Retrospective

In 2024, Fraunhofer IKTS presented its research and services at numerous trade fairs in Germany and abroad and as the organizer of several scientific congresses as well as at various events for the general public.

February 6, 2024
Maintenance of rail vehicles and rail infrastructure

Together with the Set4Future Research Factory of the rail technology cluster Rail.S e. V., Fraunhofer IKTS organized a workshop in Dresden-Klotzsche that focused on reliable electronics for the safe and efficient operation of trains and rail systems. In presentations and during a tour of the institute, participants learned about the solutions offered by IKTS for prognostic health management, circular economy and augmented reality.

March 8–9, 2024
SPIN2030 science festival

More than 50 scientific institutions from all parts of Saxony gave interested visitors an insight into their exciting work at the Dresden Technology Collections. In its World of Exhibits, Fraunhofer IKTS presented how ultrasound can be used to localize the exact position of a damaging event. This can be used to monitor structures that are difficult to access, such as large wind turbines or underground pipelines. As part of the Science Night, our researchers presented their projects in an entertaining way at the Dresden Fraunhofer Institutes' Science Slam.

March 12, 2024
Lithographic additive manufacturing in practice

Lithographic additive manufacturing methods have now established themselves as promising manufacturing methods for both ceramic and metallic components. Fraunhofer IKTS and Fraunhofer IFAM organized a joint workshop, in which component and system manufacturers reported on their experiences in the use of lithographic AM processes for a wide variety of applications, e.g. in industry, medicine, aerospace, and luxury goods. Participants were able to get to know both institutes during a lab tour and also took the opportunity to exchange ideas in B2B meetings.

March 13, 2024
thyssenkrupp nucera and Fraunhofer IKTS agree on a strategic partnership in SOEC technology

(top image)

A new partnership with the electrolysis technology provider thyssenkrupp nucera was made public at a ceremony held at the IKTS site in Arnstadt. The industrialization of the high-temperature electrolysis developed by Fraunhofer IKTS will enable thyssenkrupp nucera to strengthen its technology portfolio for the production of green hydrogen. By the first quarter of 2025, a pilot plant planned and built by Fraunhofer IKTS is scheduled to start operation for the production of high-temperature electrolysis stacks with SOE cells – the core elements of the SOEC stacks. The strategic partnership also includes a license for the production and use by thyssenkrupp nucera of CFY stacks based on the SOEC technology of Fraunhofer IKTS. Fraunhofer IKTS was honored by the Fraunhofer-Gesellschaft with the "Acquisition of the Year" award for this major project.

March 14 / April 25 + 27 / May 25, 2024
Support for young researchers at IKTS

Our offers for young researchers were once again greatly appreciated in 2024: **The Schau rein!** program focused on training as a physics laboratory technician. Interested pupils from all over Saxony listened to presentations, took on typical tasks in various departments of the institute and had lively conversations with our trainees. On **Girls' Day**, STEM-enthusiastic girls came to us and talked to IKTS employees about career paths. As always, the highlights were the hands-on activities, such as laboratory experiments on nanotechnology, a tour through the tape casting technology center, working with 3D printing and slip casting as well as a ceramics quiz. Young detectives used ultrasound to search for faults at the **Junior Doctor** event. After a theoretical introduction, the pupils from grades 3 to 5 examined various materials. They were able to identify materials and localize damage.

March 27, 2024
Excellent feasibility study confirms potential of CERENERGY®

Altech Batteries GmbH, a joint venture of Fraunhofer IKTS and the ALTECH Group, has reached an important milestone with the publication of the feasibility study for the joint CERENERGY® project. The study underlines the great economic potential of the technology, which offers a sustainable energy storage solution with sodium solid-state batteries, especially for grid applications. A battery factory is planned in Schwarze Pumpe (Saxony) with an annual capacity of 120 battery containers, termed "GridPacks", with an output of 1 MWh each. The analysis predicts that the project will generate an annual profit of 51 million euros and an estimated average annual return of 19 percent from the operation of the battery factory.

