Focus Area: Lignocellulose (https://biooekonomie-bw.uni-hohenheim.de/en/lignocellulose-projects)

Project Title: "LIGAROM" (LIGnin-based AROMatic amino acids)

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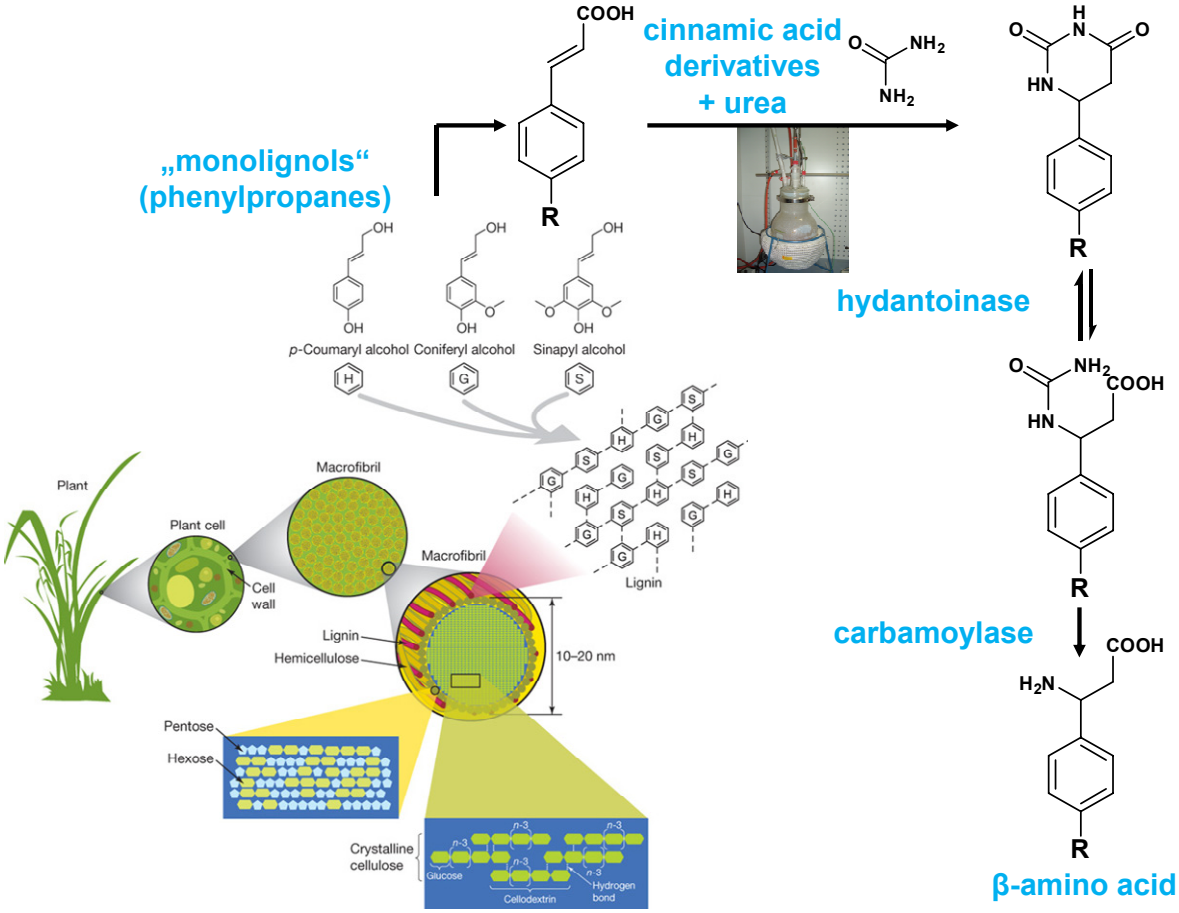
Start of PhD project: 15. September 2017

Source of Funding: China Scholarship Council

Project Description:

The research group "biocatalysis" at KIT, Institute of Process Engineering in Life Sciences (Chair: Professor C. Syldatk, Technical Biology) is investigating the enzymatic synthesis and conversion of aromatic amino acids which constitute the main building blocks of the lignin part of plant lignocellulose.

The proposed CSC project aims to use phenylpropane compounds ("lignin monomers") and biogenic waste for chemoenzymatic syntheses of high-priced fine chemicals, e.g. β-amino acids from cinnamic acid derivatives and urea (via aryl dihydrouracils). Key elements will be the development of processes to directly use the aromatic compounds from liquefied lignocellulose (using the expertise from bioliq pilot plant at KIT) and the stabilization of enzymes for the expectedly harsh reaction conditions.



Methods that will be used:

Organochemical synthesis, qualitative and quantitative chemical and biochemical analysis methods, molecular cloning, protein purification, enzyme technology

Collaboration Partners:

Prof. Stefan Bräse, KIT-CS, IOC and Prof. Uwe Beifuß, University of Hohenheim, Bioorganic Chemistry: Isolation and/or synthesis of defined aromatic compounds from liquefied lignocellulose; instrumental analysis

Dr. Ulrike Engel, KIT-CS, BLT_II – Technical Biology: Isolation, characterization and molecular cloning of suitable enzymes

Prof. Matthias Franzreb, KIT-CN, IFG – Bioengineering and Biosystems: Immobilization and stabilization of enzymes; process development and simulation

Working Packages:

1. Isolation and/or synthesis of phenylpropane compounds from lignocellulose
2. Further synthesis to substituted dihydropyrimidines
3. Screening of enzymes for the sequential stereoselective hydrolysis of these compounds
4. Characterization, stabilization and immobilization of the most suitable enzymes
5. Set-up and modeling of a bioprocess to realize a (chemo-)enzymatic cascade reaction
6. Development and application of analysis methods to qualitatively and quantitatively analyze all substrates, intermediates and products