



OUR RANGE OF FUNCTIONAL COATINGS

Clean surfaces

- hydrophilic/hydrophobic coatings (e. g. anti-drip)
- oleophobic coatings (e. g. easy-to-clean, anti-fingerprint, anti-graffiti)
- antimicrobial coatings
- antistatic coatings
- photocatalytic coatings

Protective coatings

- scratch proof and abrasion resistant
- barriers against gas, humidity, flavor, softening agents, and migratable monomers
- barriers against oil and grease
- corrosion protection (Chromium VI substitute)
- high-temperature protective coatings (above 600 °C to 700 °C)

Optical functional and decorative coatings

- anti-reflective – with or without anti-dust properties
- scattering layers
- electrochromic coatings
- colored ORMOCER® coatings

Fraunhofer Institute for Silicate Research ISC

Neunerplatz 2
97082 Würzburg
Germany

Contact

Dr. Thomas Hofmann
Phone +49 931 4100-350
Fax +49 931 4100-399
thomas.hofmann@isc.fraunhofer.de

FUNCTIONAL COATINGS

DEVELOPMENT, PILOT-SCALE PRODUCTION AND
IN-PROCESS QUALITY CONTROL





DEVELOPMENT OF CUSTOMIZED COATING MATERIALS

Functional coatings are an ideal way to provide products with new properties by using just a minimum of extra material. Fraunhofer ISC develops customized coatings for all kinds of applications.

Their basis are inorganic materials and hybrid polymer sol-gel materials for wet-chemical coatings.

These two material systems offer numerous advantages

- anti-scratch and anti-abrasion resistance tends to be significantly higher than in functional coatings based on conventional organic polymer materials
- several functionalities can be combined in a single coating
- all coatings are transparent and can be colored
- processing is possible with industrial standard procedures such as roll-to-roll processing, dip coating, or spray coating
- the coatings are non-flammable and environment friendly
- their property profile is adjustable over a broad range

Newly developed bioORMOCER®s now also allow biobased and biodegradable coatings.



UPSCALING – FROM LAB TO PRODUCTION SCALE

Upscaling from lab to production scale usually means overcoming a number of barriers both in the new material itself and in its processing. Fraunhofer ISC is excellently equipped for the upscaling of the material synthesis to pilot scale and provides a near-industrial infrastructure for the next step so that the risks involved in the implementation into production processes are kept to a minimum.

Available processing

- synthesis in batch sizes up to 100 l
- dip coating
- roll-to-roll processing under clean conditions (cleanroom class 100 000)
- rolling (both flexible and rigid substrates), spraying, spin coating

Range of services

- synthesis on demand
- formulation according to production requirements
- pilot scale production
- test coating



CHARACTERIZATION AND QUALITY CONTROL

The effective development of a coating requires thorough analyses, testing, and characterization.

Standards-compliant testing of coating properties

- mechanical abrasion resistance and hardness
- weathering and corrosion resistance
- surface energy and conductivity
- surface topography and optical characteristics

Coating analysis

- analysis of surfaces and coatings
- high resolution analysis of surface and interface chemistry
- high resolution imaging of microstructures, surfaces, and interfaces (e. g. electron microscopy)
- unparalleled non-destructive ion beam preparation of samples
- analysis of distribution and diffusion of elements
- microscale characterization of material properties

Damage analysis

Analysis results and measuring data are substantiated by a sound evaluation with result interpretation and proposals on how to solve the problem in terms of material or process optimization.