

# DYNAMICS OF HYDROGEN LOSS AND STRUCTURAL CHANGES IN PYROLYZING BIOMASS MATERIALS UTILIZING NEUTRON IMAGING ANALYSIS

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Biomass is an important source for biofuel and porous carbon materials. In our studies, we have been investigating material structural decay during biomass pyrolysis as well as associated hydrogen loss utilizing *in-situ* neutron radiography image analysis. At the last Carbon conference in Madrid, we presented results from our first investigations that included the determination of *in-situ* hydrogen loss dynamics inside beech wood and transmission changes in poplar up to 400 °C and neutron computed tomographies (NCTs) of wood samples. We also compared NCT with X-ray tomography on one sample that suggested that one could develop a method for obtaining relative H/C in the structure. Indeed, neutrons are sensitive to H while X-rays measure C.

In this presentation we will show new results from extended pyrolysis up to 1000 °C where the level of carbonization reached a higher level than at 400 °C. From the *in-situ* experiments we identified different stages of hydrogen loss rate dynamics with high spatial resolution. Imaging also allows us to correlate structural dynamics of the biomass materials to the concurrent dynamics of hydrogen loss. We will also present NCTs comparing fresh and carbonized end products. The work will include new information on results from more detailed image analysis for H/C comparing the sample introduced at the last Carbon conference in Madrid.

Keywords: Biomass, pyrolysis, neutron imaging, X-ray imaging, hydrogen, hydrogen-carbon ratio