

Lignin valorization via a dithionite-assisted organosolv fractionation of lignocellulosic biomass

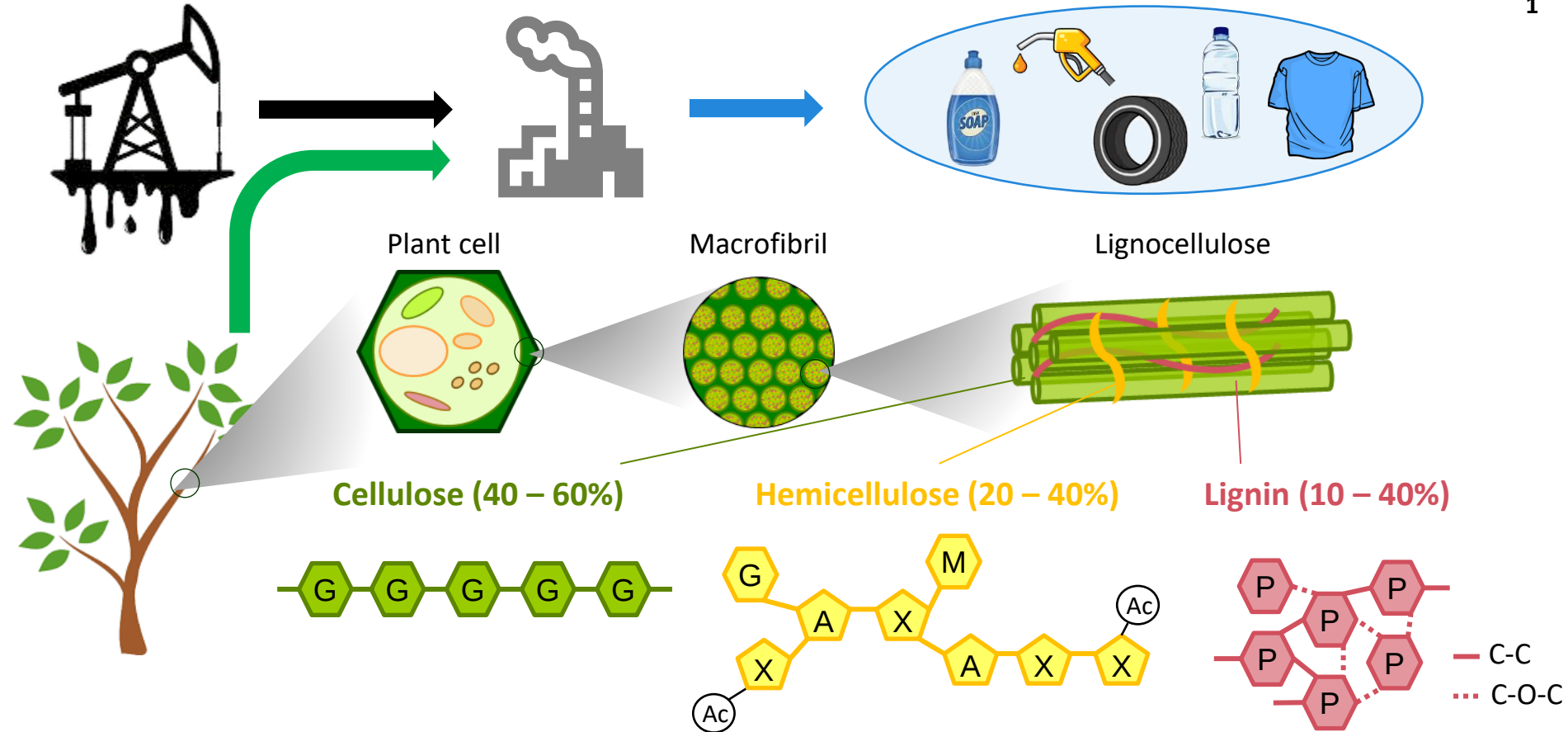
PhD student: Filippo Brienza

Supervisors: Prof. Damien Debecker & Prof. Iwona Cybulska

May 26th 2021

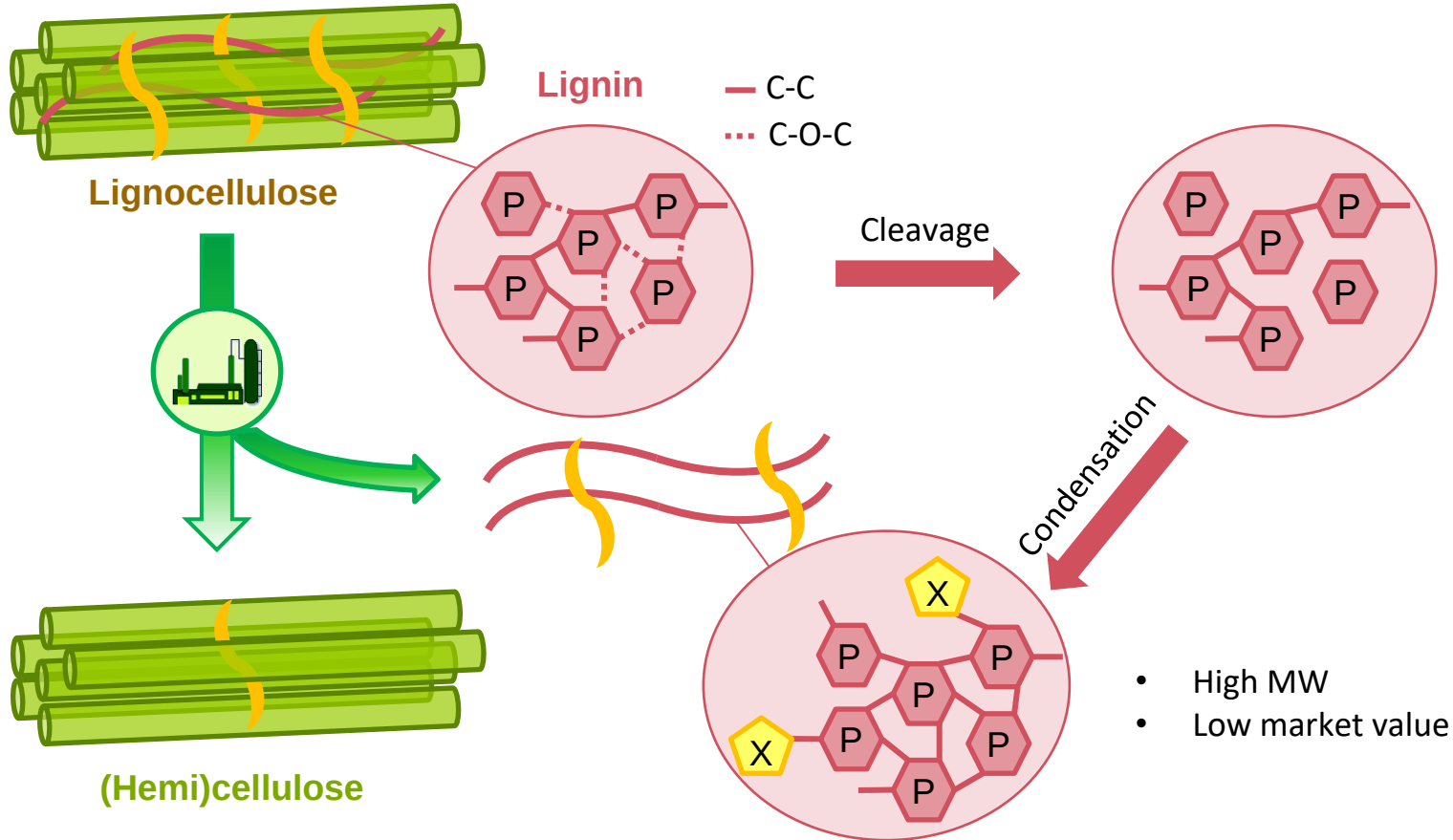
