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BOOK OF ABSTRACTS

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THE *PROS* AND *CONS* OF THE DEDICATED UPGRADE OF THE HEMICELLULOSIC SUGAR STREAM IN A BIOREFINERY FRAMEWORK

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The challenge of the future integrated biorefineries is the full economically utilization of all biomass components with the simultaneously production of fuels and chemicals, preferably of added-value. This can only be achieved by the selective fractionation of the lignocellulosic biomass into its polymeric components, thus increasing their individual upgradeability to enhance the process economics. To reach this goal, the fractionation methods used are of crucial importance. Yet, many of the most widely accepted biochemical biorefineries potential lay-outs, are mainly concerned with cellulose hydrolysis and fermentation and the hemicellulosic fractions are, at best, clamped with cellulose, averting its differential upgrade. Therefore, a change in perspective by which the fractionation processes, as well as the overall biorefinery lay-out, are thought and evaluated is needed.

The objective of this work is to review, compare and discuss the main advantages and bottlenecks of the currently available biomass pre-treatment technologies, particularly those leading to the selective fractionation of hemicelluloses. The advantages and disadvantages of the methods will be analysed foreseeing the added-value products possible to obtain from the hemicellulose path, and the most relevant factors which influence both product yield and consistency. Actually, the chemical composition and structural diversity of hemicelluloses constitutes an opportunity for the production of many chemicals, which has not yet been fully exploited. The integration of potential added-value products, e.g. oligosaccharides, polyols, and enzymes in a biorefinery framework will also be presented and discussed based on data for the upgrade of agro-food industrial residues and by-products. Examples will compare the use of mild processes for the selective recovery of hemicelluloses such autohydrolysis and dilute acid hydrolysis of brewery's spent grain, wheat straw, and eucalypt wood and the biotechnological processing of the hydrolysates.
It is foreseen that hemicellulose-derived chemicals will become an ever more relevant category of products, as they hold a promise of economic benefit for the biorefineries.