Project 1: Multiphase reaction systems for the efficient valorisation of Biomass

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HOST INSTITUTION 1: Università di Bologna, Italy. Supervisors of the PhD student in Bologna: Prof. Fabrizio Cavani and Dr. Stefania Albonetti
HOST INSTITUTION 2: Delft University of Technology, The Nederland (Dr. Isabel Arends)

PROJECT DETAILS

Aim of the project is the development of multi-phase reaction systems for the transformation of renewable feedstocks into novel platform chemicals. The project target includes dehydration of glucose in the presence of various alcohols as solvents to yield alkyl levulinates. Alkyl levulinates exhibit significantly reduced polarity and are easily recovered from the polar reaction phase due to phase separation, reducing the potential of by-product formation. In a cascade type reaction system, the formed alkyl levulinates are consequently transformed further via hydrogenation into γ-valerolactone which is a promising platform chemical for the production of biomass based fuels and polymers.

The development of the multiphase reaction system is accompanied by synthesis and optimization of suitable heterogeneous catalysts including solid acids for dehydration and esterification of glucose to alkyl levulinates and supported base metal catalysts for the consequent transformation into γ-valerolactone. The possibility to apply suitable homogeneous or bio-catalysts for individual reactions will be evaluated together with the host II institutes. The analysis and application of adapted methods for online-monitoring of the reaction progress are necessary pre-requisites for a subsequent modelling and simulation of the integrated process which will be carried out together with the partner universities.