Lignocellulose: a source of energy and materials

1



Pretreatment aims at (hemi)cellulose isolation

2



Reductive catalytic fractionation

3

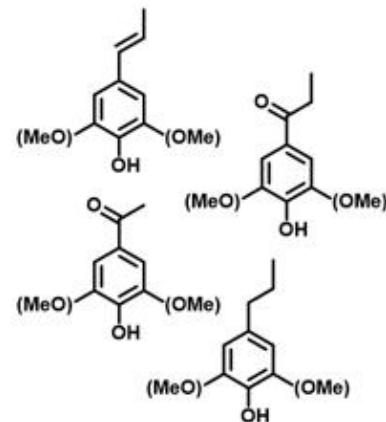
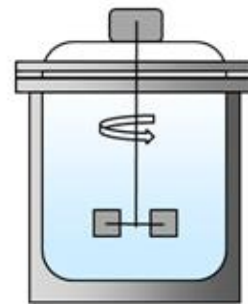
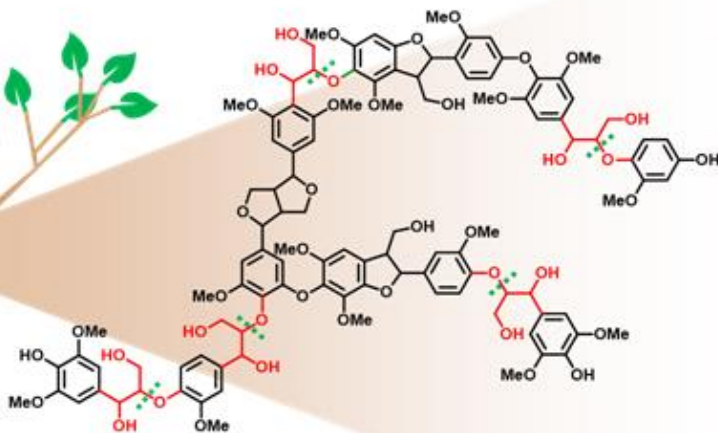