April 17 / September 28, 2024
Online seminars in the NDT4Industry series

The NDT4INDUSTRY seminar hosted by Dr. Malgorzata Kopycinska-Müller and Mohammad Tadayon in April was about the further development of biologized materials. They presented how materials that integrate or imitate biological components can be characterized using optical coherence tomography (OCT) and nanomechanical in-situ SEM/TEM evaluations. "From fiber to component – current testing and monitoring methods for CFRP" was the title of our fall seminar, which took place as part of the Webseminar Wednesday of Composites United e.V. Dr. Kilian Tschöke and Martin Schulze presented automated testing and monitoring technologies based on ultrasound and eddy currents that are being developed at Fraunhofer IKTS.

April 24, 2024
Trade fairs: experts and technologies live
(top image)

A total of 31 appearances in Germany and abroad reflected the diversity of the institute and the areas of application of ceramic components, systems and non-destructive testing technologies. The institute demonstrated solutions for the bioeconomy at **HANNOVER MESSE** and **ACHEMA** in Frankfurt. The focus was on indoor farming and controlled environment agriculture (CEA) as an innovative method of plant cultivation that takes place in closed systems under controlled conditions. IKTS demonstrated its expertise in water treatment, monitoring and nutrient use as well as in lighting, climate control and the development of control concepts. Water treatment technologies as well as air filtration and gas separation using membranes were presented at **IFAT** and **FILTECH**. Solutions for the energy transition – from materials to systems - were

the focus of the **European Hydrogen Week** in Brussels. IKTS researchers were also represented at **CERAMITEC**, the leading trade fair for the ceramics industry. Key topics for the institute were the decarbonization of industrial processes, the circular economy for by-products and waste products and the role of the ceramics industry in energy generation and storage as a user and supplier with a focus on hydrogen technology. Visitors got to know innovative systems for condition monitoring and non-destructive testing at the exhibition stands at **JEC World** in Paris and at **WCNDT** in South Korea. The focus here was on non-destructive quality assurance for CFRP lightweight components and battery slurries as well as augmented reality (AR)-supported ultrasonic testing. Testing systems for railroad technology and infrastructure were presented at **Innotrans**. IKTS presented innovative developments for electrocaloric cooling elements and power electronics at **Chillventa** and **Electronica**. A preview of the upcoming trade fairs can be found on page 67.

April 24, 2024
Opening of the coordination office for research cooperation with Korea

In Berlin, the Korea Institute for Advancement of Technology (KIAT) and Fraunhofer opened a coordination office to strengthen international research cooperation in the presence of representatives from the Korean Ministry of Trade, Industry and Energy (MOTIE). The so-called "K-FAST – Korea Fraunhofer Office of Science and Technology", as one of six coordination centers worldwide, aims to network the Korean economy more closely with partners of excellence. In Germany, in addition to KIAT, the Fraunhofer-Gesellschaft is involved in the initiative with eight institutes – under the leadership of Fraunhofer IKTS.

May 25 and June 14, 2024

Long Science Nights in Freiberg and Dresden

(top image)

At the **Freiberg Night of Science and Business** in May, the IKTS team at Fraunhofer THM provided insights into battery recycling technologies. The "Carbon Cycle Technologies KKT" working group explained the chemical recycling of plastics. With hands-on experiments, laboratory tours and lectures, the Dresden IKTS team presented its research at the **Dresden Long Night of Science** 2024 in June. Children were able to electrochemically "gold plate" 5-cent pieces, look inside objects with a HoloLens and test their knowledge in the children's quiz. Grown-up guests learned how to use ultrasound to detect cracks in components and how to clean wastewater using electrolyte cells. The event also offered the opportunity to take a look at our 3D printing labs.

June 12, 2024

IKTS takes part in REWE Team Challenge

24 motivated IKTS employees competed in the REWE Team Challenge Dresden in six teams with creative names such as Rennstoffzellen, CerAMigos or Höchstleistungskeramiker, aiming to place the institute as high as possible. The running event is one of the largest company runs in Germany. A record 28,500 runners took part in the 15th edition. The IKTS team will be competing again in 2025.

