

#### Our cooperation offer:

- Feasibility studies for the applicability of our lacquers on your substrates
- Tailor-made adaptions 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

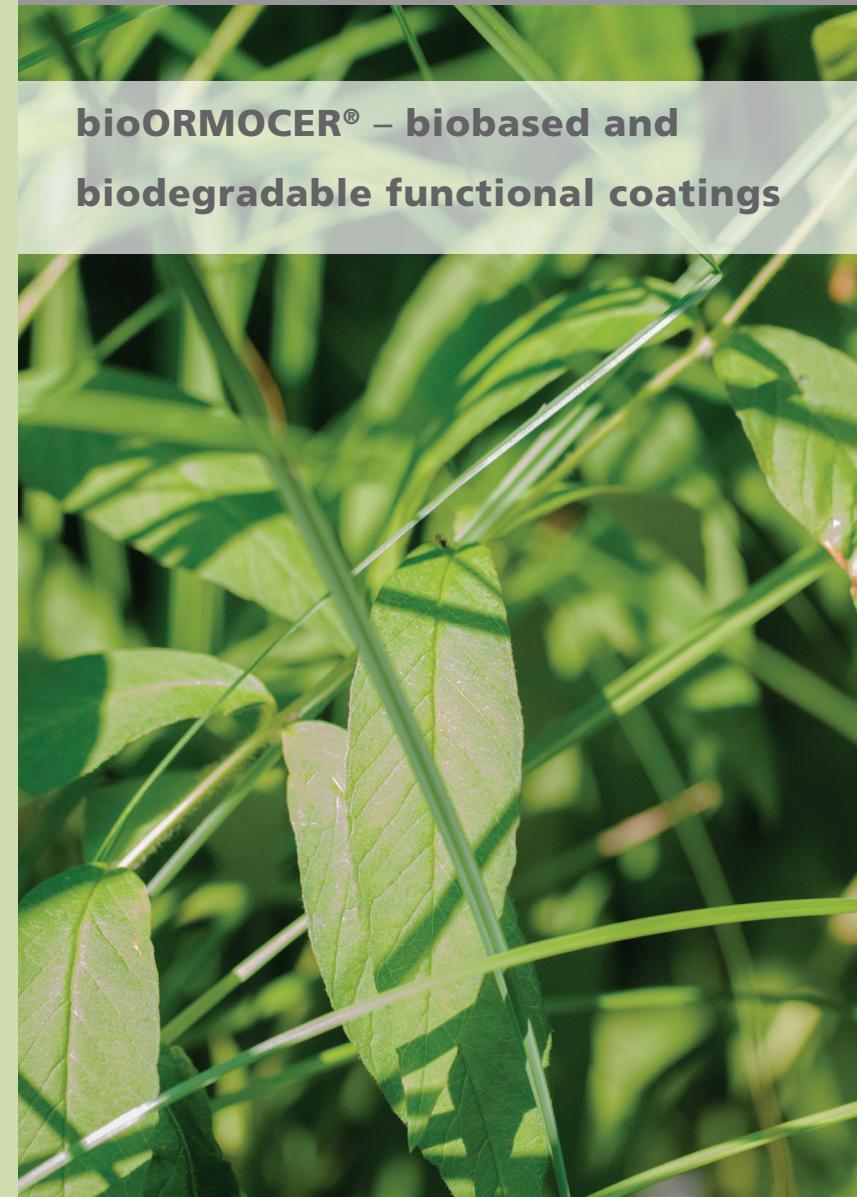
You are invited to share your ideas and visions with us.

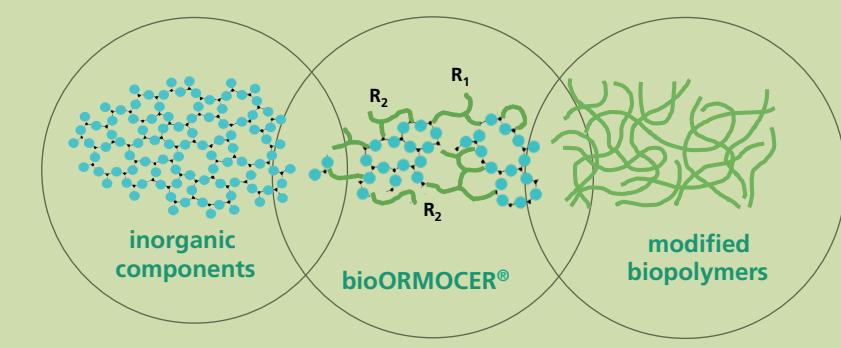
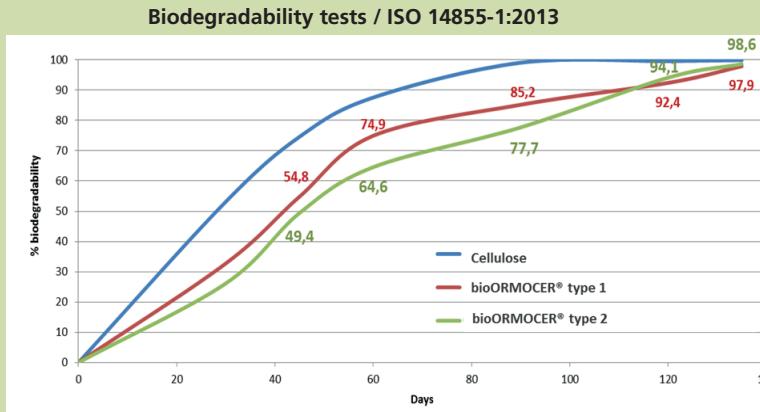
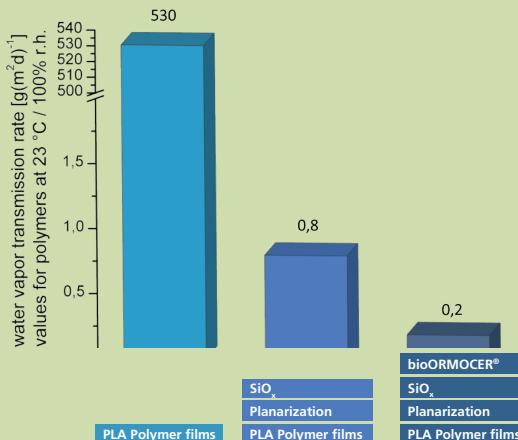
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Biodegradable packaging materials from cellulose regenerates as well as polylactic acid and starch-based blends are already in the market where they lead a niche existence. As they lack essential features such as having a sufficient barrier effect 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**