

Fraunhofer ICT – from biomass to technical materials

The Pfinztal-based Fraunhofer Institute for Chemical Technology investigates and develops innovative technical materials on the basis of biobased thermoplasts and furanic resin. Innovative companies in the consumer goods, packaging and transport industries are extremely interested in such products.

Applied electrochemistry, energetic materials and systems, as well as polymer and environmental engineering are the core competences of the Fraunhofer Institute for Chemical Technology (ICT). Engineers, chemists and physicists are focused on the interdisciplinary research and development of new materials for use in the automotive and transport, chemistry and process engineering, energy and environment as well as defence, safety and aerospace sectors.

The ICT's materials and process engineering section is mainly focused on the analysis of materials and the specific and quick development of new materials. The creation of new materials from biomass is a topic that keeps ICT developers, who deal mainly with thermoplasts and furanic resins developed under the EU-funded BIOCOMP project, rather busy.

Furfural made from cane trash (bagasse) is used for the production of furanic resins. "Rather than seeking to produce bulk plastics, we are focusing on the development of technical plastics," explains Dr. Norbert Eisenreich, project manager, physicist and deputy head of department at the Fraunhofer ICT. In cooperation with its Belgian partner TransFuran Chemicals BVBA, the ICT is developing new technical materials from furanic resins. "Several methods to produce such thermosetting plastics (duroplast) are available and the Fraunhofer ICT is working on improving these methods," said Eisenreich.

