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PRESS RELEASE
January 4, 2017

ECF bleaching with low environmental impact

December 15, 2016, Jennifer Marcon defended her doctoral thesis at University Grenoble Alpes (specialty: Fluid Mechanics, Energy, Processes) prepared under the supervision of Professor Gérard Mortha and of Nathalie Marlin, Associate Professor (Grenoble INP-Pagora / LGP2). She presented the results of her research work entitled *Lignocellulosic pulp: study of a new ECF bleaching stage with low environmental impact*.

Chlorine dioxide is the most widely used bleaching agent for the production of bleached chemical pulps. However, its main drawback is the formation of chlorate, which decreases the delignification efficiency, and the reject of COD and toxic chloro-organic molecules (AOX) in mill effluents.

This study focused on the development of a new bleaching stage using chlorine dioxide (D stage) in non-conventional conditions, to reduce the environmental impact and production costs. The work was carried out on several softwood kraft pulps after cooking, taken at different stages of the bleaching sequence. The best results of the novel D stage were obtained for pulps at low kappa number, i.e. at the end of the bleaching sequence. The D stage was optimized and coupled with hydrogen peroxide addition. The same brightness and average degree of polymerization as for conventional D bleaching were obtained. Interestingly, a very important decrease of pollution load (70% of AOX and 20% of COD) was obtained, accompanied by a significant gain of productivity and energy saving (lower temperature and reaction time).

Chemical investigations on the reaction mechanism, carried out by different techniques (ESR, NMR and FTIR spectroscopies, HPAEC-PAD chromatography), allowed to reveal the main features of the reaction mechanism of chlorine dioxide and highlight the structural modifications brought to the pulp residual lignin during the novel unconventional D bleaching stage.

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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 is home to three teams: Biorefinery: chemistry and eco-processes – Multiscale biobased materials – Surface functionalization through printing processes. The research conducted by LGP2 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). ***http://pagora.grenoble-inp.fr/research/***

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