- High cost of precious metals
- High H_2 pressure

Organic solvent

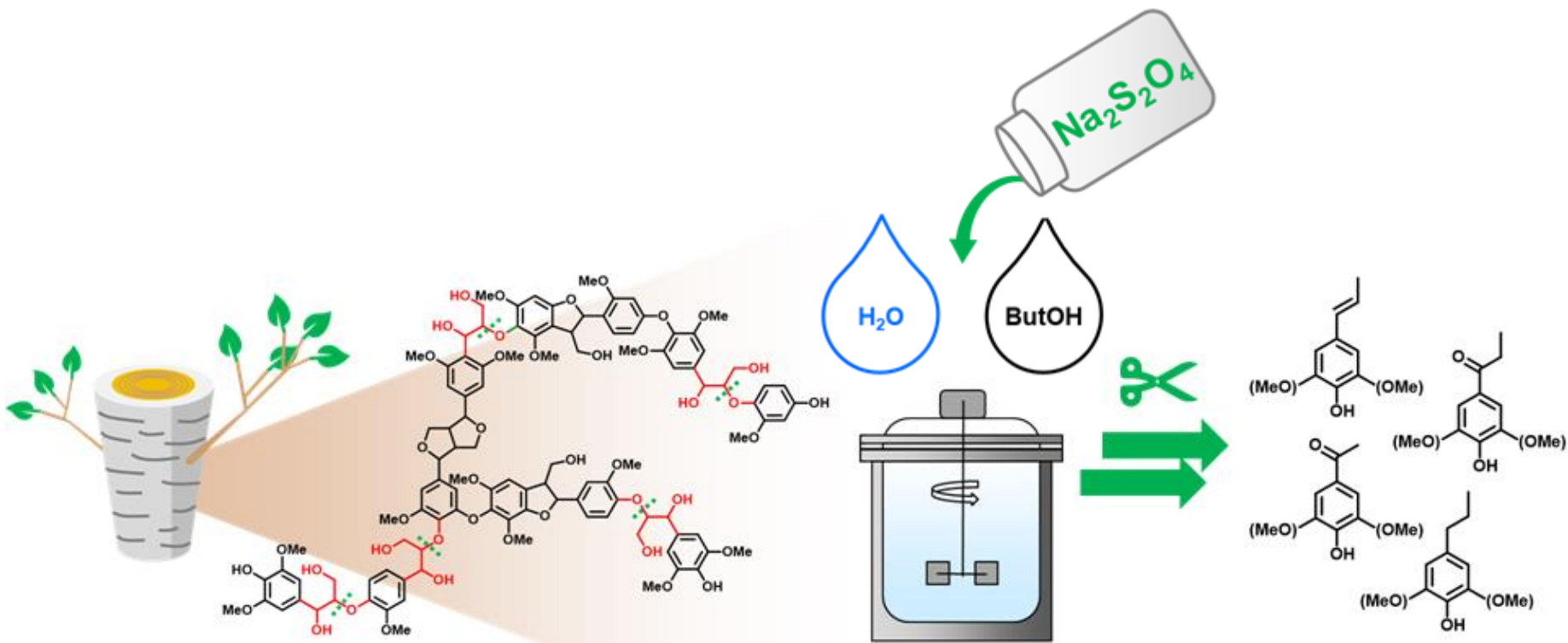
