Lehrstuhl für Energiesysteme
TUM School of Engineering and Design
Technische Universität München

Bachelor's Thesis

(Theoretical)

Study on the Flowability of Powdered, CO_2-Neutral Feedstocks in Thermochemical Conversion Processes

Description:

In light of the climate-driven transformation of resource and energy systems, as well as the high import dependency on fossil raw materials, the development of new feedstocks such as biogenic residues or plastic waste is of strong importance. Closing the carbon cycle also represents a key aspect in making the chemical industry more sustainable. A promising approach in this context is entrained-flow gasification for converting pretreated residues into high-quality synthesis gas (H_2 & CO). This syngas can subsequently be used, for example, in IGCC power plants for electricity generation or in catalytic synthesis processes to produce base chemicals such as methanol or Fischer–Tropsch (FT) products.
For thermochemical conversion in entrained-flow reactors, specific requirements must be met by the feedstock material. Due to the high temperatures and short residence times, very finely ground materials with particle sizes below 250 µm are required to achieve sufficient conversion. However, these requirements lead to challenges regarding the flowability and conveyability of the feedstocks, which are essential prerequisites for the practical use of renewable materials.
The aim of this work is to conduct a study on the flowability of solid feedstocks. In a first step, key characteristic parameters are to be identified through a literature review. Furthermore, suitable measurement methods for determining these parameters are to be derived. Based on the findings, the flowability of selected feedstocks will be evaluated and classified. Finally, the results will be compared with literature data and discussed in a scientific context.

Requirements

- Independent working style
- Reliability and sense of responsibility

Work Packages:

- Familiarization with entrained-flow gasification, particularly the requirements for feedstocks
- Execution and evaluation of a literature review
- Derivation of relevant findings and regular discussion with the supervisor

Start: 01.07.2026

contact: M. Sc. Lukas Springmann

Room: MW 3711

Tel.: 089 289 16292

Email: lukas.springmann@tum.de