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Fraunhofer Institute for Ceramic Technologies and Systems IKTS

Fraunhofer IKTS in profile

From materials to competitive edge

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Fraunhofer IKTS in profile

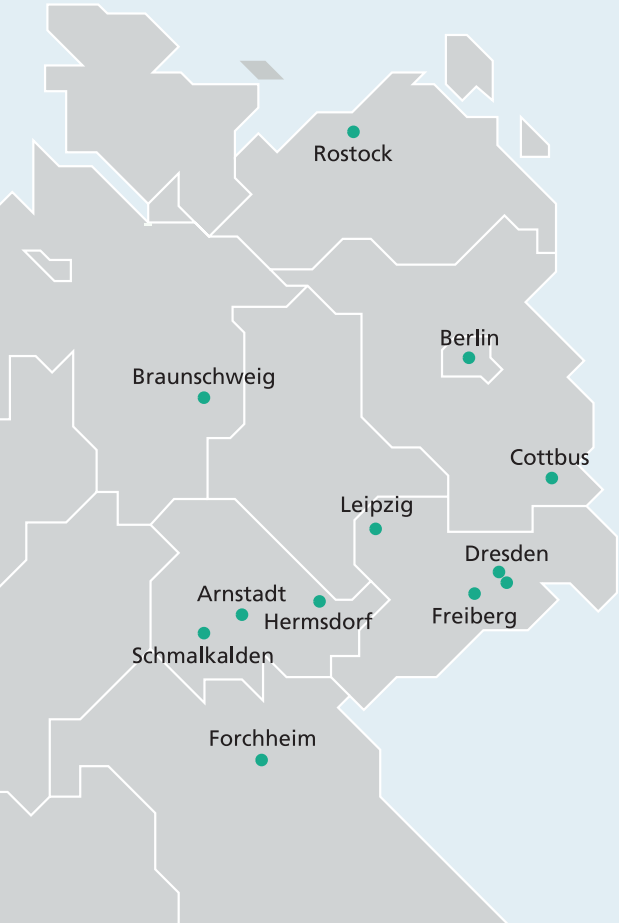
For more than 30 years, Fraunhofer IKTS has been demonstrating the potential of ceramic materials in a steadily growing range of applications. Our development work is derived from the needs of nine market-oriented business divisions – supplemented by strategic preliminary research at the highest scientific level.

It is our drive to develop complete system solutions and services, but also to solve specific challenges within the processes of our partners from industry and science. Our expertise in the characterization and analysis of materials, components and systems along their life cycle provides us with a unique data pool to carry out new developments more efficiently and faster.

With state-of-the-art equipment on more than 40,000 m², competent staff and result-oriented research management, we offer a contact point for companies and research partners to tap the unique properties of ceramic materials for new and improved applications.

Sites

Fraunhofer IKTS has a staff of more than 800 at its three main sites in Dresden and Hermsdorf as well as numerous external locations. This makes it the largest ceramics research institute in Europe. Researchers have access to 40,000 m^2 of floor space with excellently equipped laboratories and pilot plants. These include both pilot lines suitable for industrial use and application centers in which new developments can be tested under conditions that are close to industrial practice.



Expertise

Materials

We qualify ceramics, hardmetals and composites for specific application scenarios and master the necessary manufacturing processes at the highest level. We open up new fields of application through the targeted combination of structural and functional material properties. We can transfer developments from laboratory to pilot-plant scale and realize the prototypes and pilot series required for market entry, establish industrial manufacturing processes and implement quality processes.

Process engineering

We are one of the world's leading research institutes in the field of complex ceramic-based systems for energy-efficient separation processes, chemical mass transfer, and materials recovery. Our approaches are based on the sustainable use of resources and closed materials cycles. In state-of-the-art laboratory and pilot plants, we can model, validate and optimize relevant parameters for these processes. With our excellent infrastructure, we are able to realize projects of the most diverse scope and scale.