Metal catalyst

H_2



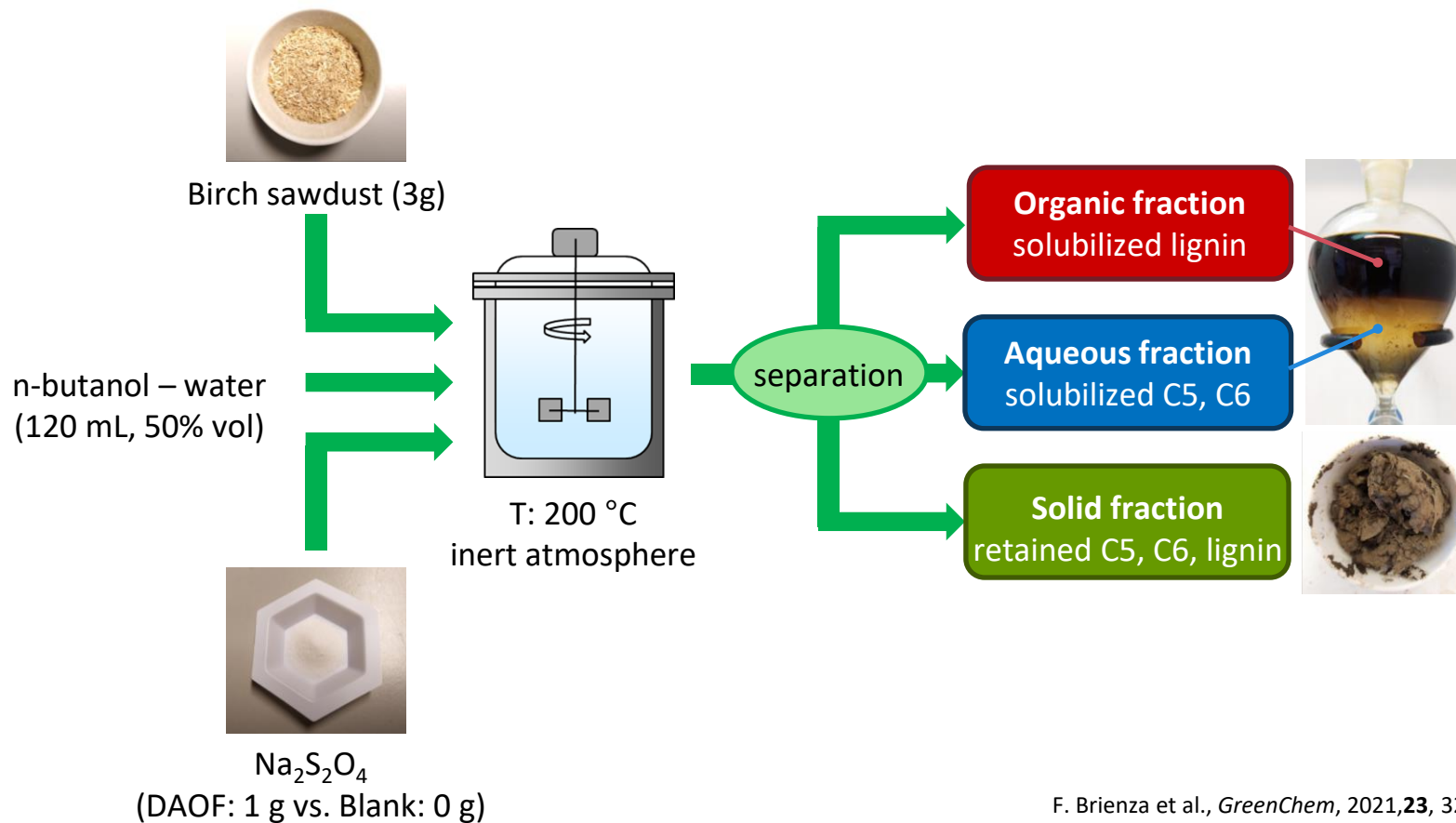
Dithionite-assisted organosolv fractionation

