



DEPARTMENT OF ENERGY TECHNOLOGY
AALBORG UNIVERSITY

PhD Public Defence

- Title:** Feedstock Preparation and Physico-chemical Characterization; Optimization of Feedstocks for Continuous HTL and Optimum Yield
- Location:** Pontoppidanstræde 111, auditorium
- Time:** Tuesday 23 May 2017 at 13.00
- PhD defendant:** Iulia-Maria Sintamarean
- Supervisor:** Professor Lasse Rosendahl
- Moderator:** Associate Professor Henrik Sørensen
- Opponents:** Associate Professor Carsten Bojesen, Dept. of Energy Technology, Aalborg University Esbjerg (Chairman)
Principal Scientist Anja Oasmaa, Liquid Biofuels, VTT, Finland
Associate Professor Derk Willem Frederik Brilman, University of Twente, the Netherlands

All are welcome. The defence will be in English.

**After the defence there will be an informal reception
in Pontoppidanstræde 111 (coffee room).**



Abstract:

Hydrothermal liquefaction (HTL) is a thermochemical route to convert a diverse range of biomass substrates into liquid energy carrier. The HTL process includes the preparation of a biomass aqueous slurry and heating the slurry up to sub- or supercritical water conditions to facilitate the biomass dissolution and conversion into biocrude. For continuous HTL processing, the preparation of pumpable biomass slurries is extremely challenging especially when it comes to lignocellulosic biomass. So far, the feedstock pumpability has been a neglected area of research within the hydrothermal processing field because most studies are conducted in batch reactors where pumpability is beyond scope.

The main contribution of this work is in developing strategies to prepare pumpable wood slurries for continuous hydrothermal liquefaction. Three pretreatment methods are proposed for processing wood powder (particle size < 0.25 mm) or wood chips (10 mm to 15 mm or larger). Methods based on thermochemical treatment as well as strategies based on physical and mechanical pretreatment (consisting of size reduction and mixing of biomass with other substrates) are studied. The impact of the feedstock pretreatment on the biocrude yield and biocrude properties is also investigated. Two of the three pretreatment strategies were tested in a continuous bench scale HTL plant which confirms the technical feasibility of the pretreatment methods proposed but also the good agreement between the laboratory-scale and the large scale pretreatment and pumpability tests.