Cottbus-Senftenberg, Germany, in 2023. She was awarded for her scientific work resulting in her PhD thesis "In-situ study of crack propagation in patterned structures of microchips using X-ray microscopy" with the DGM Young Scientist Award in 2023. Kristina Kutukova was a Research Associate in the Department of Microelectronic Materials and Nanoscale Analysis at Fraunhofer Institute for Ceramic Technologies and Systems, Dresden. Subsequently, she headed the Development and Application Lab at deepXscan GmbH, Dresden, with the main tasks to the develop customized solutions for high-resolution 3D imaging and to coordinate development projects. Kristina Kutukova expanded her knowledge in advanced microelectronic technologies by joining the Fraunhofer Institute for Reliability and Microintegration, Dresden. She took on the task as Head of the Application X-ray in the PVA Technology Hub GmbH, Branch Dresden, in September 2024.

Prof. Dr. David Rafaja
TU Bergakademie Freiberg

Solid state physicist Prof. Dr rer. nat. habil. David Rafaja (born 1965 in Prague) has held the Chair of Structure and Microstructure of Materials since 2003 and has been Director of the Institute of Materials Science at the Technische Universität Bergakademie Freiberg since 2005. From 2009 to 2014, he was coordinator and spokesperson of the Saxon Cluster of Excellence "Functional Structural Design of New High Performance Materials by Atomic Design and Defect Engineering (ADDE)", from 2017 to 2023 one of the spokespersons of the "Saxon Alliance for Material and Resource Efficient Technologies (AMARETO)", and since 2022 he has been Dean of Studies for the Master's programme "Advanced Materials Analysis" at the TU Bergakademie Freiberg. His research topics include microstructure design, defect engineering and the further development of methods for structure and microstructure analysis, in particular the further development of diffraction methods.

Dr. Roald Tagle
Bruker Nano GmbH

Dr rer. nat. Roald A. Tagle Berdan has been globally responsible for X-ray fluorescence applications at Bruker Nano since 2022. He was born in Havana, Cuba, in 1973. After studying chemistry in Leipzig and obtaining his doctorate in geochemistry and cosmochemistry in 2004 (Berlin), he conducted research as a Post Doc. Fellow of the German Academy of Sciences LEOPOLDINA at various institutions in Germany, Canada and Belgium. Since 2007 he has been working at Bruker Nano GmbH in the field of spatially resolved X-ray fluorescence analysis and is dedicated to the further development of this technology.

Dr. Janis Timoshenko

Fritz-Haber-Institut der Max-Planck-Gesellschaft

Janis Timoshenko is the leader of the "Operando Hard X-ray spectroscopy" group at the Department of Interface Science of the Fritz-Haber Institute of the Max-Planck Society in Berlin, Germany. He received his PhD in solid state physics in 2015 from the University of Latvia, where he worked under the supervision of Prof. Alexei Kuzmin on the development of advanced approaches to EXAFS data analysis. He then went for postdoctoral positions at the Physics Department of Yeshiva University and the Department of Materials Science and Chemical engineering of Stony Brook University, New York, USA, where he worked on the in situ investigation of nanomaterials using synchrotron radiation under the lead of Prof. Anatoly Frenkel. In 2018 he joined the Department of Interface Science at the Fritz-Haber Institute under the direction of Prof. Beatriz Roldan Cuenya. His primary research interests are synchrotron-based investigations of catalyst transformations under working conditions, as well as the development of simulation-based and machine learning-based approaches for XAS data interpretation. In 2022 he received the Young Scientists Award for Theory and Instrumentation (Farrel Lyttle Prize) from the International X-ray Absorption Society.

Book participation

DGM-Mitglied

DGM-Nachwuchsmitglied	€ 1,200.00 incl. VAT
DGM Mitglied	€ 1,500.00 incl. VAT

Online

Online Teilnahme	€ 1,000.00 incl. VAT

Reguläre Teilnahme

Reguläre Teilnahme	€ 1,600.00 incl. VAT

Contact person

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https://dgm.de/akademie/en/events/x-ray-techniques-for-materials-development-and-process-control-2026-03

Venue

Fraunhofer-Institut
Winterbergstraße 28
01277 Dresden

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