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Towards feasible production of fuels and chemicals from lignocellulosic biomass - Improving the enzymatic hydrolysis of lignocelluloses by revealing the inhibitory effects of lignin

Now that the E10-petrol supplemented with 10% ethanol has reached the petrol stations in the member countries of the EU, it is highly topical to think from where all this ethanol is actually coming from.

Today the industrial scale bioethanol production relies on sugarcane and corn carbohydrates that are considered controversial due to their value in human food and feed production. However, there are non-food alternatives for these raw materials, such as lignocellulosic residues from agriculture and forestry that may also be used for fuel and chemical production.

Enzymatic hydrolysis of lignocellulosic plant material aims at degradation and solubilisation of the cell wall polysaccharides into mono- and oligomeric sugars that may be used as starting material in further chemical or biochemical conversion. However, the enzymatic degradation process suffers from the presence of lignin in the raw materials.

The aim of this PhD thesis is to reveal the underlying inhibitory mechanisms that interfere with the action of hydrolytic enzymes during lignocellulose hydrolysis. Most importantly, better understanding of the underlying inhibitory mechanisms enables the development and selection of better enzymes for lignocelluloses hydrolysis.