

PRESS RELEASE

PRESS RELEASEJanuary 15, 2016 || Page 1 | 3

Wood completely broken down into its components

Crude oil is getting scarce. This is why researchers are seeking to substitute petroleum-based products – like plastics – with sustainable raw materials. Waste wood, divided into lignin and cellulose, could serve as a raw material. In a pilot plant at the Fraunhofer Center for Chemical-Biotechnological Processes CBP in Leuna this fractionation is handled on a large scale.

We are still burning vast quantities of petroleum in our engines and heating systems today. Even the majority of synthetic materials are derived from the “black gold.” Yet this excess may soon be over. Certain industries that are heavily reliant on petroleum are consequently looking for alternatives. Thus, for instance, carbohydrates could replace the petroleum used to make plastics. But this choice also leads to moral conflicts – the “barrel of oil or bowl of food”-debate – because carbohydrates, such as starches and sugars, are foods.

One option for obtaining carbohydrates is to use wood as a source, for example. It mainly consists of cellulose and hemicelluloses, in other words, carbohydrates and lignin. These substances were hitherto only procured in the production of cellulose (pulp) for wood-based paper production. But only 50 percent of the wood was a viable substance, the rest would be converted into energy, that is to say, burnt and thus consumed as bioenergy. In addition, lignin is contaminated, since sulfur compounds are typically used as a tool to break up the wood. So for many products, lignin is out of the question: it cannot be post-processed in systems that involve catalysts. So to make raw materials like wood accessible to certain sectors in the chemicals industry, researchers use the same approach as a biorefinery. Similar to a petroleum-based refinery, they fractionate the raw materials into their basic components, and then send each component to its optimal application.

Together with 12 partners from industry and research institutions researchers at the Fraunhofer Center for Chemical-Biotechnological Processes CBP developed a process that enables them to use 80 to 90 percent of the wood substance – moreover, the lignin is sulfur-free. “We break down the wood into its primary components, lignin and cellulose, by boiling it in water and alcohol at high temperatures and under high pressure – sort of like a pressure cooker,” explains Dr. Moritz Leschinsky, group manager at CBP. Lignin dissolves in the fluid, while the cellulose remains solid. In another step, the scientists extract the lignin from the fluid.

The extracted cellulose serves as a raw material for biosynthetics: Once broken down into basic components, i.e. sugars, the researchers then produce the necessary monomers from this. In turn, the lignin is used as a binding agent for the wood industry, for example, or likewise used as a biomaterial. “The main challenge we’re

FRAUNHOFER INSTITUTE FOR INTERFACIAL ENGINEERING AND BIOTECHNOLOGY IGB

facing is how to design the process affordably while sparing resources. For example, we need to close the cycle for ethanol and water and recover these substances," says Leschinsky.

In a lignocellulose biorefinery pilot plant the researchers have scaled up the laboratory results to large amounts of wood. This pilot facility is truly one-of-a-kind throughout Europe: Each week, it can break down up to a ton of wood into its individual constituent parts, using organic solvents.

The researchers will be presenting their research within the nature.tec show (Hall 4.2, Booth 216) at the International Green Week Berlin 2016.

PRESS RELEASE

January 15, 2016 || Page 2 | 3



The pilot plant in Leuna is dismantling wood in its components. (© Fraunhofer CBP / Norbert Michalke) | Picture in color and printing quality: www.igb.fraunhofer.de/press

Reprints free of charge. A voucher copy is appreciated in case of publication.

Contact Departments

Gerd Unkelbach | Fraunhofer Center for Chemical-Biotechnological Processes CBP | Am Haupttor, Tor 12, Bau 1251 | 06237 Leuna | Germany | www.cbp.fraunhofer.de | Phone +49 3461 43-9101 | gerd.unkelbach@cbp.fraunhofer.de

Dr. Moritz Leschinsky | Fraunhofer Center for Chemical-Biotechnological Processes CBP | Am Haupttor, Tor 12, Bau 1251 | 06237 Leuna | Germany | www.cbp.fraunhofer.de | Phone +49 3461 43-9102 | moritz.leschinsky@cbp.fraunhofer.de

Contact Press

Dr. Claudia Vorbeck | Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB | Nobelstrasse 12 | 70569 Stuttgart | Germany | www.igb.fraunhofer.de | Phone +49 711 970-4031 | claudia.vorbeck@igb.fraunhofer.de

The **Fraunhofer-Gesellschaft** is the leading organization for applied research in Europe. Its research activities are conducted by 66 Institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of nearly 24,000, who work with an annual research budget totaling more than 2 billion euros. More than 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contacts with industry and from public research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

The **Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB** develops and optimizes processes and products in the fields of medicine, pharmacy, chemistry, the environment and energy. The institute combines the highest scientific quality with professional expertise in its fields of competence – Interfacial Engineering and Materials Science, Molecular Biotechnology, Physical Process Technology, Environmental Biotechnology and Bioprocess Engineering, and Cell and Tissue Engineering – always with a view to economic efficiency and sustainability.