Utilization of lignocellulosic materials for valuable products - research activities in Saxon Institutes

Saxon Institute for Applied Biotechnology (SIAB)

Institute of Wood and Paper Technology, Institute of Plant and Wood Chemistry (TUD)

Institute of Technical Chemistry (FUMT)

Department of Lightweight Structures and Polymer Technology (TUC)

Services and contract research

SIAB:

- *Trichoderma reesei* strains for cellulase production
- *Penicillium verruculosum* as alternative cellulase strains
- Enzyme fermentation up to 600-litre scale
- Order-fermentation and down stream processing up to pilot scale (GMO of security up to level 1)
- Pre-treatment of lignocellulosic materials
- Separation and modification of lignin

FUMT:

- Process development (bio-catalysis)
- Low-temperature biomass conversion
- Characterisation and immobilisation of biocatalysts
- Innovative downstream-processing technologies
- Bio-catalytic production of chiral building-blocks
- Reactions in micro-structured reactors

TUD:

- Hydro-thermo-mechanical pre-treatment and characterisation of lignocellulose (wood, straw etc.)
- Alkaline pre-treatment of lignocellulose materials
- Structural characterisation of lignin and cellulose
- Chemical decomposition of lignin to phenols and cresols
- Small and medium scale compounding of lignin and fibre
- Micro-scale injection and press moulding of fibre-reinforced bio-composite

TUC:

- Medium to large scale compounding of lignin and fibre
- Medium to large scale processing of bio-composites
- Construction of special tools for polymer engineering
- Determination of properties of bio-composites
- Design, simulation, manufacturing of prototypes
- Product development with renewable and recycled materials

These Saxon Institutes act as partners in the **ERA-IB-project EIB.10.013**

Development of a process for the utilization both the carbo-hydrate and the lignin content from lignocellulosic materials of annual plants for the production of valuable products

Objectives

The general aim of the project is the development of a process for the material utilization of both the carbohydrate and the lignin content of lignocellulose from annual plants, particularly wheat or maize straw. This concerns in particular the following tasks:

(1) a pre-treatment process, which allows the separation both of the lignin content and the carbohydrate content for material application,

(2) the development of a *Penicillium verruculosum* enzyme complex which is optimized for the saccharification of the carbohydrate content in a process of simultaneous saccharification and fermentation (SSF),

(3) investigations on the SSF-process, using model strains for the production of platform chemicals, e.g. ethanol, isobutanol, isopentanol as well phenyl-ethanol,

(4) the modification of the separated lignin for the production of fibre-reinforced biopolymers as well as for the production of basic chemicals.

Bioreactor with 400-L working volume for enzyme production and SSF-process in pilot scale (in co-operation with UFZ-Centre for Environmental Biotechnology, UbZ).

Miniplant (system for lignocellulosic pre-treatment)

Contact:
Dr. Gerhard Kerns
e-mail: kerns@rz.uni-leipzig.de

This project is financially supported by the European Union & the Federal Ministry of Education and Research.