

PRESS RELEASE 17 March 2020

Surface modifications of cellulose nanocrystals for biobased food packaging



On March 5, 2020, Manon Le Gars defended her doctoral thesis of the Université Grenoble Alpes, prepared under the supervision of Julien Bras, Associate Professor HDR, and Naceur Belgacem, Professor (Grenoble INP-Pagora / LGP2), Philippe Roger, Professor, and Hanène Salmi-Mani, Associate Professor (Université Paris-Saclay).

She presented the results of her research work entitled *Surface modifications of cellulose nanocrystals for biobased food packaging applications*.

The purpose of this project is to develop new surface chemical modifications of cellulose nanocrystals (CNCs), in order to enhance their compatibility with biobased poly(lactic acid) (PLA) polymer, and to combine their respective outstanding intrinsic properties.

Biobased PLA-based multi-phase materials, including the designed nanostructures, are produced. Furthermore, the final materials are expected to be used in food packaging sector, and the improvement of the barrier properties of the PLA, especially towards oxygen and water vapour, is a key point in the characterization of the materials. In this project, different routes are proposed for the grafting of various compounds – polymers or single molecules – on the surface of the CNCs. Their grafting efficiency has been confirmed and carefully characterized. The modified CNCs are then introduced in PLA-based materials via two different strategies. Indeed, they are either used as nanofillers in a PLA matrix with inclusion rates comprised between 2 and 10 wt%, or as an inner layer of PLA-based multi-layered materials.

In both cases, final PLA-based materials including various designed cellulosic nanomaterials exhibit enhanced and highly encouraging properties in terms of homogeneity, transparency, and barrier towards oxygen and water vapour, in accordance with required properties for food packaging materials.

Contact

Naceur.Belgacem@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 and management 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. 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: it offers a 2nd year engineering course, international semesters and a Biorefinery & Biomaterials Masters, taught 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. These various activities ensure that the training offered is up to date with the latest scientific and technological advances. pagora.grenoble-inp.fr

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/lgp2