



Materials from Renewable Resources: Lignin-Based Polymers

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Based on the commitment of chemical industry and German government, current academic and industrial research in material science is focused on utilization of renewable resources (biomass) to design novel innovative biobased materials. Thus, analogue to conventional refineries for crude oil processing, so called biorefineries are under development. In 2012, the first biorefinery pilot plant started the biomass Organosolv processing in Leuna (Sachsen-Anhalt), a collaboration project of Fraunhofer society and chemical industry (Figure 1).

Besides cellulose, lignin is the second major component of hard and soft wood and annual plants, such as grasses (e.g. Miscanthus). As a side product of the pulp and paper industry, lignin is available in industrial scale (Figure 2).



Figure 1 (clockwise from left): Roadmap Biorefinerien, Policy of the Verband der Chemischen Industrie (VCI), Crude Oil versus Renewables Refinery, Pilot plant opening in Leuna 2012 and European Biorefinery Vision 2030.

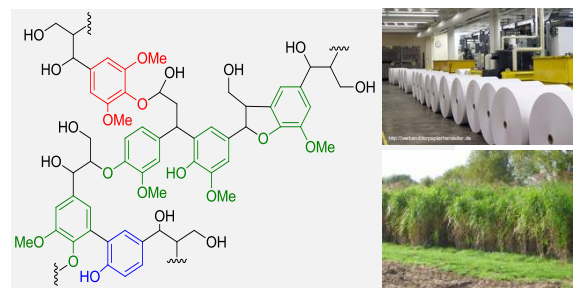


Figure 2: Lignin sturture (left), a side product in pulp and paper industry (right top) or isolated from Miscanthus plants, cultivated at Campus Klein-Altendorf, University Bonn (right bottom).

Target of the BMBF project LignoBau are foams and adhesives generated from renewable resources for construction and packaging.

The BMBF project Persolmplant focuses the development of biocompatible materials for tissue engineering applications. In particular, biopolymers as scaffolds for stem cell-based approaches in bone regeneration are developed.

Research activities of our group are focused on the isolation and utilization of renewable resources, in particular biomass-based lignins for applications in construction, packaging and biomedicine.

In collaboration with partners from university and industry, we investigate the isolation, purification and chemical modification of industrial Kraft lignins, their analysis and synthesis of novel lignin-based polymers.

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