

# **“Process performance, influence on reactivity, and hydrophobic character of wet and dry biomass torrefaction”**

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## Abstract:

The doctoral dissertation is a written work, a collection of published and thematically related scientific articles. The work focuses on the issues of dry and wet torrefaction processes, including their productivity, as well as the impact of thermal valorization processes on reactivity and hydrophobic characteristics. Review articles show the place of biomass valorization processes in a broader context, i.e., the power system and its flexibility, and discuss important aspects of valorization processes, including their impact on changing the physico-chemical characteristics of products in relation to substrates. Experimental works focus on wet and dry torrefaction processes, as well as on conversion processes of solid fuels into liquid or gaseous fuels, such as pyrolysis or gasification, and in particular gasification with a relatively low underflow of oxidant, typical for the operation of gasification installations under low load, with respect to the nominal load. The scientific achievements, which are an integral part of the doctoral dissertation, present original solutions to scientific problems related to wet and dry torrefaction processes and their impact on biomass reactivity, including the developed concept of a tar deposition diagram, evaluation and determination of the applicability limits of indirect methods for assessing the productivity of wet and dry torrefaction processes, as well as the concept of ash yield, which is able to quantify the loss of ash due to leaching in the wet torrefaction process, even in a situation where the ash content of the valorization products is higher than the ash content of the substrates.

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