Biobased thermoplasts for technically challenging tasks

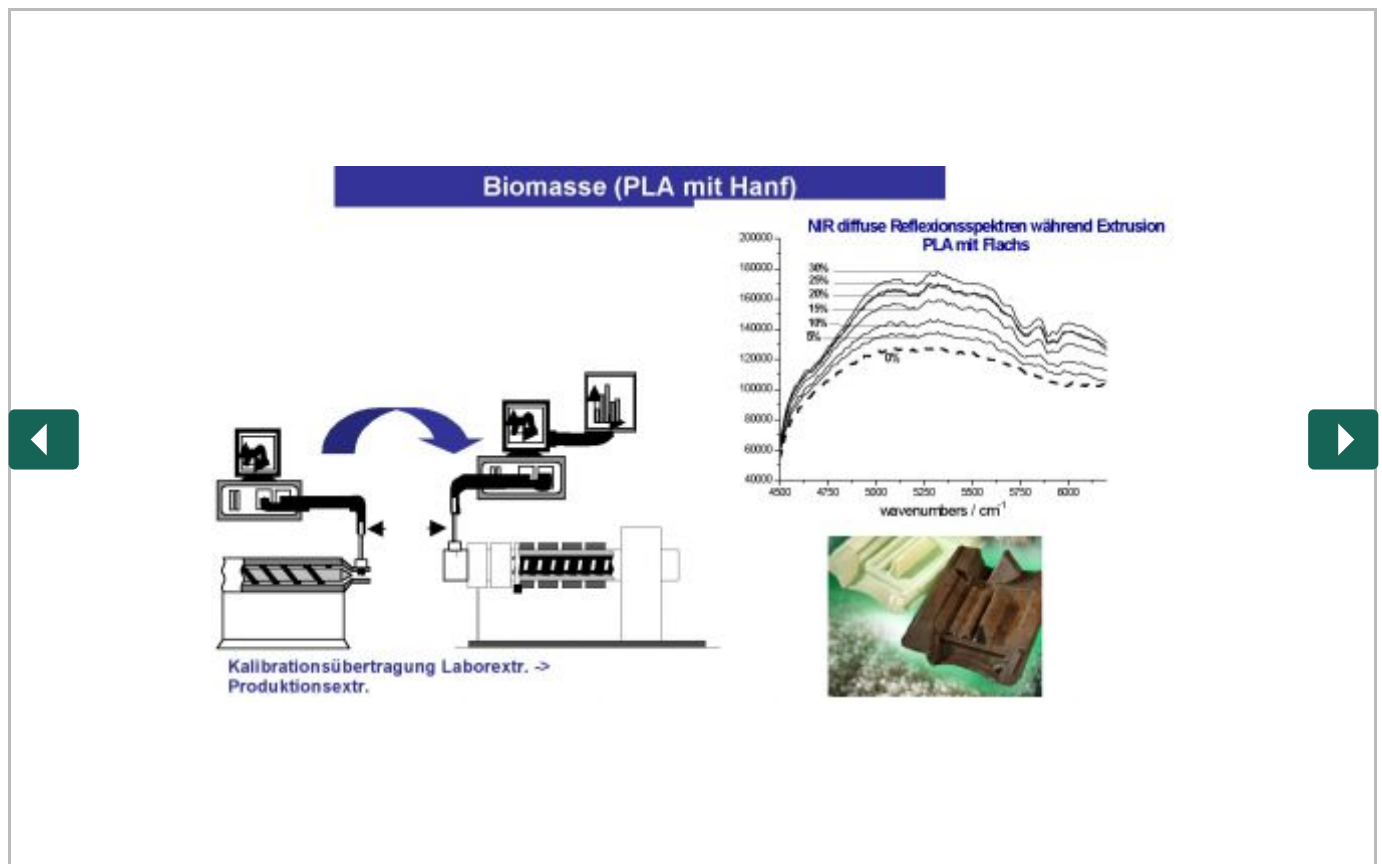


Model products developed in the BIOCAMP (NMP2-CT-2005-515769) project coordinated by the Fraunhofer ICT
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The ICT researchers are also investigating thermoplastic biopolymers such as lignin, polylactic acid (PLA) and polyhydroxybutyric acid (PHB). In the field of lignin, the ICT researchers are working closely

with the company TECNARO GmbH and have already achieved major success. One example is ARBOFORM, which the ICT and TECNARO developed in cooperation and which is now commercialised by TECNARO. "The ARBOFORM granules are already mass produced and available for numerous applications. We need to come up with further variations in order to make ARBOFORM suitable for applications in other markets," said Norbert Eisenreich highlighting the cooperative goals of the two partners.

The ICT brings into the cooperative projects methods for extracting basic material components and the further development of the materials for large-scale processing. In the EU-funded BIOCOMP project, the Fraunhofer researchers have been able to show that the biobased thermoplasts are equally well suited as petrol-based thermoplasts for technically challenging applications, for example flame protection. "Slowly but surely, biobased thermoplasts are getting cheaper and we are approaching the prices of traditional plastics," said Norbert Eisenreich. The ICT only uses natural fibres or regenerated cellulose fibres to produce fibre-reinforced plastics entirely from biomass.



Duroplaste aus Biomassekomponenten (Furanharze)

Ziel: Bauteile aus Furan-Harzsystemen und Kohlefasern
Entwicklung von Duroplasten aus Biomasse für Hochleistungs-CFKs
In-line Untersuchung der Reaktionsmechanismen und Reaktionsbedingungen zur Harzoptimierung



Online control increases economic efficiency

In a future EU project, the ICT researchers are planning to work with a Finnish partner to produce

lignin from bark. At present, bark accumulates as a waste product in the timber industry and is difficult to compost. However, the project partners believe that their idea of turning bark into lignin has enormous economic and ecological potential.

In addition, the Fraunhofer ICT is specialised in investigating plastics processing using near-infrared spectroscopy, which is used to control the distribution of fibres in biobased thermoplasts. The researchers are able to use this method because the cellulose fibres absorb light in the near-infrared range (wavelengths between 700 and 2500 nm). Another problem faced in the production of thermoplasts is the agglomeration of natural fibres. Online control helps the researchers to identify problems very early on in the production process, thus enabling them to intervene and reduce costs. Nobert Eisenreich sees major potential for online measurements in the area of biomass use. "The use of online control systems raises the potential of avoiding time-consuming and costly analyses such as the ones that are currently required to test production outcome, and further increasing the economic efficiency of biobased plastics production."

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Bioeconomy: a new model for industry and the economy



Lignin – a natural resource with huge potential