

WE OFFER AN INTERESTING AND CHALLENGING POSITION FOR

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**MASTER THESES, SCIENTIFIC ASSISTANTS OR WORK EXPERIENCE CANDIDATES ON THE TOPIC OF DEVELOPMENT OF A PROCESS FOR CHEMICAL RECYCLING OF PET AND ITS SUBSEQUENT OPTIMIZATION**

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### Motivation

PET is a widely used polymer in different walks of human life. However, post-consumer and post-industrial PET waste accounts for 8% of the total plastic waste produced globally. Though mechanical recycling is commonly used to recycle PET, this strategy is not infinite. Alternatively, upcycling PET to its constituent monomers renders the waste stream as a valuable feedstock for the chemical industry and paves way towards a resource-efficient future. The aim is to develop and optimize the existing chemical recycling strategies of PET in strict adherence to the principles of green chemistry and sustainable chemical engineering.

### Project description

The ultimate goal is to develop a holistic, intensified and sustainable strategy for chemical recycling of different grades of post-consumer and post-industrial PET waste. It involves optimizing the current chemical recycling strategy developed at Fraunhofer ICT using design of experiments. In addition, determining the kinetics of the reaction and subsequent modelling is also a part of this training. Further, an appropriate down streaming strategy for product purification should be synthesized and the entire process must be modelled and simulated in Aspen Plus® in order to estimate the cumulative energy demand (CED) of the process. Possible hotspots for process intensification and optimization through heat integration should also be identified. Results obtained from these tasks should be disseminated in relevant scientific publications and/or at appropriate conferences.

### Tasks

- Comprehensive literature research on the current state-of-the-art technologies for recycling PET
- Identification of the most appropriate solvents for selective dissolution of PET
- Developing a process concept for selective depolymerisation with the aid of shortlisted eco-friendly solvents and low molecular weight organic catalysts
- Process optimisation through design of experiments and sensitivity analysis
- Determination of reaction kinetics and subsequent kinetic modelling
- Process simulation in Aspen Plus® in order to estimate the cumulative energy demand (CED) of the process
- Contribution to a publication to disseminate the scientific findings

### Requirements

- Degree in Chemistry or Chemical and/or Process Engineering
- Interest in subjects like Chemical Reaction Engineering, Process Modelling and Optimization, Circular Economy and Sustainability (Green Chemistry)
- Proficiency in simulation tools like Aspen Plus® and Aspen HYSYS®
- Practical laboratory experience
- Motivation to establish this topic further at Fraunhofer ICT
- Dissemination of the results through appropriate publications and/or at relevant conferences

### Start

by appointment

### Contact

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