Fraunhofer
IMWS

FRAUNHOFER INSTITUTE FOR MICROSTRUCTURE OF MATERIALS AND SYSTEMS IMWS

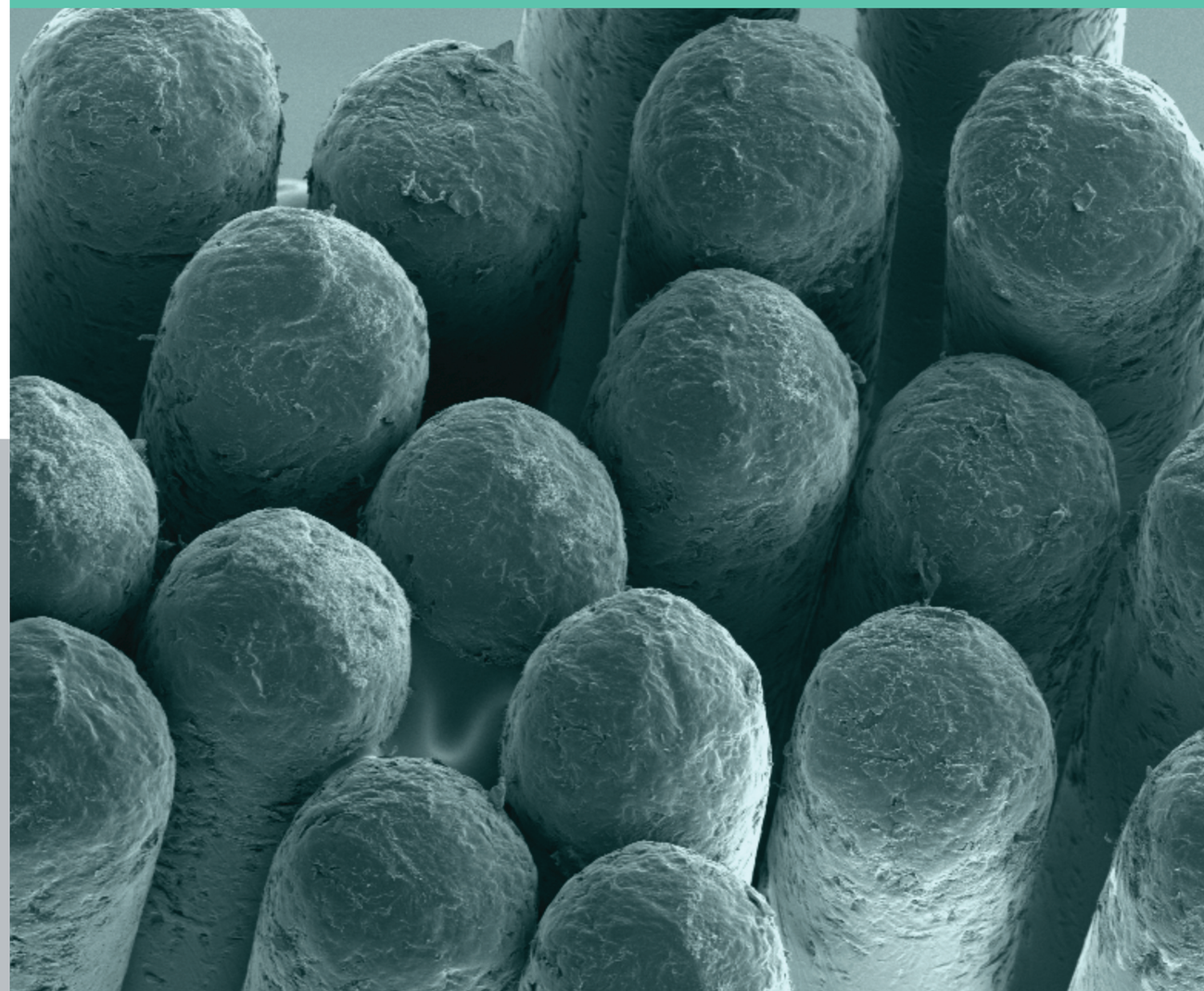
Fraunhofer IMWS

Project-based industry-oriented contract research
The Fraunhofer IMWS is the point of contact for industry and public contracting bodies on the topic of material functionality and reliability. Its core competencies are microstructure diagnostics and design. We understand materials down to the molecular level and link their microstructure to their functionality, efficacy and durability.