4



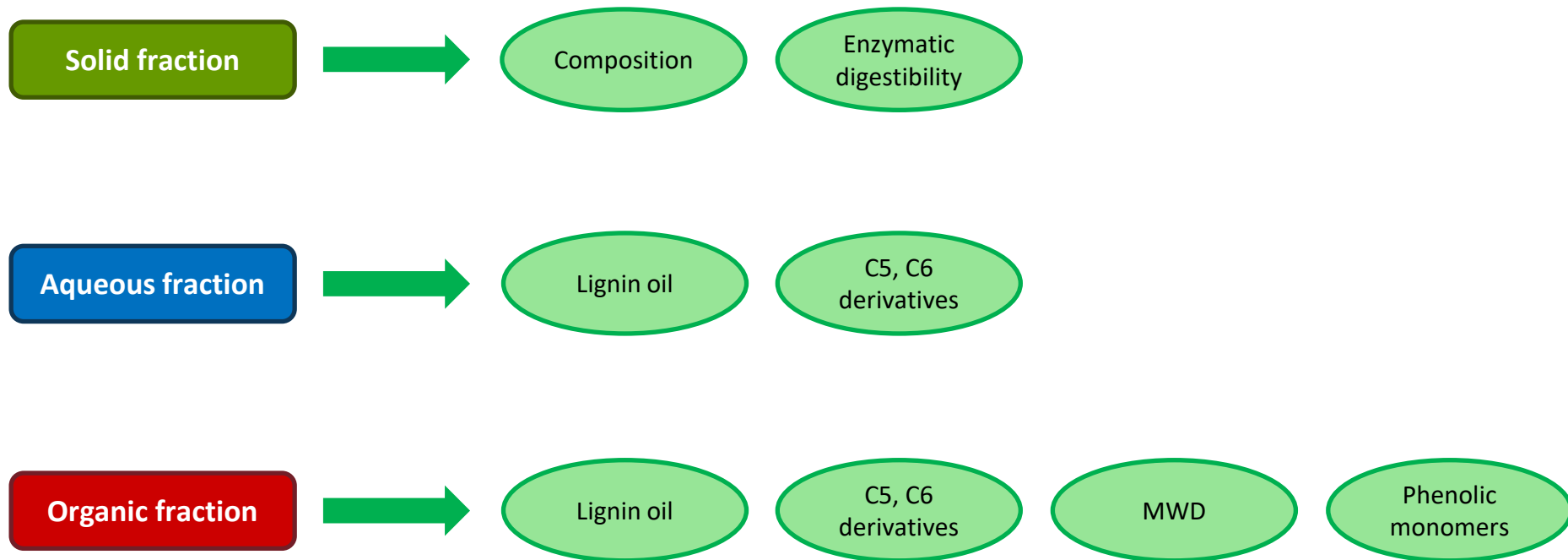
Process outline

5



Products analysis

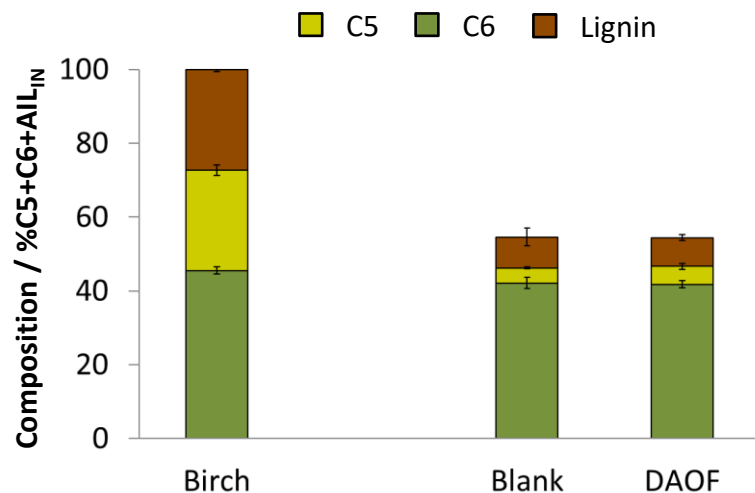
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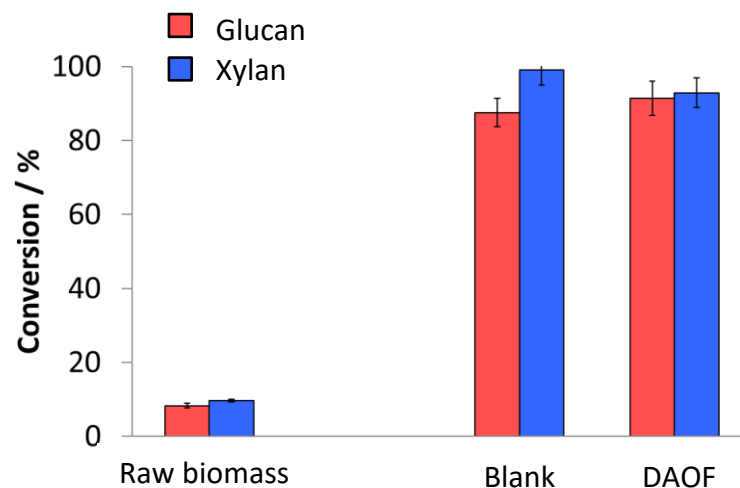
The solid fraction

