

CARBON SEQUESTRATION AND STORAGE FROM BIOMASS THROUGH HYDROTHERMAL CARBONISATION



Nowadays, the increase in the search for new technologies to extend the time of carbon storage has grown. Hydrothermal Carbonization (HTC) has shown to be a promising process to sequester and store carbon from biomass waste sources. HTC is a process that runs at elevated pressures and temperatures (super critical conditions) that aims to densify the carbon into the solid fraction. The resulting solid material rich in carbon (hydrochar) is stable and can be stored easily for further uses (energy production, gasification, etc.). However, this technology is still under development and needs further improvements depending on the desired goal.

This master assignment at the Thermal Engineering group aims to study strategies to improve the carbon sequestration and storage from biomass through hydrochar hydrothermal carbonization. The main task will be

- Through literature review, study the formation the carbon material (hydrochar) during hydrothermal carbonization.
- Identify additives that can help to increase the polymerization of carbon compounds and hence the increase of the carbon densification during HTC (transfer to the solid fraction).
- Develop an experimental plan and perform experimental tests on the influence of different process parameters and biomass feedstocks on the product yield and quality of the HTC process in a batch (500ml autoclave) reactor and the characterization of these products.
- Based on the experimental results (mass and energy balances) develop a system model for carbon sequestration and storage through HTC.

We are looking for an motivated master, pro-active and independent student with a chemical/mechanical engineering or sustainable energy technology background with strong preference to perform laboratory tests and analyses (or willing to learn) and a bit of modelling (ASPEN PLUS). The experiments will be run in the new HTC setup located at the Kleinhorst, see picture above.

The research will be performed in the Thermal Engineering Group, 30 (6 months) EC for SET students and 45 EC (9 months) for ME or Chem.Eng students.

The supervision will be done by Mr. Bramer and Mr. Aragon-Briceño

If you are willing to discuss about the master assignment, please contact:

Ir. Eddy Bramer (e.a.bramer@utwente.nl) Thermal Engineering Group (ME)

Dr. Ir. Christian Aragon-Briceño (c.i.aragonbriceno@utwente.nl) Thermal Engineering Group / Sustainable Process Technology Group (Chem.Eng)