

N°258 / OC

TOPIC(s) : Polymers / Biomass conversion

Combining fatty acids and oligosaccharides by click chemistry for the design of bio-based amphiphiles

AUTHORS

Henri CRAMAIL / LCPO - ENSCBP, 16, AVENUE PEY-BERLAND, PESSAC

PURPOSE OF THE ABSTRACT

The development of new chemicals and polymeric materials from renewable resources is nowadays a strategic research area. In this presentation, some recent studies performed at the LCPO and aiming at combining fatty acids and oligosaccharides to design high added value bio-based amphiphiles will be discussed.

In this work, the valorization of woody hemicelluloses was investigated. The most abundant hemicellulosic polymers are xylans ? essentially linear heteropolysaccharides- accounting for 25-35% of the dry biomass of woody tissues. The chemical modification and the degradation of hemicelluloses into oligosaccharides are still a challenging task and would open the route to high potential bio-based materials.

The acidic hydrolysis of xylan from beechwood was first performed in mild conditions allowing the production of well-defined oligomers constituted, as an average, of six xylose and one glucuronic units. The coupling of these oligosaccharides with hydrophobic moieties such as fatty acid derivatives, thanks to the suitable chemical modification of the oligosaccharides reducing chain-ends, was then performed, leading to fully bio-based amphiphiles. The resulting amphiphilic bio-based conjugates were then self-assembled using three different methods, namely direct solubilization, thin-film rehydration/extrusion and microfluidics. Well-defined micelles and vesicles were obtained and their high loading capacity with propiconazole as an antifungal active molecule was shown. The resulting vesicles loaded with propiconazole in a microfluidic process, proved to significantly improve the antifungal activity of propiconazole, demonstrating the high potential of such xylan-based amphiphiles. (1)

1. J. Rosselgong, M. Chemin, C. Cabral Almada, G. Hemery, J-M. Guigner, G. Chollet, G. Labat, D. da Silva Perez, F. Ham-Pichavant, E. Grau, S. Grelier, S. Lecommandoux, H. Cramail

Synthesis and self-assembly of Xylan-based amphiphiles: from bio-based vesicles to antifungal properties

Biomacromolecules DOI: 10.1021/acs.biomac.8b01210

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

xylans | fatty acids | amphiphiles | self-assembly

BIBLIOGRAPHY

1. J. Rosselgong, M. Chemin, C. Cabral Almada, G. Hemery, J-M. Guigner, G. Chollet, G. Labat, D. da Silva Perez, F. Ham-Pichavant, E. Grau, S. Grelier, S. Lecommandoux, H. Cramail
Synthesis and self-assembly of Xylan-based amphiphiles: from bio-based vesicles to antifungal properties
Biomacromolecules DOI: 10.1021/acs.biomac.8b01210