June 22, 2024

IKTS PhD student receives Manfred Hirschvogel Prize

IKTS researcher Dr. Gregor Herz received the Manfred Hirschvogel Prize from TU Dresden for his dissertation on the "Techno-economic analysis of hydrogen-based approaches for emission mitigation for the steel industry". The prize is endowed with 5000 euros and awarded annually for the best dissertation in the field of mechanical engineering.

August 22, 2024

Health Day at the Fraunhofer Institute Center in Dresden

On August 22, it was time for employees at the Fraunhofer Institute Center in Dresden to leave the laboratory or office and put on their sneakers. With a colorful sports program ranging from yoga to human soccer, individual check-ups and informative lectures, the Health Day on campus invited people to learn about health issues and get active in sports. Due to the positive response, the concept will be continued.

August 29, 2024

Europe's first R&D center for transparent ceramics is opened in Hermsdorf

(middle image)

A new research and development center for transparent ceramics was opened at the IKTS site in Hermsdorf in the presence of Wolfgang Tiefensee, Thuringian Minister for Economic Affairs and Science. The center is unique in Europe and covers the entire process chain for the production of transparent ceramic components, not only on a laboratory scale, but also on the pilot and series scales. The new infrastructure includes equipment and facilities for the conditioning of high-purity powders, shaping, heat treatment, laser and ultra-precision machining. In the future, a variety of novel, cost-effective applications will be developed here together with partners from industry.

September 1, 2024

Reinforcing the BTU team: Constanze Tschöpe appointed

(page 17 top left image)

Dr.-Ing. Constanze Tschöpe was appointed to the Brandenburg University of Technology Cottbus-Senftenberg (BTU), where she took up the professorship for Cognitive Materials Analytics at the MINT faculty – Mathematics, Computer Science, Physics, Electrical Engineering and Information Technology. She has been working at Fraunhofer IKTS in Dresden since 1996 and

is currently group manager of "Machine Learning and Data Analysis" and head of the Fraunhofer Project Group "Cognitive Materials Diagnostics".

September 7, 2024
Open house day at the Hermsdorf site

A glimpse behind the scenes of a research institute – many people took advantage of this opportunity and visited the Hermsdorf site during the open house day at Fraunhofer IKTS. Open laboratories in five buildings, tours through technical centers, lectures by deputy institute director Prof. Ingolf Voigt, hands-on experiments with non-Newtonian fluids or clever mini-robots – the numerous guests were offered an exciting program.

September 11, 2024
Technology Day "Electronics of the Future"

The first "TechVision" technology day took place in Dresden, organized by Fraunhofer IKTS in cooperation with Fraunhofer IZM and CONTAG AG. The focus was on the professional exchange of ideas and networking on innovative solutions for printed circuit boards, ceramic circuit carriers and their assembly and connection technologies (AVT), RF & smart sensor systems as well as 3D electronics, following the motto "Electronics for the future – PCBs and beyond".

September 17, 2024
Outstanding IKTS personalities honored
(top right image)

The late Dr. Gerhard Gille and Prof. Waldemar Hermel were honored by their colleagues, companions and guests at the invitation of Fraunhofer IKTS and H.C. Starck, in the presence of their families. Dr. Gerhard Gille made an important contribution to the development of hard materials and the hardmetals constructed from them, initially at ZFW Dresden, and subsequently at Fraunhofer IKTS and at H.C. Starck Tungsten GmbH. Prof. Waldemar Hermel worked on effective sintering processes for metal powders at ZFW and made a significant contribution to the development of technical ceramics. As founding director of IKTS, he played a major role in establishing the institute.