Fraunhofer-Gesellschaft
Fraunhofer IMWS is a member of the Fraunhofer-Gesellschaft, Europe's largest application-oriented research organization. Its research activities are conducted by 72 institutes and research units at locations throughout Germany. More than 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. Fraunhofer research efforts are geared entirely to people's need: health, security, communication, energy and the environment. We are creative. We shape technology. We design products. We improve methods and techniques.

Reasons for a cooperation with Fraunhofer IMWS
Fraunhofer IMWS uses the latest material science and technology developments. It has a broad-based range of expertise – more than 200 motivated and competent employees can form teams that meet any project`s individual needs.
Many hundreds of successful research and development projects carried out every year and a certified quality management system are proof of the institute's reliability in carrying out projects that meet the needs and conditions of industry. The high level of customer satisfaction proved by customer surveys confirm our reputation.

MATERIAL RESEARCH IN DENTAL CARE



Fraunhofer Institute for Microstructure of Materials and Systems IMWS

Group leader
Characterization of medical and cosmetic care products

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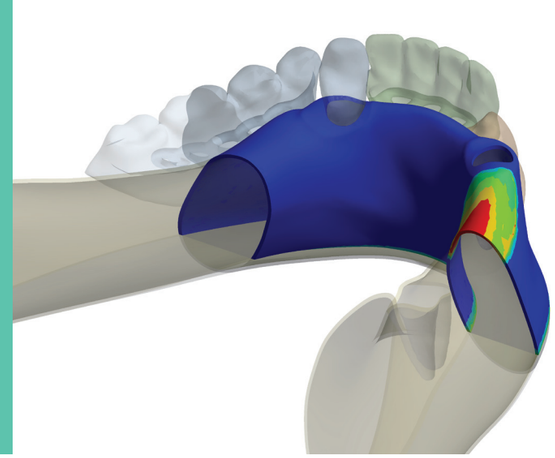
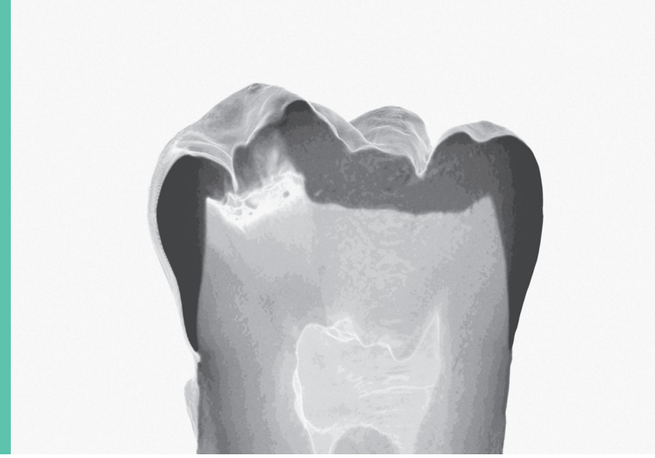
Quality management at Fraunhofer IMWS is ISO 9001 certified.





Services

We are a dedicated team of specialists at the Fraunhofer Institute for Microstructure of Materials and Systems (IMWS) Halle, Saxony-Anhalt, Germany.

We focus on the needs of the dental industry – from large multinational corporations to small and medium sized enterprises.

We apply leading edge equipment, methods and models to characterize dental care products and their interaction with biological surfaces.

As a partner to R&D and to Marketing we perform research projects, support product development, provide claim substantiation and supply visualization for marketing and training material.

We provide a wide range of existing methods and models published in scientific literature or defined by official guidelines like DIN ISO norms.

Our unique strength is the transfer of know-how from fields like nanotechnology or microelectronics to develop customized innovative solutions to answer your specific questions. We use this expertise together with our high-end equipment to provide visual representations of stunning quality to set your products apart.

