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Polysaccharides as innovative renewable raw materials for the development of green/blue surfactants

AUTHORS

Louise RENAULT / ECOLE NATIONALE SUPERIEURE DE CHIMIE DE RENNES, 11 ALLEE DE BEAULIEU, RENNES

Thierry BENVEGNI / ECOLE NATIONALE SUPERIEURE DE CHIMIE DE RENNES, 11 ALLEE DE BEAULIEU, RENNES

PURPOSE OF THE ABSTRACT

The development of Green/Blue surfactants based on natural renewable resources is a concept that is gaining recognition in detergents and cosmetics. This new class of biodegradable and biocompatible products is a response to the increasing consumer demand for products that are both "greener", milder and more efficient. In order to achieve these objectives, it is necessary to use renewable low-cost biomass that is available in large quantities and to design through green processes molecular structures that show improved performance, favourable ecotoxicological properties and reduced environmental impact.[1] Within this context, marine algae and pectins represent a rich source of complex polysaccharides and oligosaccharides with innovative structures and functional properties that may find applications as starting materials for the development of green/blue surfactants and cosmetic actives. Professor Thierry Benvegny's team at the Ecole Nationale Supérieure de Chimie de Rennes (ENSCR) is developing original surfactants based on alginates (cell-wall polyuronic acids from brown seaweeds) or pectins (structural heteropolysaccharides contained in the primary cell walls of terrestrial plants) and fatty hydrocarbon chains derived from vegetable resources. Controlled chemical depolymerizations of the algal or pectin polysaccharides give saturated functional oligosaccharides incorporating rare sugars such as uronic acids (mannuronic, guluronic, glucuronic, galacturonic acids) and neutral oses (D-galactose, L-arabinose, L-rhamnose, D-xylose). The functionalization of these oligosaccharides through transesterification/transglycosylation processes in fatty alcohols or aminolysis in fatty amines is solvent-free and yields anomerically pure ester- or amide-type derivatives.[2] Aqueous basic and acid treatments lead to anionic or neutral single-tailed surfactants. Direct and one-pot conversion of algal or pectin polysaccharides into green/blue surfactant compositions was recently developed with a reduced cost and attractive biodegradability and ecotoxicity profiles. The industrial development of these technologies is in progress within the start-up SurfactGreen®. [3]

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Green chemistry | Bio-based surfactants | Biomass | Renewable

BIBLIOGRAPHY

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