September 24, 2024
Funding intelligent maintenance of trains

As part of Innotrans 2024, Dr. Volker Wissing, Federal Minister for Digital and Transport, presented two funding notifications for the D4M and DEFLECTOR projects, in which Brandenburg University of Technology Cottbus-Senftenberg, Deutsche Bahn, Fraunhofer IKTS and other local companies are involved. The aim of the projects is to use artificial intelligence (AI) and sensor technology to make train maintenance even more precise, economical and sustainable in the future.

October 8, 2024
Annual Conference Ceramic Applications

For 20 years, the "Ceramics Meeting Point" at Fraunhofer IKTS in Dresden has not only presented its own research highlights, but also exhibits from more than 90 industrial partners. In 2024, the Ceramic Applications industry network partners, including ceramics companies and user companies, were guests at IKTS.

November 4–5, 2024
ESYMS – European School for Young Materials Scientists

On November 4–5, 2024, about 50 young materials scientists from Europe met at Fraunhofer IKTS in Dresden. They exchanged ideas in the fields of materials science, nano-

technology, nanoscale materials, nanoanalysis, multi-scale materials characterization, and microscopy. The conference included two talks by senior scientists and great contributions from the PhD students. The best four presentations and posters were honored with an award.

November 6–7, 2024

CMC – Correlative Materials Characterization Workshop

The CMC workshop took place in Dresden on November 6 and 7, 2024 and attracted more than 100 participants from ten countries. They took the opportunity to discuss all relevant techniques for correlative materials characterization. In compelling talks, the speakers presented new developments in the fields of light microscopy, electron microscopy, X-ray microscopy, and atomic force microscopy.

November 6–8, 2024

ISPA 2024

For the 10th time, international experts met in Dresden for the International Symposium on Piezocomposite Applications ISPA to exchange ideas on new developments, applications and market requirements for piezocomposites. This year, the focus was on applications in the fields of high-intensity focused ultrasound (HIFU), sonar technology and energy harvesting. The event opened with an industry workshop, hosted by CTS Ferroperm Piezoceramics.

November 13, 2024

HTW professorship for IKTS researcher Laura Nousch

(bottom left image)

Dr.-Ing. Laura Nousch has been appointed Professor of Regenerative and Sustainable Energy Systems at the Faculty of Mechanical Engineering at HTW Dresden. The graduate mechanical engineer has been conducting research on high-temperature fuel cell systems at Fraunhofer IKTS since 2011. Current projects focus, among other things, on alternative fuels such as ammonia. In her new position, she is working on the use of renewable energies in buildings and neighborhoods. The sustainability aspect in the sense of life cycle assessments plays an important role here.

November 22, 2024

Long Night of Science in Jena

Together with the Thuringian Water Innovation Cluster ThWIC and Hermsdorf student laboratory Sensor Space, Fraunhofer IKTS participated in the Long Night of Science in Jena with an interactive program on water research. Visitors were able to test their own water samples, carry out water purification experiments or virtually explore a waterworks plant using VR glasses.

January 1, 2025

Fraunhofer IKTS strengthens activities in Saxony-Anhalt

The Center for Economics and Management of Technologies (CEM), based in Halle (Saale), has been part of Fraunhofer IKTS since January 2025. CEM expands the competence portfolio toward techno-economic analyses, the modeling of process and value chains as well as technology and regulatory impact assessment. The goal is to provide companies and organizations with intensive support in mastering transformation processes, improving innovation processes and becoming successfully active in new fields of technology. The focus here is on technology transfer in the chemical and process industries as well as the evaluation of regional and location-based transformation concepts. Read more on page 20.

February 5, 2025

Natalia Beshchasna becomes Adjunct Professor at Indonesian University

(bottom right image)

Dr.-Ing. Natalia Beshchasna has headed the IKTS working group "Biodegradation and Nanofunctionalization" at the Dresden-Klotzsche site since 2020, where she researches material changes and aging processes of implants in order to understand interactions between functionalized implant materials and human tissue. She has now been appointed Adjunct Professor at Universitas Gadjah Mada, one of the largest and most renowned universities in Indonesia. Her work will focus on polymer-based structures and nanomaterials in the dental sector as well as microfluidic-based organ-on-chip systems.