

PRESS RELEASE 15 March 2019

Cellulose pretreatments for a nanofibrillation by twin-screw extrusion



February 1st 2019, Fleur Rol defended her doctoral thesis of the University Grenoble Alpes, prepared under the supervision of Julien Bras, Associate Professor HDR (Grenoble INP-Pagora/LGP2). She presented the results of her research work entitled *Cellulose pretreatments for a nanofibrillation by*

twin-screw extrusion.

The CERISE project, conducted under the auspices of the Tec21 Laboratory of Excellence and the Carnot PolyNat Institute, aims to develop a new process for manufacturing cellulose nanofibrils (CNF) with a high dry matter content and low energy consumption. Twin screw extrusion (TSE) – industrially well-known energy-efficient and highly adaptable technique – was optimized to produce CNF at 20 % dry content. By decreasing considerably their water content, this new strategy improves their transport cost, their storage and extends their field of application.

The objectives were to

- Develop new pretreatments of cellulose fibers to facilitate the nanofibrillation and produce high quality functionalized CNF.
- Optimize TSE screw profile and conditions to produce CNF.
- Prepare new materials made of this new type of CNF.

Four chemical pretreatments, identified as easily industrializable, have been optimized. Extrusion nanofibrillation was simulated by software to obtain optimal extrusion conditions. This cost-effective approach was validated at semi-industrial scale. Various applications are considered for these new NFC with a high dry matter content.

Contact Julien.Bras@pagora.grenoble-inp.fr

Logo logo-lgp2.eps

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.

pagora.grenoble-inp.fr • cerig.pagora.grenoble-inp.fr • www.facebook.com/GrenobleINP.Pagora

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/