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 lab scale 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

**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 remarkably 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.

**CONTACT**

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Winterbergstrasse 26
01277 Dresden, Germany
Phone +49 351 2553-7700
Fax +49 351 2553-7600
Michael-Faraday-Straße 1
01109 Dresden, Germany
Phone +49 36601 9301-0
Fax +49 36601 9301-3921
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**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.
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**EXPERTISE**

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**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. Due to the unique properties of ceramic materials, our know-how is intertwined with our expertise 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, absorbers and catalysts of Fraunhofer IKTS play a vital role in this context.

**Material and process analysis, plant monitoring**

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 process designs required for market entry. Furthermore, we can also implement quality processes. All this allows us 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.

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**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
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- Waste water management and water treatment
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- Chemistry and electrochemistry
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**Electronics and Microsystems**

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**Materials and Process Analysis**

- Raw materials analysis and evaluation
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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
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Energy
- Energy storage systems
- Fuel cells
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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.
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
- Network creator

More than 450 national and international partners

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.

CONTACT
Fraunhofer Institute for Ceramic Technologies and Systems IKTS
Winterbergstrasse 26
01277 Dresden, Germany
Phone +49 351 2553-7700
Fax +49 351 2553-7900

Michael-Faraday-Strasse 1
01109 Dresden, Germany
Phone +49 36601 9301-0
Fax +49 36601 9301-3921

Maria-Reiche-Strasse 2
01109 Dresden, Germany
Phone +49 351 88815-501
Fax +49 351 88815-509

info@ikts.fraunhofer.de
www.ikts.fraunhofer.de

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FRAUNHOFER IKTS FROM MATERIALS TO SYSTEMS