

SUSTAINABLE PRODUCTION IN BIOREFINERIES

Anton Friedl

TU Wien Getreidemarkt 9, 1060 Vienna, Austria, anton.friedl@tuwien.ac.at

Sustainable supply of bioactive substances based on natural resources will be necessary for the future. Besides this main product other products like chemicals, fuels and energy are produced from side streams of the process. From lignocellulosic materials, a wide variety of valuable products combined with energy can be produced by the application of a biorefinery approach.

The application of a biorefinery concept has the target of maximum value creation for the received products. Depending on the source of biomass and its composition several product fractions like a high value extract (e.g. polyphenolic compounds), a cellulose fraction for the production of fibers, a mixed sugar fraction (e.g. xylose, arabinose, galactose, mannose and glucose) and a lignin fraction can be derived. Side stream of the process can be used for energy production by application of proven biological and thermal processes.

For the economy of the biorefinery the value of the gained products from all fractions is very important. A main process stream is the extract with lignin. Lignin is after cellulose the second most available natural polymer up to now lignin is used in classical pulp and paper mills for energy production only. Our approach is to achieve a higher value product by the production of lignin particles in nanoscale for advanced applications to increase the economy of biorefineries. Due to its chemical composition lignin is interesting for many applications. All these activities are enhanced with the increase of surface area due to the formation of micro and nanoparticles. Possible applications of nanolignin particles are as natural sunscreens or in food packaging as natural antibacterial, biocide and antifungal component. Lignin acts also as free radical scavenger arising from the phenolic structure as well as its antioxidant behavior.

All these possibilities show clearly the potential of valorization of the different process streams of a biorefinery. Since during the processes not all of the process streams will be converted into high value products. These streams will be used for energy production to provide the process energy and energy for export.