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Lignorefinery - Using lignified biomass as raw material

Margit Kapfer and Christian Plas
Austria (Margit.Kapfer@denkstatt.at)

The project series “Lignorefinery” was conducted between 2012 and 2017 with the aim to utilise the full potential of wood waste / forestry waste as raw material, without competing other biomass utilisation processes.

This work was being conducted by scientists from the University of Natural Resources and Life Sciences (BOKU), in Vienna, denkstatt GmbH, Österreichische Bundesforste, TDZ Ennstal and Fermtec GmbH.

Lignified biomass was used as input material to chemically and biotechnologically harvest sugars and lignin in order to produce raw materials, which are currently produced on a petroleum basis.
From the cellulose part lactic acid and – using genetically modified yeast – itaconic acid was produced. Itaconic acid resembles malic acid, which serves as a precursor for making acrylates and resins. Both itaconic acid itself and its derivatives can be employed as building blocks in chemical synthesis. For instance, itaconic acid can be decarboxylated and then esterified to make methyl methacrylate, which is then turned into plexiglass.

Lignin from the wood waste was used for N-crosslinking and to form stable aerogels based entirely on lignin. Aerogels are ultra-light, highly porous materials with a growing number of technical applications, such as high-performance thermal and acoustic insulation, substrate for catalysts and filter systems, electrode material for electrochemical applications.

The project also includes the development of an economic business modell and an environmental impact assessment of the project as well as of the potentially replaced products, based upon petroleum.