



Diploma project (MSc): Investigation of new routes towards biobased polymers using underutilized forestry products

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Background

Polymers play an essential role in everyday life from materials in automotive, packaging and electronics to compounds in medicine. Nevertheless, the finite supply of fossil fuels which are needed for most synthetic polymers leads to an increased need for the development of new materials from renewable sources. The use of renewable natural products from forestry, especially terpenes, offers a highly versatile platform for green building blocks. Abundant natural terpenes found in forest biomass can be functionalized through organic chemistry to add functional groups for polymerization. These monomers can then be converted into sustainable biobased materials. One of such promising product-class are polyesters derived from polycondensation of diols and alcohols.

Project description:

This project aims to combine organic monomer synthesis, enzyme catalysis and polymer chemistry to develop new synthetic techniques for novel biomaterials, contributing to a more sustainable society. In this project, different biobased monomers for the design of sustainable polymers will be evaluated. Herein, the intended research targets efficient routes to obtain polymers from different renewable feedstocks. The project will include a short literature study on polymer synthesis from renewable monomers. The practical part of the project will be divided into two parts. Part one will be focusing on the optimization of the synthesis and purification of the desired polymers. This part will also include the utilization of enzymes as green catalysts to achieve selective transformation under mild reaction conditions. Part two will assess the properties of the resulting polymers and elaborate the use of them in coating materials. During the training, the candidate will perform thermal, mechanical, and structural analyses. This project will combine state of the art experimental techniques and offers the chance to participate in a rapidly developing research field.