



5th EuGSC

European Conference on Green and Sustainable Chemistry

5th

EuChemS Conference on
Green and Sustainable
Chemistry

Conference Proceedings

26-29 September 2021

Virtual Conference

www.5eugsc.org

co-Organized by



EuChemS

European Chemical Society

— Division of Green and Sustainable
Chemistry —



Synthesis, functionalization and applications of 2,5-bis(hydroxymethyl)furan (BHMF): a stable bio-based diol

Fabio Aricò*

¹Ca' Foscari University, Department of Environmental Sciences, Informatics and Statistics, Campus Scientifico, via Torino 155, 30172 Venezia (Italy)

*e-mail: fabio.arico@unive.it

In the last twenty years biorefinery has gained exceptional attention in the scientific community. This interest has been prompted by the substitution of petroleum-based compounds with renewable substances with the aim of establishing a bio-based economically self-sustained industry. In this view, C6 furan-based compounds, usually referred as furanics, have been extensively investigated as aromatic promising building blocks from renewables. 5-Hydroxymethylfurfural (HMF) and 2,5-furan dicarboxylic acid (FDCA) are well known examples of furanics whose syntheses and applications have been extensively reviewed in the literature.[1] This presentation is focused on our latest results on the synthesis, functionalization and application of yet another interesting furanic bio-based platform chemicals, i.e., 2,5-bis(hydroxymethyl)furan (BHMF).[2] BHMF is a stable bio-based diol with numerous applications as monomer for bio-materials and fuels. In our most recent works we have reported that BHMF can be prepared in large scale via a two-steps reaction. First HMF was prepared from D-fructose via acid catalyzed reaction employing dimethyl carbonate:tetraethyl ammonium bromide as biphasic solvent system. Thus, HMF - recovered from the reaction mixture with minimal work-up – was converted to BHMF by reduction.[3]

BHMF was consequently alkylated to achieve a library of 2,5-bis(alkoxymethyl) furans (BAMFs) with potential applications as biofuel candidates.[4] Furthermore, reaction of BHMF with several dialkyl carbonates allowed the preparation of BHMF alkyl carbonates in mild conditions.[5] These new compounds resulted stable over time and they are suitable monomers for new bio-based polycarbonates and polyurethanes.

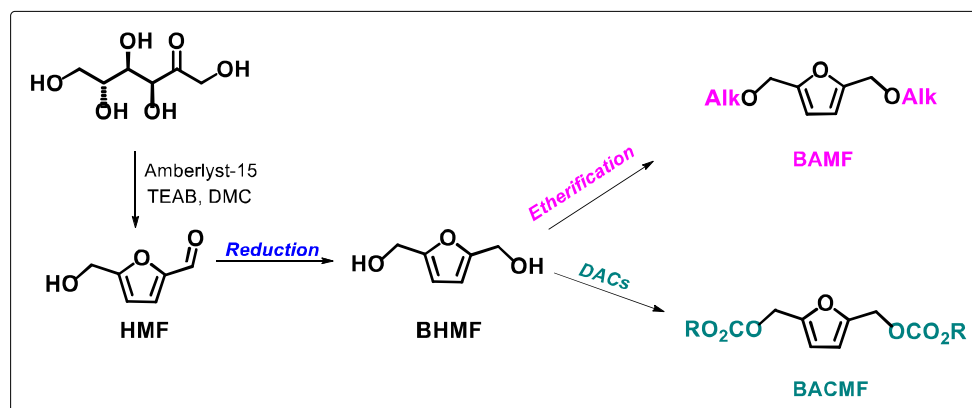


Figure 1. Synthesis and functionalization of BHMF

Acknowledgements

The author wants to acknowledge COST Action FUR4Sustain (CA18220-European network of FURan based chemicals and materials FOR a Sustainable development), supported by COST (European Cooperation in Science and Technology).

References

1. a) M. Sajid, X. Zhao, D. Liu. *Green Chem.* **20**, 5427 (2018); b) H. Yuan, H. Liu, J. Du, K. Liu, T. Wang, L. Liu. *Appl. Microbiol. Biotechnol.*, **104**, 527 (2020).
2. F. Aricò, *Pure Appl. Chem.*, accepted, <https://doi.org/10.1515/pac-2021-0117> (2021).
3. M. Musolino, J. Andraos, F. Aricò, *ChemistrySelect*, **3**, 2359 (2018).
4. M. Musolino, M. J. Ginés-Molina, R. Moreno-Tost, F. Aricò, *ACS Sustainable Chem. Eng.* **7**, 10221 (2019).
5. A.G. Sathicq, M. Annatelli, I. Abdullah, G. Romanelli, F. Aricò, *Sustainable Chemistry and Pharmacy*, **19**, 100352 (2021).