

Biological Recycling of PET-containing Textiles

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Abstract: The research project EnzyDegTex focuses on the biological transformation of textile recycling using enzymatic degradation and microbial synthesis of (bio)polymers.

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The significance of textile recycling is continuously growing due to the increasing waste generated by the fast fashion sector. In North-West Europe alone, approximately 4.7 million tons of discarded textiles are collected each year [1]. At the same time, it is estimated that 73 % of the globally produced textiles end up in landfills and incineration, while only less than 1% is recycled in a closed loop [2]. Major challenges faced in regard to recycling are due to the complex composition of textile products, which involve e.g. various blended fibre materials and the extensive usage of additives and dyes. Consequently, recycling widely used mixed textiles made from e.g. polyethylene terephthalate (PET) and cotton, also known as polycotton, remains challenging given the current recycling methods available.

The approach of the research project EnzyDegTex is a biological transformation of textile recycling to close the loop for PET-containing textiles. Enzymes can offer valuable assistance in processing mixed textile waste because of their high level of selectivity, enabling the targeted degradation of PET fibres from mixed textiles. This process releases PET oligomers, followed by monomers such as terephthalic acid and ethylene glycol.

Additionally, genetically modified microorganisms can be utilized to enhance the versatility of renewable carbon sources by metabolizing and converting the released monomers into base chemicals or biodegradable polymers. These polymers can subsequently be utilized for the development of new fibres via melt-spinning and further processing into textiles.

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