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MEMBRANE FILTRATION FOR THE RECOVERY OF LIPIDS FROM MICROALGAE EXTRACTS

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Introduction

Disrupted cells suspension

- Cells fragments
- Lipids
- Proteins
- Polysacch.
- Salts
- water

Clarification

Ultrafiltration

Feed → Retentate

Permeate

membrane

In this work we focus on the recovery of lipids from aqueous extracts of microalgae. After the culture of *Parachlorella Kessleri*, in starving conditions to enhance their lipid production, the micro-organisms were ground and the resulting mixture were centrifuged to extract aqueous fractions containing a large quantity of dispersed lipids.

Challenge

Cell disruption:
Target molecules are released in the aqueous phase.
+ risk of degradation of their properties
+ risk of reorganisation: how to fractionate?

P-chlorella kessleri
Cultured in starving conditions

(Gunerken 2015)

Ultrafiltration

Crossflow (CF) module
(Orelis Rayflow Pleiade)

Real supernatant, MS 2g/L

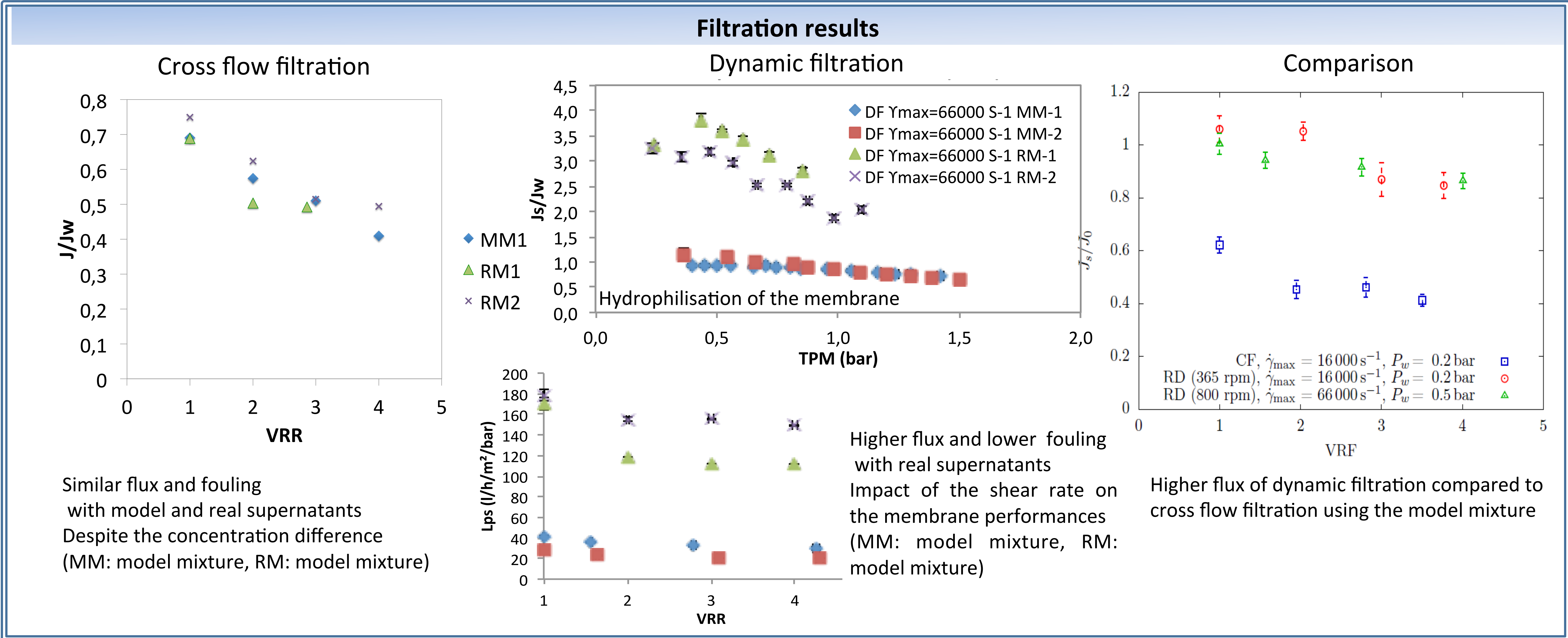
Model supernatant, MS 20g/L

Model mixture: available in large quantities; controlled composition and organisation; Tests at high concentration

Dynamic filtration (DF) module
(UTC Rotating disk)

Shear rate : 10,000 – 50,000 (s⁻¹)

Shear rate: 10,000 – 500,000 (s⁻¹)



Conclusions and Perspectives

The membrane filtration allows the concentration of lipids from the aqueous extracts. The dynamic filtration offers interesting flux. The model mixtures allows the prediction of the fouling with concentrated extracts. The retention of the other compounds will depend on the cell disruption conditions: this will be deepened in a future study (PhD Shuli LIU). The membrane modification through hydrophilisation or fouling will be characterised through inovative technics in a future work (post-doctoral study, collaboration with ISCR Rennes and INRA Nantes).