

**Our cooperation offer:**

- Feasibility studies for the applicability of our lacquers on your substrates
- Tailor-made adaptations of existing material solutions to your requirements
- Synthesis of lacquer in larger quantities (batches up to 100 kg)
- Licensing (from knowledge transfer up to the complete IP)
- (New) product development (in cooperation with the industries, publicly funded research projects, bilateral or multilateral)

**Furthermore we offer:**

- Analytical services
- Coatings in pilot scale upon customer request
- Analysis and testing of barrier materials
- Process engineering | up-scaling

**You are invited to share your ideas and visions with us.**

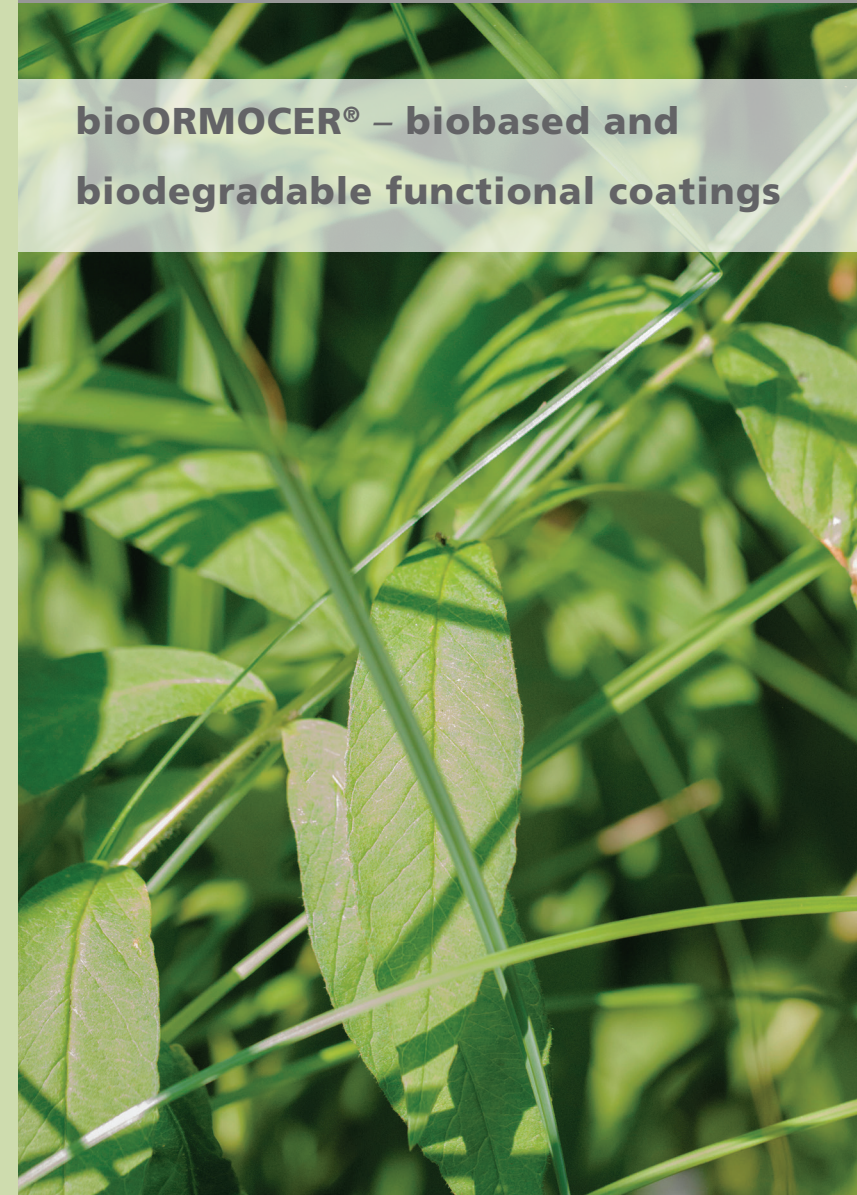
**For further information and detailed discussions please contact:**

