

Development of second generation ethanol process based on xylose consumption using non-conventional and recombinant yeasts

Isabela Pereira¹, Ângela dos Santos², Davi Gonçalves², Marcela Purificação², Nick Guimarães¹, Robson Tramontina³, Natalia Coutouné⁴, Eduardo Zanella², Boris Stambuk², and Jaciane Ienczak⁵

¹Universidade Federal de Santa Catarina Centro Tecnológico

²Federal University of Santa Catarina

³Universidade Estadual de Campinas

⁴National Center for Research in Energy and Materials (CNPEM)

⁵Universidade Federal de Santa Catarina

May 5, 2020

Abstract

Fermentation of the pentose fraction from hemicellulosic hydrolysate is an important challenge to be studied in second generation ethanol (E2G) production. In this sense, we have tested non-conventional (*Scheffersomyces stipitis* and *Spathaspora passalidarum*) and recombinant yeast strains (*Saccharomyces cerevisiae* recombinant MP-C5 and MP-C5H1) capable to uptake xylose with the aim to design a strategy for E2G production. Growth tests in different carbohydrates (glucose, xylose, glucose + xylose and sucrose + xylose) have shown that the integration of xylose and sucrose presented better results for all yeast tested, and the co-fermentation of these sugars provided faster xylose consumption by *S. cerevisiae* recombinant. On the other hand, *Sp. passalidarum* do not present high performance of sucrose consumption in microanaerobic fermentation conditions and an intracellular invertase high activity was observed by this yeast. *S. cerevisiae* MP-C5H1 presented best performance for fermentation tests and a batch strategy with high cell density was designed. By this strategy was possible to achieve high ethanol yield (0.48 g g^{-1}), titer (53.7 g L^{-1}) and global ethanol productivity ($2.24 \text{ g L}^{-1} \text{ h}^{-1}$).

Hosted file

Manuscript_Pereira et al., 2020.doc available at <https://authorea.com/users/301118/articles/430923-development-of-second-generation-ethanol-process-based-on-xylose-consumption-using-non-conventional-and-recombinant-yeasts>