7

Composition



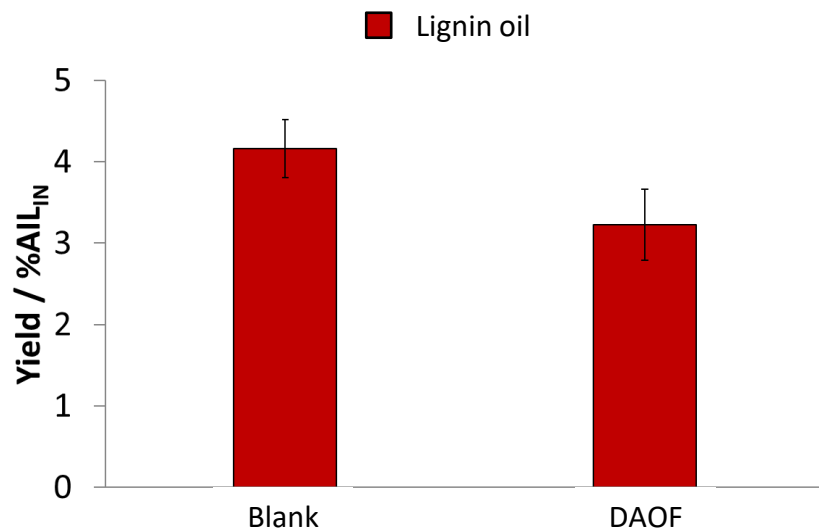
Enzymatic Digestibility



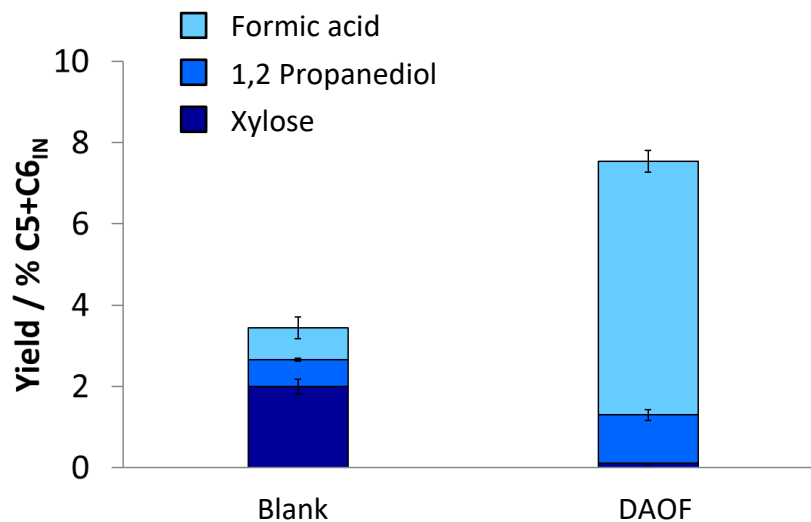
The aqueous liquid fraction

8

Lignin derivatives



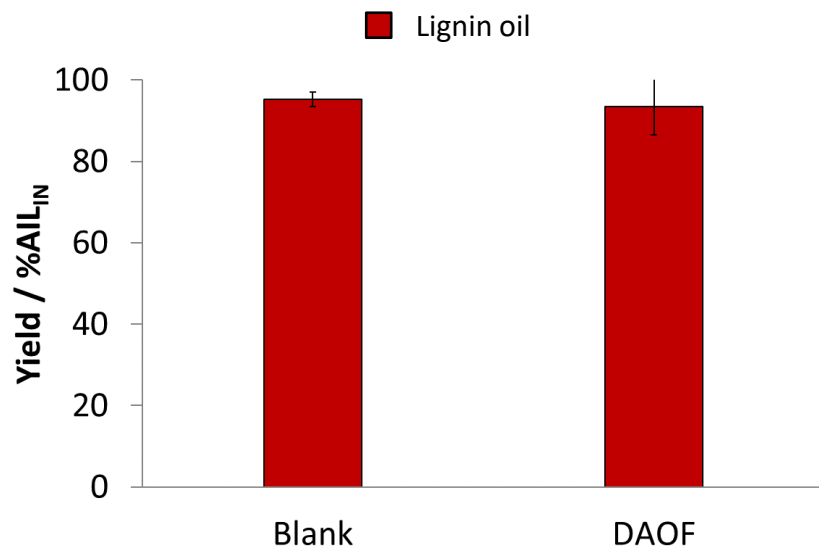
Carbohydrate derivatives



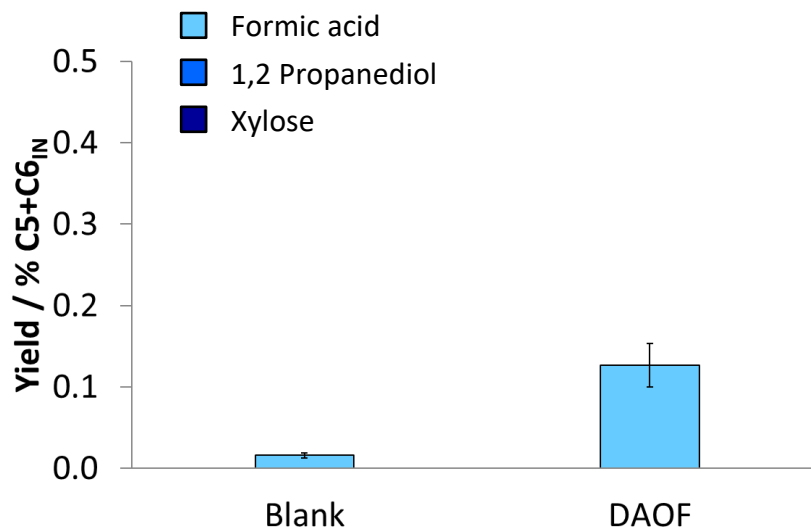
The organic liquid fraction

9

Lignin derivatives



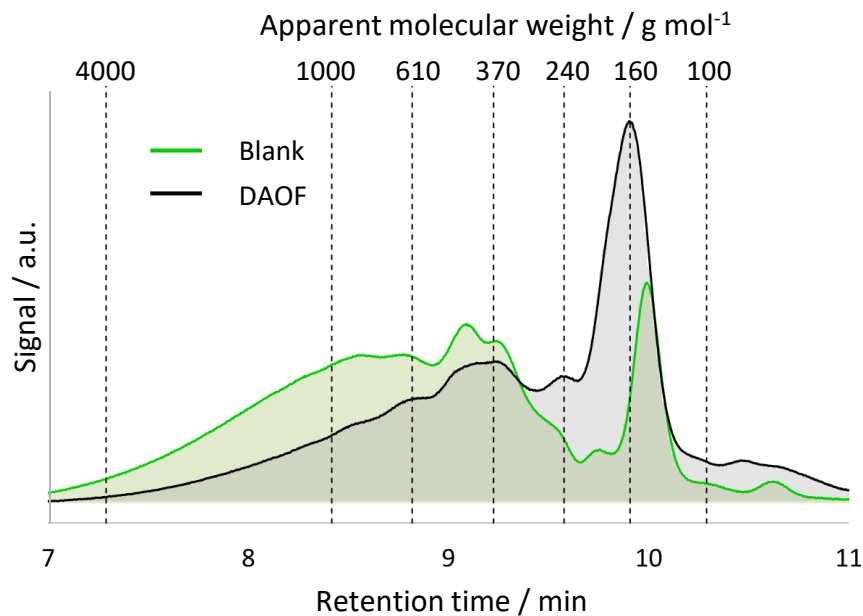
Carbohydrate derivatives



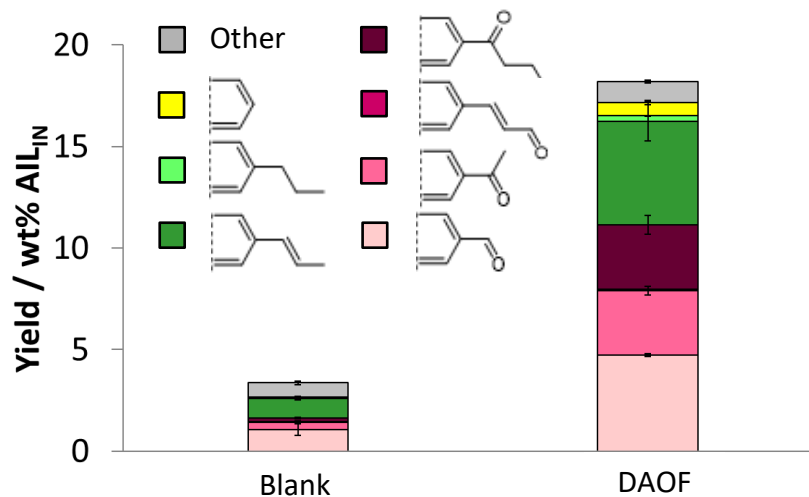
$\text{Na}_2\text{S}_2\text{O}_4$ enhances the yield of monophenolics

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Molecular weight distribution



Monophenolics



Conclusion: DAOF is a promising approach

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Effective isolation of lignin in the organic fraction and cellulose in the solid fraction



Higher lignin depolymerization for DAOF compared to a blank organosolv treatment



No need for H₂ and precious metals



SO... WHAT NEXT?



Optimization of process conditions



Treatment of other lignocellulosic feedstocks



Techno-economic assessment

THANKS FOR YOUR ATTENTION!

Want to know more about DAOF?



