

Structural and Compositional Transformations of Biomass Chars during Fast Pyrolysis - DTU Orbit (08/11/2017)

Structural and Compositional Transformations of Biomass Chars during Fast Pyrolysis

In this work the physical and chemical transformations of biomass chars during fast pyrolysis, considered as a 2nd stage of combustion, has been investigated. Seven biomasses containing different amount of ash and organic components were reacted at up to 1673 K with high heating rates in a wire-mesh reactor and the resulting chars were retrieved. In order to obtain information on the structural and compositional transformations of the biomass chars, samples were subjected to elemental analysis, scanning electron microscopy with EDX and Raman spectrometry. The results show that there are significant changes in both the organic and inorganic constituents of the chars. Under high heating rates (> 100 K/s) char particles underwent different types of melting and pores of different size were developed in dependency on the temperature and biomass composition. The Si-rich rice husks char did not show any melting behavior up to 1673K. Samples with high lignin content tended to melt completely and developed micropores, while the samples with the high hemicellulose content softened and transformed into the separated molten carbon skeleton particle with the form similar to the virgin biomass particle and with inner and outer macropores. From the lab-scale experiments on the wire-mesh reactor, it was observed that the final temperature has more significant effect on the char yield than heating rate. The applied variation of holding time from 1 to 4 sec and a particle size fraction from 50 micron up to 1 mm showed that the char yield depends mainly on the biomass type.

General information

State: Published

Organisations: Department of Chemical and Biochemical Engineering, CHEC Research Centre, Technische Universität München, University of Copenhagen

Authors: Trubetskaya, A. (Intern), Steibel, M. (Ekstern), Spliethoff, H. (Ekstern), Barsberg, S. T. (Ekstern), Larsen Andresen, M. (Ekstern), Jensen, P. A. (Intern), Jensen, A. D. (Intern), Glarborg, P. (Intern)

Number of pages: 1

Publication date: 2014

Event: Abstract from TCS 2014, Denver, United States.

Main Research Area: Technical/natural sciences

Electronic versions:

[abstractTCS_2014.docx](#)

Source: PublicationPreSubmission

Source-ID: 117971897

Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2015