



**Fraunhofer**  
IGB

From chitin-containing resources to the  
substitute of fossil-based polymers in coatings

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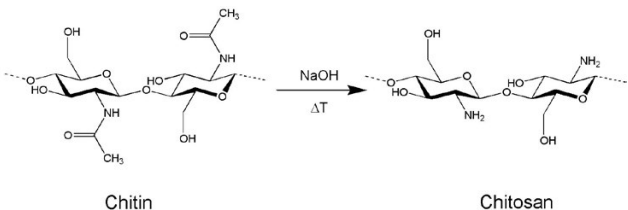
## Chitin and Chitosan Biorefinery

# Fraunhofer IGB's wide-spread chitin and chitosan portfolio

Fraunhofer IGB is your partner for chitin and chitosan, from the resource to analysis and application. There are several services we provide:

- Literature and patent research concerning chitin and chitosan resources, processes and applications
- Determination of chitin content and the chemical composition of chitin-containing materials
- Process development from resource to chitin including
  - investigation of optimization potentials
  - evaluation of key parameters of the process
  - scale-up of the purification steps
  - evaluation of holistic utilization of the raw biomass
- Chitin analytics measuring ash, purity and acetylation degree
- Chemical chitin deacetylation to achieve chitosan
- Chitosan analytics including molecular weight, deacetylation degree, film formation, swelling and purity
- Testing different chitosan cross-linker within our self-developed plate-based assay
- Investigating the chitosans eligibility for different application fields including compatibility tests

Did you find anything concerning chitin and chitosan which is not included above? Tell us, we can surely discuss it.



# Chitosan – a bio-based protective film-former for technical applications

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Chitin is the second most abundant polysaccharide on earth derived by different side streams. The production of chitosan, the most important derivative, was optimized by Fraunhofer IGB, partially in pilot scale, for several resources. According to our findings, chitosans properties and versatility make it a relevant candidate for the substitution of petrol-based polymers in various fields.

## All about Chitin and Chitosan

Chitin is a nitrogen-containing polysaccharide with N-acetylglucosamine as major repeating unit. It can be derived from several agro-industrial side streams, such as industrial fermentation, insect meal production or fishery. Due to the different resources and thus different contaminants, the purification processes and the analytical tools need to be developed for each side stream. At the same time, scalability of the process needs to be considered and optimization potentials fully exploited. Chitosan is the deacetylated and most promising derivative of chitin. The deacetylation process is challenging, but worthwhile because chitosans potential to substitute fossil polymers mainly bases on its

- solubility in aqueous solutions,
- vegan-source option,
- film-forming ability,
- biodegradability,
- antibacterial and odor-inhibiting properties,
- adhering and viscosity-adjusting properties as well as
- the opportunity for easy functionalization.



*Chitosan (left: derived from *A. niger*; middle: from adult flies) and high-purified chitosan from larval exuviae (right)*

Although easy to handle, the chitosan must be brought into a suitable form, i. e. formulated, in order to fully develop these useful properties. Therefore, the incorporation of chitosan into the formulation and its compatibility with the other components must be determined. Furthermore, the most important properties of the chitosan – deacetylation degree, molecular weight and purification degree – have to be considered for the specific application. One opportunity to determine incompatibilities and to evaluate the chitosans characteristics and eligibility for different applications is the film formation via solvent casting.

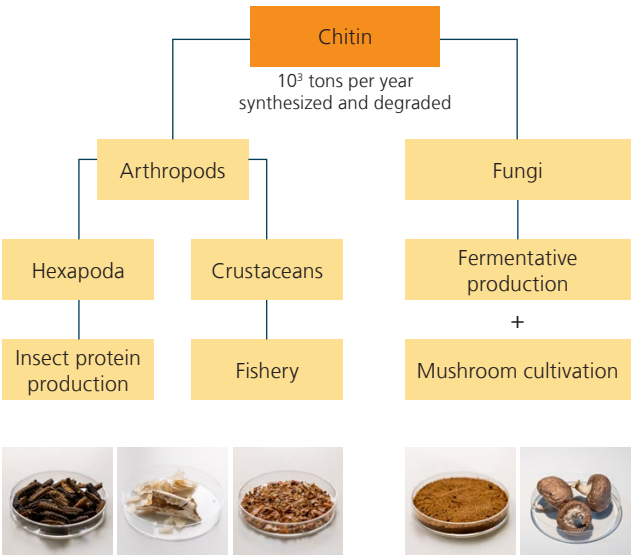


*Chitosan films are well suited for packaging applications because of their balanced elasticity and transparency.*

## Chitosan application fields: Sustainability meets performance

Thanks to its versatility and different beneficial properties chitin and chitosan are eligible to be applied in different sectors.

- Textile sector: Sizing agent, template for water-repellent and flame-inhibiting finishing, anti-odor finishing
- Waste water purification: Flocculation agent, heavy metal removal
- Packaging: Bio-based coating and edible material
- Pharmacy: Encapsulation or formulation agent
- Food processing: Clarification of liquids, suppression of off-flavours
- Agriculture: Plant strengthener



## Get in touch!

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Are you ready to substitute your fossil-based polymer with a versatile natural one? If you have any questions concerning the production of chitin and chitosan from different side streams, the chitosan and chitin analytics or the application of chitosan in finishing/coating solutions, in plant strengtheners or the waste water purification, get in touch.

## Contact

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