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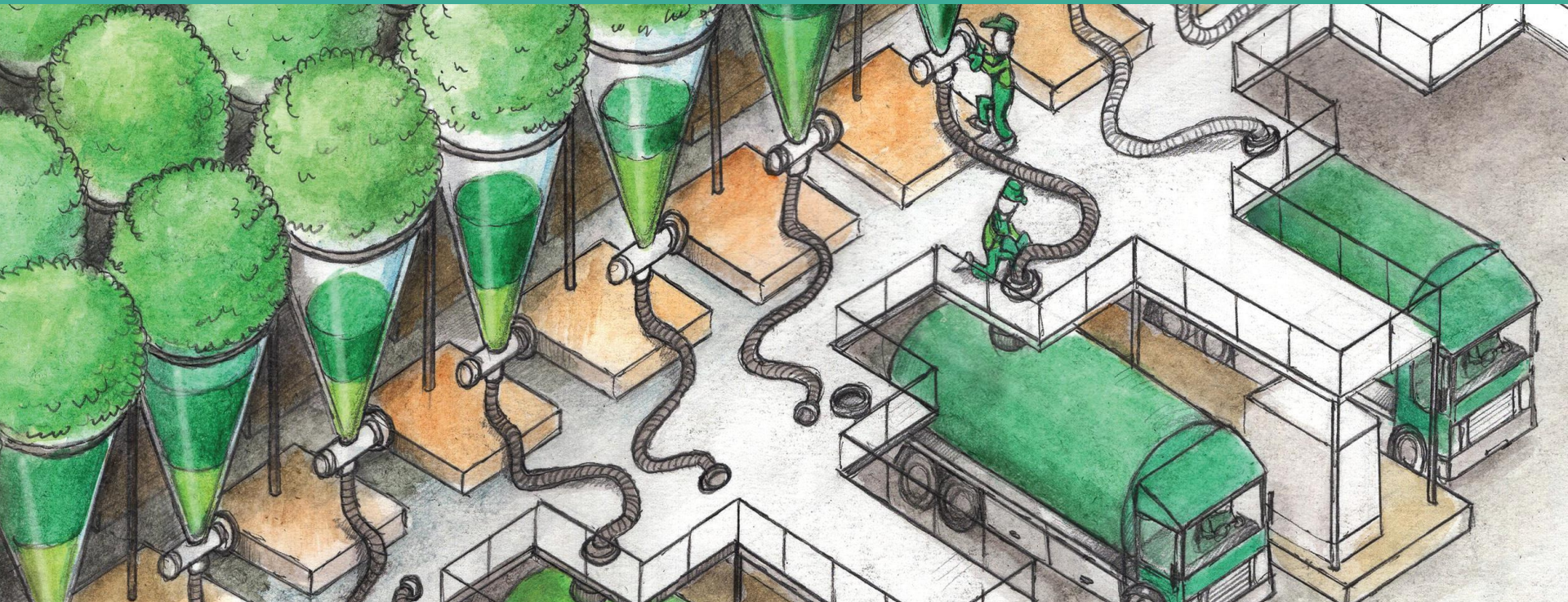
<https://www.researchgate.net/profile/Filippo-Brienza>

- I. Cybulska et al., WO/2021/058483, 2021
- F. Brienza et al., *GreenChem*, 2021, **23**, 3268-3276

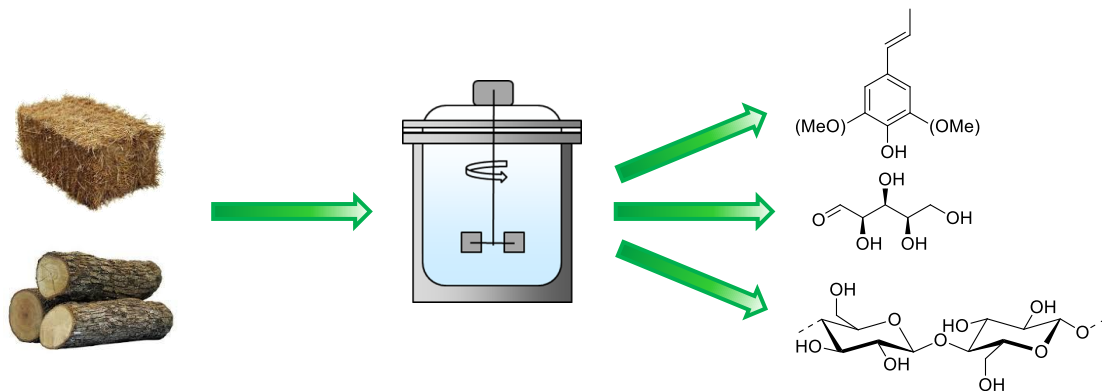




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