



**Fraunhofer**

FEP



**Fraunhofer FEP in profile**

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# Evolution of Surface and Light

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# Evolution of Surface and Light

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Fraunhofer FEP has more than 30 years of expertise in research and development of technologies for innovative solutions in the field of vacuum coating and surface treatment.

Our core competencies:

- Electron beam technology
- Plasma-activated evaporation
- Magnetron sputtering

With focus on the needs of our customers, we research and develop on efficient and sustainable processes and innovative devices up to pilot production for:

- Thin film coating and surface refining
- Plasma chemistry
- Biotechnological processes



# Fields of Application

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Our core competencies in electron beam and plasma technology are the basis for the development of processes and solutions for a wide range of application fields.



## Energy and Sustainability

- Piezoelectric layers for energy harvesting
- Lithium thin films for energy storage media
- Layer systems for solar heating and photovoltaic systems
- Energy-efficient coatings for smart buildings
- Coating technologies for production, storage and processing of hydrogen
- Non-thermal electron beam processes for treatment of exhaust gases
- Effective metal extraction with electron-stimulated microorganisms by bioleaching



## Electronics, Optics and Engineering

- Plasma pre-treatment and wet-chemical cleaning
- Optical filters and precision layer systems for displays
- Anti-scratch and anti-reflection layers for optics
- High-barrier layers for electronics
- Optical sensors and thin-film corrosion sensors
- Corrosion protection layers and hard material layers



## Mobility

- Coatings for automotive and aviation (interior, exterior)
- Anti-reflective, anti-corrosive, anti-freeze coatings
- Surface refinement of additively manufactured parts
- Coatings for hydrogen technology
- Functional thin-film structures for integrated radar sensors
- Thermal barrier layers for turbine blades
- Electron beam modification of surfaces, e.g. curing or welding for automotive industry



## Food Industry and Healthcare

- Coatings for biodegradable packaging
- Electron beam treatment of seeds
- Sterilization and hygienization concepts and technologies
- Virus inactivation by low-energy electron beams
- Sensors and diagnostics
- Coatings and surface treatment for implants and medical products

# Expertise and Research Focus



## Electron Beam Technology

- Use of accelerated electrons in the energy range of 10–300 keV
- Application of electron beam technology in industrial-scale manufacturing
- Use of the thermal, chemical, and biological effects of accelerated electrons
- Technological engineering and tailored development of new processes as well as new electron-beam sources



## Plasma Technology

- Development of plasma-activated coating processes for industrial-scale manufacturing
- Development of large-area coatings based on both PVD and PECVD processes in roll-to-roll and sheet-to-sheet
- Development and application of integrated suitable cleaning processes and plasma pre-treatment



## Sputter Technology

- Development and use of state-of-the-art sputtering methods for complex coating requirements
- Application of thin, functional layers by cathode sputtering in sheet-to-sheet and roll-to-roll, as well as on 3D components

## **Process Engineering**

We offer customized solutions for process development, optimization, and scale up of technologies. We have extensive experience in designing and optimizing processes for a variety of applications, including thin film deposition, surface modification, and surface cleaning. We offer sample coatings and substrate treatments, technology transfer, commissioning, and customer support. The institute also offers services for process simulation and modeling, as well as for process automation and control.

## **Technological Key Components**

We develop, manufacture, and integrate industrial electron beam, coating, and plasma sources as well as specific supply, control, and regulation technology.

## **Pilot Fabrication**

Pilot fabrication at Fraunhofer FEP offers industrial partners the opportunity to bring new products to market quickly and cost-effectively by drawing on the institute's extensive experience and expertise in the development and production of innovative materials and coatings.

## **Test, Characterization and Bioanalytics**

Our institute has versatile tools and methods for characterization of thin films and surfaces. The equipment and the wide analytical experience of our staff are available for the product and technology development within the institutes activities and project work as well as a service offer to our customers.

# How to work with us

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Our services range from customized solutions to the optimization of complex production processes. In doing so, we work with you in the way that best suits your individual needs. Our aim is to transfer know-how from scientific research and development to industry.



**Contract research**



**Joint projects with  
multiple partners**



**Strategic partnerships  
and innovation clusters**



**Spin-offs**



**Licensing**

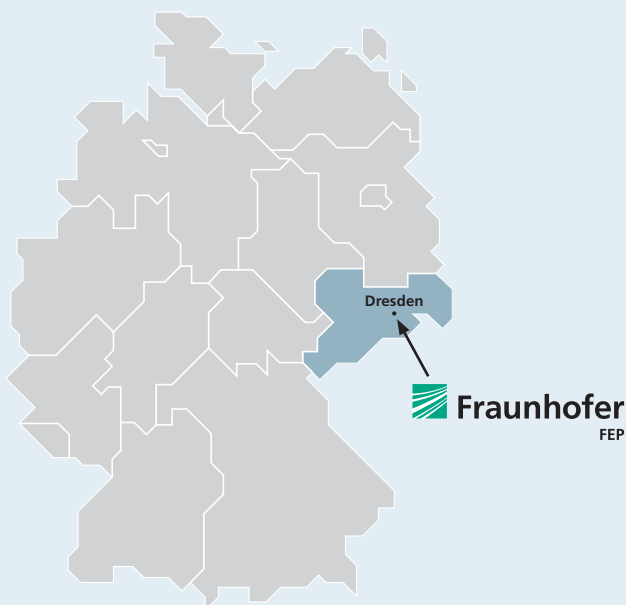
# Contact

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## Director

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and the ISO 9001.*



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