

Bachelor Thesis/Project Work

Circular Bioconversion of Synthetic Polymers Inspired by Nature

Institute of Technical Biocatalysis

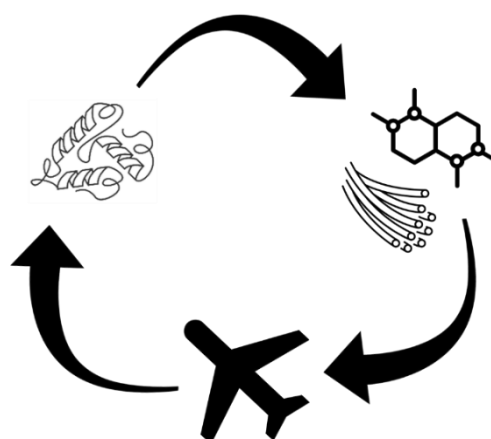


Nowadays, it is impossible to imagine our life without synthetic polymers. Apart from their use for packaging or household items, they are also increasingly employed in the automotive and aerospace industry. In this context, epoxy-based carbon fiber reinforced polymers (CFRPs) have become an important material for lightweight applications. These composite materials consist of carbon fiber meshes embedded in an epoxy polymer matrix.

However, there are no sustainable recycling approaches available to valorize the polymer matrix and carbon fibers beyond their life cycle. Even though, approaches towards the development of recycling processes have been taken, the separation of the fibers from the polymer matrix still poses a major problem and is often the reason for a lower quality of the recycled fibers. As a consequence, sustainable, bio-based technologies need to be developed that entail the potential for the recovery of high quality carbon fibers from waste CFRPs, while breaking down the epoxy resin matrix into newly usable monomers.

Aim

The aim of this research project is to depolymerize the synthetic matrix independently of toxic chemicals and harsh conditions by the use of enzymes as green catalysts to recycle both the carbon fibers and epoxy resin. For this purpose, the use of laccases will be investigated on model substrates and an optimization of the reaction conditions will be conducted.



Content of the Thesis

- Characterization of laccases
- Small-scale degradation experiments with model compounds
- Optimization of reaction conditions
- HPLC and GC-MS analysis
- Students are welcome to contribute their own ideas

Start

Immediately

Contact

Leon Klose M.Sc.
Institute of Technical Biocatalysis
Denickestr. 15 (K), Room:1514
leon.klose@tuhh.de
Tel. +49 40-42878-4265