



Fraunhofer
IKTS

FRAUNHOFER INSTITUTE FOR
CERAMIC TECHNOLOGIES AND SYSTEMS IKTS

**FRAUNHOFER IKTS IN PROFILE
FROM MATERIALS TO SYSTEMS**





GAINING THE COMPETITIVE EDGE THROUGH CERAMICS

High-performance ceramics have become an essential part of nearly all fields of industrial manufacturing, as well as of everyday life. Structural and functional ceramics offer excellent mechanical, thermal, chemical and electrochemical properties. As functionally decisive components, they contribute immensely to the creation of value.

High-performance ceramics are therefore the starting point for the continuous improvement of systems but also for completely new applications. The fact that they are superior to many other materials means they are frequently the only viable technical solution. This is shown by unique applications from the fields of plant engineering and construction, energy technology, and environmental and process engineering – such as robust wear and high-temperature components, highly efficient energy storage and converter systems, or compact water and waste water treatment plants.

Thanks to these developments, the users of high-performance ceramics are able to set themselves apart from competing companies and secure a long-term competitive edge.



FRAUNHOFER IKTS IN PROFILE

The Fraunhofer Institute for Ceramic Technologies and Systems IKTS covers the field of advanced ceramics from basic preliminary research through to the entire range of applications. As a research and technology service provider, we develop modern ceramic high-performance materials, customized industrial manufacturing processes and create prototype components and systems. Furthermore, we offer various test procedures and systems which contribute substantially to the quality assurance of products and plants. Fraunhofer IKTS is therefore available as a competent consulting partner and starting point for all ceramics-related issues: a real "one stop shop" for ceramics. Among our unique areas of expertise, we offer:

- **Complete production line**

From materials to systems

- **Multiscale development**

From laboratory to pilot scale

- **Structural and functional ceramics**

Combination of different technology platforms

- **Material, component and process analysis**

Throughout the entire product life cycle

- **Network creator**

More than 450 national and international partners



EXPERTISE

Structural and functional ceramics

Fraunhofer IKTS handles and optimizes powder metallurgical manufacturing processes for all ceramic material classes to the highest standard. In this regard, we are able to transfer developments from the lab into the pilot-plant stage and realize, for the benefit of our partners and clients, the prototypes and pre-series designs required for market entry; furthermore, we can also implement quality processes. All this allows to minimize time-to-market and risks related to remnant costs. Regarding functional ceramics, we have special know-how in paste and tape casting technology. The combination of functional with structural ceramics enables the production of cost-efficient multifunctional components and systems offering considerable added value.

Environmental and process engineering

When it comes to mass transfer technology and chemical reaction engineering using ceramic materials, we are among the leading research institutions worldwide. Our knowledge of materials is intertwined with our know-how in engineering and processes. This enables us to develop complex process-engineering systems for energy-efficient mass transfer processes, chemical conversion and the recovery of valuable materials. Ceramic membranes, filters, adsorbents and catalysts of Fraunhofer IKTS play a vital role in this context.



Material and process analysis, plant monitoring

In industrial production processes, powerful analytics and quality control are pivotal factors when it comes to achieving market acceptance of products. Using its deep and comprehensive process and material analytics capabilities, Fraunhofer IKTS advises clients in the development of new materials and products, helps to solve complex failure mechanisms and reach compliance with legal and quality-related standards. Beyond this, we provide test systems for the condition monitoring of components and plants, thus ensuring optimal process and product qualities, low manufacturing and testing costs, as well as reduced downtime due to maintenance or failure.



BUSINESS DIVISIONS

The institute operates in eight market-oriented business divisions to demonstrate and qualify ceramic technologies and components as well as non-destructive test methods for new industries, product concepts and markets beyond the established fields of application. These include:

Materials and Processes

Materials development · Powder technology and semi-finished products · Shaping · Heat treatment and sintering · Green machining and finishing · Joining

Mechanical and Automotive Engineering

Wear and corrosion resistance · Tools · High-temperature components · Exhaust gas treatment · Test systems · Process, machine and system monitoring · Sensor technology

Optics

Light systems · Optics and laser technology · Optical measurement and diagnostic systems · Transparent protection · Decorative and design ceramics

Bio- and Medical Technology

Implants · Dental ceramics · Biosensors and bioactuators · Surgical instruments and components · Analytics and diagnostics



Energy

Energy storage systems · Fuel cells · Electrolysis and power-to-gas · Photovoltaics and solar thermal systems · Energy harvesting · High-temperature gas turbines and thermal energy systems · Bioenergy · Synthetic fuels · Deep geothermics

Environmental and Process Engineering

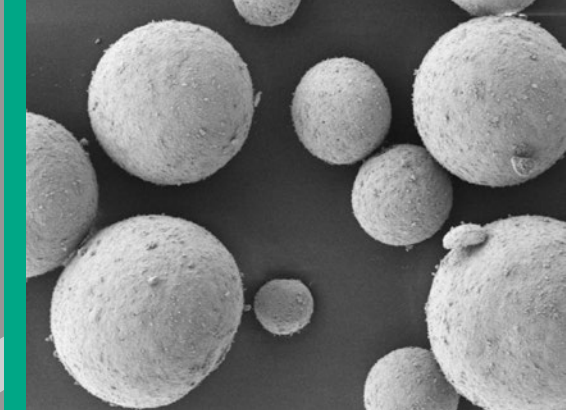
Waste water management and water treatment · Oxygen production and use · Exhaust gas after-treatment and gas processing · Chemistry and electrochemistry · Biotechnological processes

Electronics and Microsystems

Electronic devices and components · Sensors and sensor systems · Electronic microsystems · Intelligent materials and systems · Material parameters and reliability · Printing inks and flexible electronics

Materials and Process Analysis

Raw materials analysis and evaluation · Characterization along the entire process chain · Materials and component characterization · Component and systems performance · Analytics for micro- and nanoelectronics · Modeling and simulation



SITES

Fraunhofer IKTS has its headquarters in Dresden, with two more sites in Dresden-Klotzsche and Hermsdorf (Thuringia). All in all, more than 650 employees work with our company at these three locations. Together, the three sites constitute the largest ceramics research institute in Europe. For their research, the scientists have access to exceptionally well-equipped labs and pilot plants on more than 30,000 m² usable surface.

Furthermore, we operate several branch labs – for instance, the application centers for battery technology, bioenergy and membrane technology – where new developments are tested with the focus on their potential applications.

Together with the Department of Energy and Environmental Protection DEEP of the State of Connecticut and the University of Connecticut, Fraunhofer IKTS has founded the Fraunhofer Center for Energy Innovation CEI.



COOPERATION MODELS

One-off contracts

The classic model of cooperation: A company perceives a need for research or development. A discussion with Fraunhofer IKTS identifies possible solutions and clarifies the form the partnership could take and the estimated cost.

Large-scale projects with multiple partners

Some challenges are so complex that they require multiple partners to develop a solution. Clients in this situation have access to the full range of Fraunhofer Institutes. It is also possible to incorporate external partners and additional companies.

Strategic partnerships and innovation clusters

Pre-competitive research which starts off without any ties to specific development contracts often results in long-term partnerships with companies on a regional and international level.

Spin-offs

Fraunhofer researchers often take the step towards independence by founding their own company. Fraunhofer itself only participates in these kinds of start-ups up to a certain extent. Sometimes the customer who commissioned the new development is interested in taking a stake in the spin-off company.



FRAUNHOFER IKTS IN PROFILE

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