Master Student Thesis

Process design and parameter optimisation of novel plastics-to-plastic chemical recycling technology for upcoming start up

Green Chemistry / Technical Chemistry / Chemical Engineering / Plastic Recycling / Start-up Experience

Join us in our exciting journey to revolutionise the plastics recycling world. We are developing the next generation of chemical recycling technologies based on liquid phase low-temperature autooxidation.

We (Alexandre Kremer and Dr. Andreas Wagner) are an impact driven founder-team based in the ChemSPACE TUM Venture Labs in the Chemistry Department. We have over 10 years of professional experience in sustainability and strong academic track record, particularly in the plastics and chemical industry. We are looking for an outstanding student to support us in scaling up our technology, exploring process design and engineering questions.

Project context: Finding new feedstocks for the chemical industry constitutes a cornerstone of the net-zero transition by drastically reducing the sector's dependence on fossil fuels. In parallel, ever-growing volumes of incinerated unrecyclable (plastic) waste are not compatible with Paris pledges and alternative waste treatment is crucially needed. We aim to develop the first end-to-end integrated technology platform for plastic-to-plastic chemical recycling.

Objective of the project: The aim of the project is to develop computer-based process simulation and optimization of a novel plastics-to-plastics chemical recycling route. This will include a three-phase thermochemical step to digest the plastics polymer into smaller molecules, followed by separation and downstream electro-, bio- and thermochemical treatment. A particular emphasis will lie on integrating carbon dioxide capture and utilization with green hydrogen. The project will include close collaboration with the founding team and a senior advisor with 30+ years' experience in the field to evaluate different process design options and sensitivity analysis.

Key deliverable

- Computational process model (e.g. Aspen) with analysis of different design options and synergies based on a thorough assessment of energy consumption, emissions and economic considerations.
- Based on the final model, identify key opportunities for further modelling, process improvements and potential scaling bottlenecks.

Requirements for students: Prior experience in computational process design and chemical engineering. Strong interest in entrepreneurship and sustainability are a big plus. We are both driven by making a positive impact in our professional career and would love to work with like-minded students.

Main contact points for this project – reach out for a coffee so we can get to know each other!

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We are in contact with several professors ready to coordinate the thesis from an academic perspective. Thesis supervisor will be selected in coordination with the student based on the final topic identified.