BIOFUELS AND BIOENERGY

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In recent years, bioconversion of lignocellulosic biomass into ethanol has been identi ed as a promising technology for producing liquid biofuels. However, lignocellulosic biomass hydrolysis produces a mixture of hexose and pentose sugars, which together are di cult to ferment to produce ethanol. Moreover, it also contains several fermentation inhibitors such as acetic acid, furfural, 5-hydroxyl methyl furfural and some phenolic compounds. us in literature several recombinant strains, capable of simultaneous uptake of glucose and xylose have been developed. Along with use of recombinant strains, nano ltration has also been applied t concentrate the sugars in hydrolyzate and for simultaneously removal of inhibitors from hydrolyzate, which increased the overall sugar consumption and improved the ethanol yield [Sasaki K. et al Bioresource Technology 169, 380, 2014 also 185, 263, 2015 & Maiti S. et al, ibid,114, 419, 2012]. However, genetically modi ed strains may su er from low yields, low productivities and genetic instability. In this study, a new strategy is used where nano ltration is applied for separating the xylose from a synthetic hydrolyzate mixture (as shown in Fig. 1). Sjoman E. et al [Sjoman E. et al JMS 292, 106, 2007] had already shown that glucose and xylose can be separate using nano ltration membranes, however, their aim was towards complete separation. On the other hand in the proposed process, hydrolyzate is divided into two streams one has higher glucose to xylose ratio (retentate stream) and another has lower glucose t xylose ratio (permeate stream). Most of the inhibitors, present in hydrolyzate get enriched along with glucose in the retentate stream which can be easily fermented by S. cerevisiae. Permeate stream with lower inhibitors concentration and lower glucose to xylos ratio can be e ectively fermented by suitably adapted P. stipitis [Patent pending]. In this study simulated hydrolyzate solutions were experimentally examined using commercially available spiral wound nano ltration modules. Experiments were performed in the volume reduction (dynamic) mode at variety of operating conditions by using di erent cut-o nano ltration membranes in order to optimize the operating conditions and to identify the best suitable cut-o for maximizing the separation. e optimization study involved would be to minimize presence of xylose in the glucose enriched stream by combination of suitable concentration factor and separation factor.

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