239. Yeast platform for the production of 5-hydroxymethylfurfural-derivatives: *Saccharomyces cerevisiae as a whole cell biocatalyst*

Joana T. Cunha[1], Marlene Baptista[1], Aloia Romaní[2] and Lucília Domingues[1]

[1]CEB – Centre of Biological Engineering, University of Minho, Campus Gualtar, Braga, Portugal; [2]Chemical Engineering Department, Faculty of Science, Campus Ourense, University of Vigo, Spain

The utilization of lignocellulosic biomass for the production of biofuels has appeared as a possible solution to alleviate the envisioned depletion of fossil resources. Nevertheless, the attainment of economically viable lignocellulosic-based biorefineries requires the combined production of low value biofuels with high value compounds. 5-hydroxymethylfurfural (HMF) and its derivative 2,5-Furandicarboxylic acid (FDCA) have been previously identified as top promising chemicals to be obtained from biomass. Therefore, this work explored the potential of (1) wine residues as renewable sources of hexoses for the production of HMF and (2) *Saccharomyces cerevisiae*-the preferred microorganism for bioethanol production- as a whole cell biocatalyst for the conversion of HMF into high value derivatives. For that, grape must and pomace were submitted to aqueous microwave treatment at different temperatures and durations for extraction of sugars and their dehydration into HMF. Moreover, different industrial *S. cerevisiae* strains were compared in terms of HMF conversion, showing different potentials for its oxidation or reduction: with 2,5-Hydroxymethyl-furan-2-carboxylic acid (HMFCA) production being favored under more aerobic conditions, while oxygen limitation favored 2,5-Bis(hydroxymethyl)furan (BHMF) accumulation. *S. cerevisiae* strains were then able to produce these compounds using an HMF-rich medium derived from wine residues. Also, genetic modifications of the yeast resulted in an increase in the accumulation of the further oxidized derivatives FDCA and 5-formyl-2-furancarboxylic acid (FFCA). Taken together, these results prove *S. cerevisiae* to be a promising whole cell biocatalyst, allowing the envisioning of integrated biorefineries with combined production of biofuels and high value compounds.

Funding: This study was supported by the Portuguese Foundation for Science and Technology (FCT, Portugal) under the scope of the strategic funding of UIDB/04469/2020, the MIT-Portugal Program (Ph.D. Grant PD/BD/128247/2016 to JTC), and Biovino (0688_BIOVINO_6_E), funded by ERDF through INTERREG España – Portugal.