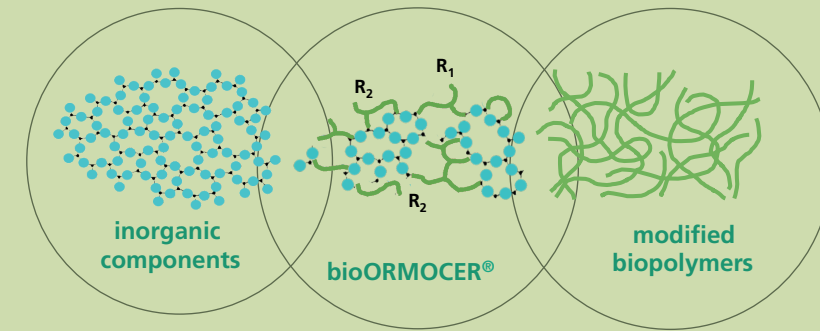
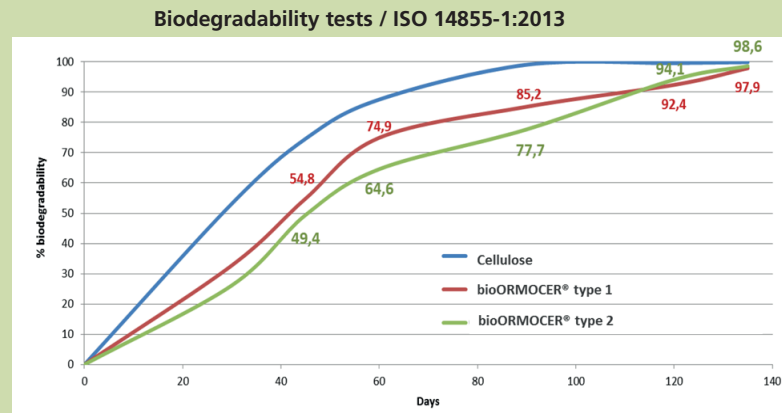
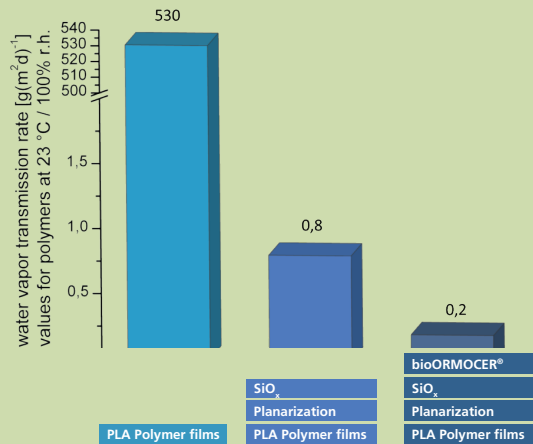
Dr. Ferdinand Somorowsky  
Functional Coatings  
Phone: +49 931 4100 256

E-mail: [ferdinand.somorowsky@isc.fraunhofer.de](mailto:ferdinand.somorowsky@isc.fraunhofer.de)  
**[www.barrier.fraunhofer.com](http://www.barrier.fraunhofer.com)**

**Fraunhofer Institute for Silicate Research ISC**  
Neunerplatz 2  
97082 Würzburg, Germany  
**[www.isc.fraunhofer.de](http://www.isc.fraunhofer.de)**

**bioORMOCER® – biobased and  
biodegradable functional coatings**





Biodegradable packaging materials from cellulose regenerates as well as polylactic acid and starch-based blends are already in the market where they lead a niche existence. As they lack essential features such as having a sufficient barrier effect against water vapor or oxygen they encounter limitations preventing their widespread application in food packaging. Our approach is to provide and improve these properties by a biodegradable functional coating.

### Biodegradable, high performing functional coatings thanks to novel bioORMOCER®

bioORMOCER® is a novel, biodegradable material class by Fraunhofer ISC. By combining inorganic-organic materials with specifically modified biopolymers, the properties can be used to optimize and adapt the functionalities of the coating material to the specified requirements of a given product. Thereby, functional, biodegradable barrier layers are created.

### The concept: upgrade conventional bio-based biodegradable films in their barrier properties

To improve the existing barrier performance, Fraunhofer ISC uses commercially available biodegradable and/or bio-based films and upgrades them by applying bioORMOCER® lacquers. An appropriate combination of composition and processing can be used to optimize barrier properties. In addition, the biodegradability of the coating material can be adapted. Since bioORMOCER® based coating materials can be used for all kinds of substrates to improve the properties, the new coating material is also suitable for fossil based polymers, e. g. to enable a sorted recycling.

### THE RESULT: biobased and/or biodegradable materials with barrier properties comparable to those of conventional barrier films.

#### Properties of bioORMOCER® at a glance:

- High transparency
- Processable at moderate temperatures (< 130 °C)
- Very good adhesion to various substrates
- Very good compatibility with other coatings and materials
- Suitable for standard industrial processes

#### Functional coatings on the basis of bioORMOCER® provide:

- Time-controlled biodegradability
- Antimicrobial activity, also humidity triggered
- Very good barrier properties against:
  - water vapor
  - oxygen
  - flavors
  - plasticizers
- Additional adjustable features:
  - antistatic behavior
  - anti-adhesive properties
  - abrasion resistance

### New: controlled antimicrobial activity for safe packaging

Humid environments are an ideal breeding ground for microbes which is problematic not only in the food sector.

#### Our objective: safer packaging

Therefore, antimicrobial additives can be incorporated into Fraunhofer bioORMOCER®, which exclusively are released upon contact with moisture. By variation of the specific composition of the lacquer, the time-controlled release rate and the total quantity of released additives can be customized.

#### Your added value: tailor-made solutions for your requirements

This is especially true for the packaging of fresh fish, meat and cheese products. Furthermore, sensitive products coming from the pharmaceutical and the cosmetic industries can be protected adequately.

#### OUR OFFER: Design and implementation of custom-made coating concepts for biodegradable packaging solutions