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PRESS RELEASE
22 February 2019

Impact of autohydrolysis on wood components and on pure cellulose production

December 4th, 2018, Hélène Curmi defended her doctoral thesis of the University Grenoble Alpes – prepared under the supervision of the Professor Christine Chirat and the Professor Emeritus Dominique Lachenal (Grenoble INP-Pagora/LGP2). She presented the results of her research work entitled ***Study of the impact of autohydrolysis on wood components and on delignification processes to produce pure cellulose*.**

This study is a part of a large project which aim is to convert a pulp mill into a fully integrated biorefinery by adding an autohydrolysis step to remove and valorize hemicelluloses prior to cooking.

This thesis's goal is to study the impact of adding an autohydrolysis step on wood components and on the subsequent delignification and bleaching processes applied to this wood to produce pure cellulose. Wood components were analyzed before and after autohydrolysis. In particular it was shown that autohydrolysis increases the amount of free phenolic groups, and lowers the involvement of lignin in lignin carbohydrates complexes. A new NMR method using Dynamic Nuclear Polarization was performed directly on milled wood to look at wood components structure without extraction's steps to avoid chemical modifications.

The second part describes the test of pulp processes (alkaline cooking, oxygen delignification and bleaching) on autohydrolysed wood chips. It showed that the addition of this autohydrolysis step improves delignification during cooking to such an extent that soda cooking alone is possible and efficient. Oxygen delignification was also improved. Two

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bleaching sequences with or without chlorinated compounds (ECF and TCF) were applied and compared, and it was concluded that sustainable bleaching without any chlorinated reagents is feasible. Finally, evaluation of bleached pulp properties demonstrated that viscose application can be targeted. Indeed, pulp had high purity cellulose content, adequate polymerization degree and high brightness and brightness stability.

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Grenoble INP-Pagora, the international school of paper, print media and biomaterials. The school is Quality, Safety & Environment certified and part of Grenoble INP, an engineering institute geared towards training *"engineers who are creative, responsible and committed to a sustainable world"*. It trains engineers for the sectors of green chemistry, paper, printing, packaging, biomaterials and printed electronics. It also offers a vocational degree: *Interactive Print and Digital Media*. Its wide range of courses, pedagogical expertise and strong partnerships with industry allow it to continuously tailor its training to the needs of businesses and to the 60 graduates it produces each year, thus enabling them to embark upon stimulating careers in France and abroad. Grenoble INP-Pagora also develops international training in conjunction with several European universities, as well as offering a 2nd year engineering course, a Master *Biorefinery & Biomaterials* and a Post-Master *Biorefinery: bioenergy, bioproducts & biomaterials* dispensed in English. The innovative research performed by its LGP2 laboratory helps to improve processes and create products that meet all the latest requirements, notably those linked to the environment. The Cerig's role is to keep an active eye on technological developments in these industries. These various activities ensure that the training offered is up to date with the latest scientific and technological advances.
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The Laboratory of Pulp and Paper Science and Graphic Arts (LGP2) is a joint research unit (UMR 5518) run by the CNRS, Grenoble INP and the AGEFPI. It conducts its scientific activities in conjunction with the academic community of Grenoble Alpes University. LGP2 comprises three teams: *Biorefinery: chemistry and eco-processes – Multiscale biobased materials – Surface functionalization through printing processes*. Their research strives to meet society's expectations when it comes to sustainable development (green chemistry, clean processes, recycling, biobased materials, renewable energy) and traceability & safety (functional materials, smart paper and packaging). ***pagora.grenoble-inp.fr/research/***