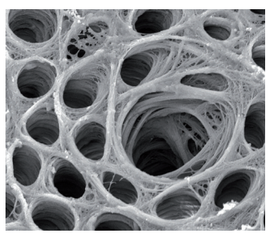
Benefit

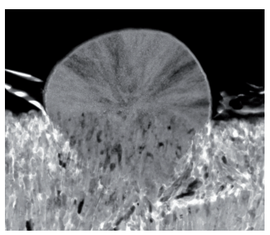
A tailor-made approach to your specific question
We offer our in-depth knowledge of the field combined with high flexibility. Together with your specialists we develop a reliable project outline and research protocols that are made to meet your specific needs.

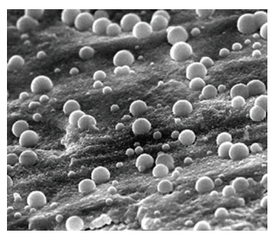
Access to the broad-based range of expertise available in the Fraunhofer IMWS Halle with its modern equipment - the latest developments available on the market.
We transfer and further develop methods and techniques for a new and innovative approach in R&D and for stunning visualization of results.

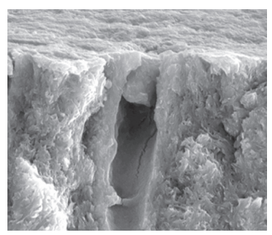
A full range of services across the development chain from a single source
- Screening of actives and products
- Proof of concept and efficacy testing
- Development, transfer and training of new testing methods
- Routine measurements for claim substantiation or as part of screening programs
- Visualization of efficacy and mode of action as powerful marketing support

A successful collaboration based on the established and proven Fraunhofer processes
In all we do, we adhere to the Fraunhofer principles of efficiency, professionalism, and confidentiality.









Fields of Expertise

Characterization of tooth hard tissues
(microstructure and chemical analysis)
- Mineralization processes
- Fluoride interaction
- Claim substantiation and mode of action analysis (caries, erosion, hypersensititvity)

Toothbrushing
- Automated brushing machines
- Relative dentin abrasion (DIN EN ISO 11609)
- Tribometers to analyze and quantify abrasive and friction properties – from brush head to single filament
- Finite element simulation of filament contact and deformation behavior

Staining and cleaning
- Staining models: optical assessment of discoloration and stain removal
- Wide range of methods from material science to characterize whitening, cleaning, polishing, abrasion

Dental materials
- Mechanical, morphological and chemical evaluation of filling and prosthetic materials
- Abrasion of dental materials
- Characterization of the interface between dental material and tissues

Dentures
- Material compatibility (e.g. cleaning procedures)
- Adhesive strength test (DIN EN ISO 10873)
- Finite element modelling of denture fit

Methods and Technologies

Non-destructive structure analysis & defect localization
- Scanning acoustic microscopy
- 3D X-Ray (Computer-Tomography)

Target preparation techniques
- Mechanical and chemical preparation, laser and ion beam techniques (sectioning and polishing), cryo-ultra-microtomy

Electron microscopy and analysis
- Analytical SEM with EBSD, EDS, WDS, EBIB, EBAC, ESEM with in situ testing and temperature stages
- TEM and EF-TEM (60-300kV), STEM, and in situ testing

Surface and trace analysis
- AFM, XPS/UPS, AES,TOF-SIMS, ICP-MS, OES

Crystallography and optical measurements / spectrometry
- XRD, EBSD, FTIR, µ-Raman, UV/VIS spectroscopy, spectral ellipsometry, color measurement, gloss

Surface topography and deformation
- Mechanical profilometry, CLSM, interferometry, laser vibrometry, image correlation systems for 3D deformation

Polymer characterization and chemical analysis
- DSC, DMY, TGA, TMA, TCA (light flash), rheometry
- pH stat, amperometry, ion sensitivity electrodes, FIA

Mechanical and reliability testing, modelling
- Static and dynamic material testing (loads down to mN); customized microtesting for deformation, strength, fatigue
- Nanoindentation, microhardness
- Finite element (FE) simulation and material modelling