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

Master's Thesis

(Practical)

Waste-to-X: Improvement of a Thermal Plasma Test Rig for Biomass and Waste Treatment

Description

Currently, fuels, plastics and a variety of other chemicals are produced from fossil fuels. For a sustainable energy system, it is therefore necessary to develop processes for the production of these raw materials from renewable sources such as residual materials and biomass in order to continue to meet the global demand.

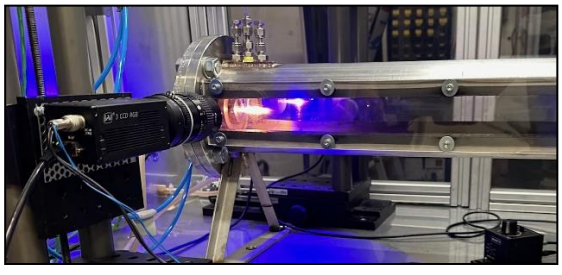
For the project "H2-Reallabor Burghausen" the construction of a mobile (containerized) Waste-to-X process chain is planned, consisting of a rotary kiln pyrolysis, a plasma reformer unit and a subsequent methanol synthesis. In particular, the treatment of pyrolysis gas with plasma is a relatively new and not well defined process, which requires research in this direction. The objective of this thesis is to improve a test rig designed for the analysis of biomass particles and small waste fractions in thermal plasma. Therefore, a new high-speed camera is utilized. The particles can be tracked in the plasma jet and valuable data can be collected by analyzing the camera frames. In addition to the practical tasks (conducting experiments etc.) of the thesis, an existing python code should be improved, to properly visualize particle tracks (see picture below).

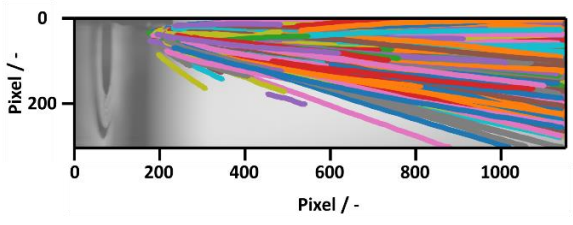
Requirements:

- Interest in design and construction
- Interest in plasma processes
- Independent and conscientious way of working
- Previous experience in process engineering

Practical work:

- Improve a test for imaging of thermal plasma processes
- Conducting experiments with the improved setup, e.g. high-speed imaging, sample analysis…
- Interpretation and analysis of the results





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