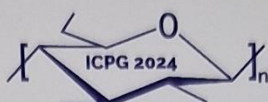


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NANOCELLULOSE-BASED ADDITIVES FOR PAPER WET AND DRY STRENGTH

ELISA GIOVANNA FAGGIOLI^a, CARLO PUNTA^a, DAVIDE GHIRARDELLO^b, ALESSANDRO SACCHETTI^a

^aDipartimento di Chimica, Materiali e Ingegneria Chimica "Giulio Natta", Politecnico di Milano, Via Mancinelli, 7, 20131, Milano ^bMare SpA, Milano, Italy, 20122 elisagiovanna.faggioli@polimi.it

In the recent years, the paper and paperboard industry has been trying to limit the use of non-biobased additives for wet and dry strength in favour of more sustainable alternatives. In this context, nanocellulose is an optimal candidate, given its affinity with the matrix and its environmentally friendly nature. This work focuses on the introduction of virgin and functionalised nanocellulose in the bulk phase of paper production to investigate its synergies with the market-ready counterparts and provide innovative solutions for a greener process.

The author wishes to thank all OSCMLab and Mare SpA for the continuous support.

AN *EQUISETUM* ENDOTRANSGLUCOSYLASE CAPABLE OF COVALENTLY GRAFTING 'CARGO' SUBSTANCES ONTO CELLULOSE

LENKA FRANKOVÁ^{a*}, ERIC WHALE^b, STEPHEN C. FRY^a

^aInstitute of Molecular Plant Sciences, The University of Edinburgh, Edinburgh EH9 3BF, United Kingdom ^bUnit 31, West Way Business Park, West Way, Dalgety Bay, Fife, KY11 9AE, United Kingdom s.fry@ed.ac.uk; lenka.frankova@ed.ac.uk; eric.whale@cellucomp.com

Equisetum hetero-trans- β -glucanase (HTG) covalently grafts cellulose (donor-substrate) onto xyloglucan oligosaccharides (XGOs acceptor-substrates). Excitingly, the XGOs can be carrying a desired functional group – a 'cargo' e.g. a fluorescent dye, pH indicator, hydrophobic moiety, radiochemical etc., conferring novel properties on cellulose. HTG, sourced from *Equisetum* (a botanical 'dinosaur') thus has unique potential in replacing hydrocarbons and in using green technology to develop new packaging and other cellulosic materials to supersede current environmentally unfriendly approaches.

Acknowledgements. We thank InnovateUK for funding.

USING HETERO-TRANS- β -GLUCANASE (HTG) TO ENHANCE THE PROPERTIES OF CELLULOSE IN THE CIRCULAR ECONOMY

LENKA FRANKOVÁ^a, ERIC WHALE^b, STEPHEN C. FRY^{a,*}

^aInstitute of Molecular Plant Sciences, The University of Edinburgh, Edinburgh EH9 3BF, United Kingdom. ^bUnit 31, West Way Business Park, West Way, Dalgety Bay, Fife, KY11 9AE, United Kingdom. s.fry@ed.ac.uk; lenka.frankova@ed.ac.uk; eric.whale@cellucomp.com

Sugar-beet pulp (SBP), a cellulose-rich by-product of the sucrose industry, can be exploited as a 'green' material, potentially replacing petrochemicals. We describe HTG, a unique enzyme of *Equisetum* plants, as a tool to modify the cellulose of SBP. HTG cleaves cellulose (donor substrate) and re-attaches it to a xyloglucan oligosaccharide (XGO; acceptor substrate) by transglycosylation, creating a cellulose-XGO glycosidic bond. Excitingly, we show that the XGO can carry 'cargoes', which thereby become covalently attached to cellulose fibres, potentially enhancing SBP's physical properties.

Acknowledgements. We thank InnovateUK for funding.

APPLICATION OF INULIN FOR COATING OF β -CAROTENE: PREPARATION AND CHARACTERISATION

INGA GABRIUNAITE^{a,b*}, TATJANA KAVLEISKAJA^b, RŪTA GRUŠKIENĖ^a, JOLANTA SEREIKAITE^a

^aDepartment of Chemistry and Bioengineering, Faculty of Fundamental Sciences, Vilnius Gediminas Technical University, Saulėtekio av. 11, 10223 Vilnius, Lithuania ^bInstitute of Chemistry, Faculty of Chemistry and Geosciences, Vilnius University, Naugarduko str. 24, 03225 Vilnius, Lithuania *inga.gabriunaite@vilniustech.lt

β -carotene (CAR) is an important antioxidant that helps prevent certain types of cancer, such as lung or breast cancer. Due to low consumption of CAR-containing fruits and vegetables, CAR may be used as a food additive. However, CAR is very unstable at room conditions and is not soluble in water. In this study, to improve the qualities of CAR, it was coated with polysaccharide, in particular with inulin (IN). IN is a known dietary fiber that improves gut health. The prepared CAR-IN particles were characterized with DLS, FTIR, DSC and NMR methods, the antioxidant activity was determined.

Acknowledgements: This research was funded by Research Council of Lithuania project No. S-PD-24-55

COMBINED APPLICATION OF NITROGEN AND SULFUR FERTILIZERS ON THE STRUCTURE AND PHYSICOCHEMICAL PROPERTIES OF BUCKWHEAT STARCH

LICHENG GAO^{a*}, GEERT HAESAERT^b, FILIP VAN BOCKSTAELE^a, PIETER VERMEIR^c, Andre SKIRTACH^d, MIA EECKHOUT^{a*}

^aDepartment of Food Technology, Safety and Health, Faculty of Bioscience Engineering, Ghent University, Valentin Vaerwyckweg 1, 9000, Ghent, Belgium ^bDepartment of Plants and Crops, Faculty of Bioscience Engineering, Ghent University, Valentin Vaerwyckweg 1, 9000, Ghent, Belgium

^cDepartment of Bioscience Engineering, Ghent University, Coupure links 653, 9000 Ghent, Belgium e-mail address xxxxx@mmm Filip.VanBockstaele@UGent.ac.be Pieter.Vermeir@UGent.ac.be Mia.Eeckhout@UGent.ac.be

Nitrogen (N) fertilizer (0, 45 kg N/ha) enhanced resulting Higher gelatinizability property cultivati

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