Data-driven analytics and monitoring

To increase the market acceptance of new materials, high-performance analytics and quality control are required – from raw material evaluation to use and recycling. For the development of new materials and products, the clarification of complex failure mechanisms or the assurance of qualitative standards, we make use of new sensor concepts, robot-assisted measurements as well as possibilities of cloud-based data acquisition and AI-supported data evaluation. In addition, we offer inspection systems for the condition monitoring of manufacturing facilities and thus ensure optimal product qualities, low inspection costs and reduced maintenance efforts.

System demonstration

For energy and process engineering systems, we are able to implement targeted system demonstrations based on market and customer requirements on the one hand and available technological options on the other. Material or technology issues are dealt with at the individual stages of the value chain, prototypes are evaluated on the basis of extensive validation and target/performance analysis of market readiness, and production and quality processes suitable for series production are developed. This qualifies us as a complete service provider for the entire process of technology development and the step-by-step transfer of knowledge into the customer's series development.

Circular economy and digitization go hand in hand in materials research.

Prof. Alexander Michaelis
Institute Director of Fraunhofer IKTS

Business divisions

We work in nine business divisions to demonstrate and qualify ceramic materials and non-destructive testing methods for new products and markets.

Materials and Processes

Materials development, powder technology and semi-finished products, shaping, heat treatment and sintering, green machining and finishing, joining and bonding technologies

Materials and Process Analysis

Raw materials analysis and evaluation, characterization of materials and components along the entire process chain, component and systems performance, modeling and simulation

Energy

Energy storage systems, fuel cells, electrolysis, power-to-X, bioenergy, deep geothermics, photovoltaics, solar thermics, energy harvesting, thermal energy systems, battery recycling

Water

Industrial process water, municipal wastewater, drinking water, mining water, agriculture

Environmental and Process Engineering

CO_2 reduction, exhaust gas after-treatment and gas processing, recycables recovery, alternate fuels, oxygen production and use, biotechnological processes

Non-Destructive Testing and Monitoring

Method development for non-destructive testing procedures, testing and tracking systems, integrated quality control for

Materials research is the foundation of our lives. Without it progress is not possible.

German Federal Ministry of Education and Research

processes and plants, permanent monitoring of components and structures

Electronics and Microsystems

Electronic devices, sensors and sensor systems, printing inks and flexible electronics, intelligent materials, analytics and reliability for micro- und nanoelectronics

Mechanical and Automotive Engineering

Wear and corrosion resistance, high-temperature components, tools

Bio- and Medical Technology

Dental and implant ceramics, bone substitute material, surgical materials, diagnosis and therapy systems

Materials as drivers of innovation

Materials such as ceramics are drivers of innovation for new and improved products that increase competitiveness and enable completely new applications. They play a pacemaker role in meeting the societal challenges of sustainable energy and raw materials supply, modern mobility or individualized medicine. In addition to comprehensive materials expertise, transferring materials into applications requires a thorough understanding of the manufacturing processes and the conditions of use in the subsequent overall system.

Research at Fraunhofer IKTS also spans the entire life cycle of a material – ideally as a closed loop. We make targeted use of the opportunities offered by digitized manufacturing processes in order to identify sources of error at an early stage, optimize production processes and establish holistic data management. State-of-the-art industrial equipment is available for all relevant technology lines to support customers not only in the realization of prototypes and pilot series but also in the establishment of optimized and quality-assured production processes.

Around 70 percent of all technical innovations depend [...] on the properties of the materials used.

German Federal Ministry of Education and Research

Cooperation opportunities

On-off contracts

In line with the company's research or development needs, Fraunhofer IKTS develops a solution that meets deadlines, quality and IP requirements.

Joint projects with multiple partners

For very complex challenges, the entire environment of the Fraunhofer Institutes is available. External partners can also be consulted.

Strategic partnerships and innovation clusters

Preliminary research often results in ongoing partnerships with companies at the regional and international level.

Spin-offs

Strategic participations and joint ventures are also possible in the case of spin-offs. Clients of new developments can also become partners of a spin-off.

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