

## Improve of Biomass Properties through Torrefaction Process

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**Abstract :** Biomass is an important renewable energy source in Poland. As a biofuel, it has many advantages like renewable in noticeable time and relatively high energy potential. But disadvantages of biomass like high moisture content and hygroscopic nature causes that gaining, transport, storage and preparation for combustion become troublesome and uneconomic. Thermal modification of biomass can improve hydrophobic properties, increase its calorific value and natural resistance. This form of thermal processing is known as torrefaction. The aim of the study was to investigate the effect of the pre-heat treatment of wood and plant lignocellulosic raw materials on the properties of solid biofuels. The preliminary studies included pine, beech and willow wood and other lignocellulosic raw materials: mustard, hemp, grass stems, tobacco stalks, sunflower husks, Miscanthus straw, rape straw, cereal straw, Virginia Mallow straw, rapeseed meal. Torrefaction was carried out using variable temperatures and time of the process, depending on the material used. It was specified the weight loss and the ash content and calorific value was determined. It was found that the thermal treatment of the tested lignocellulosic raw materials is able to provide solid biofuel with improved properties. In the woody materials, the increase of the lower heating value was in the range of 0,3 MJ/kg (pine and beech) to 1,1 MJ/kg (willow), in non-woody materials - from 0,5 MJ/kg (tobacco stalks, Miscanthus) to 3,5 MJ/kg (rapeseed meal). The obtained results indicate for further research needs, particularly in terms of conditions of the torrefaction process.

**Keywords :** biomass, lignocellulosic materials, solid biofuels, torrefaction

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