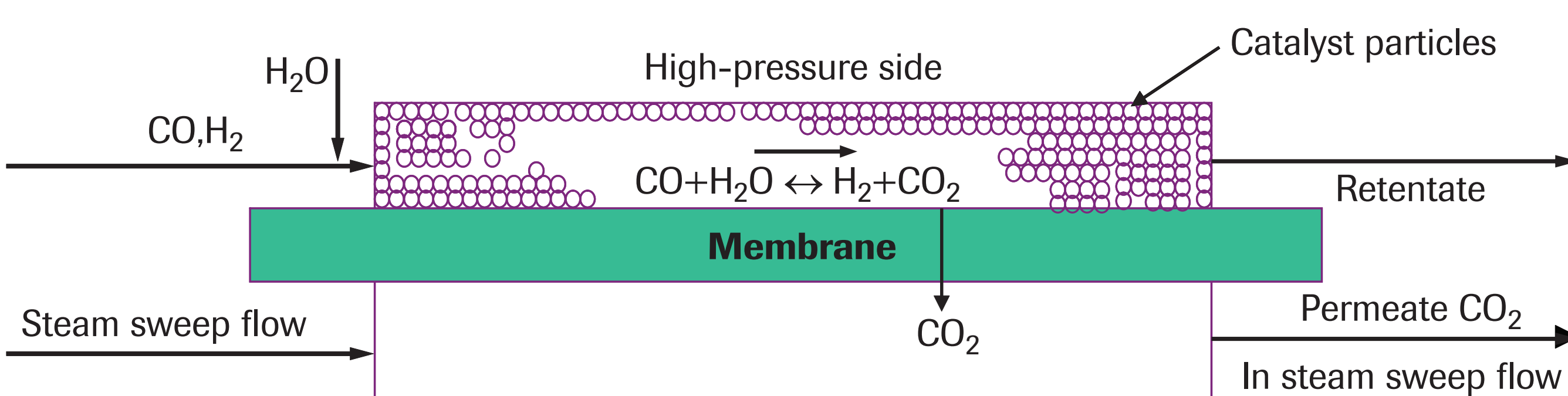


Advanced membrane reactors: first membrane preparations and tests

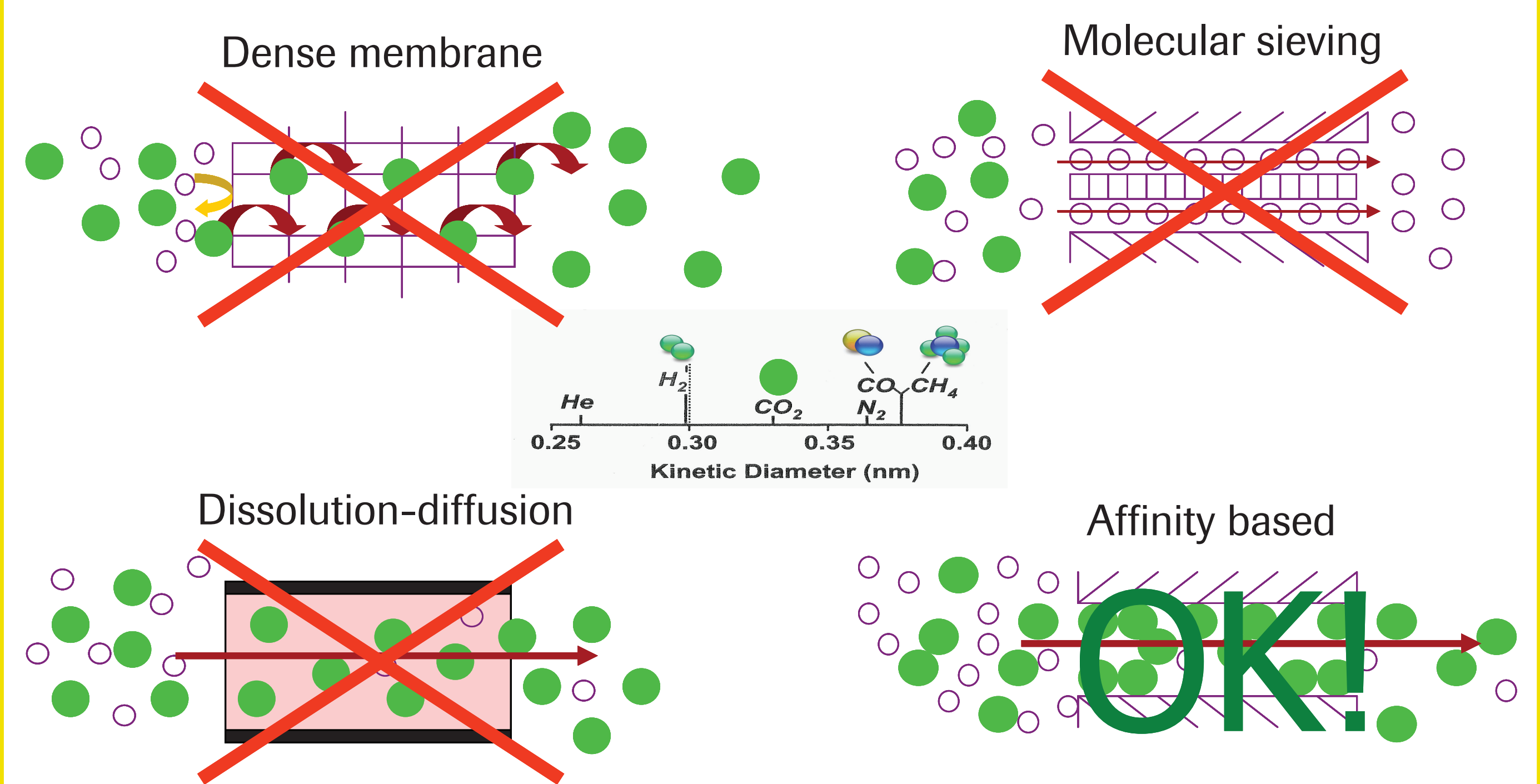
Authors: Virginie Feuillade, Wim Haije

Introduction

The research is aimed at CO₂ capture by using a membrane reactor with a porous membrane based on hydrotalcite.

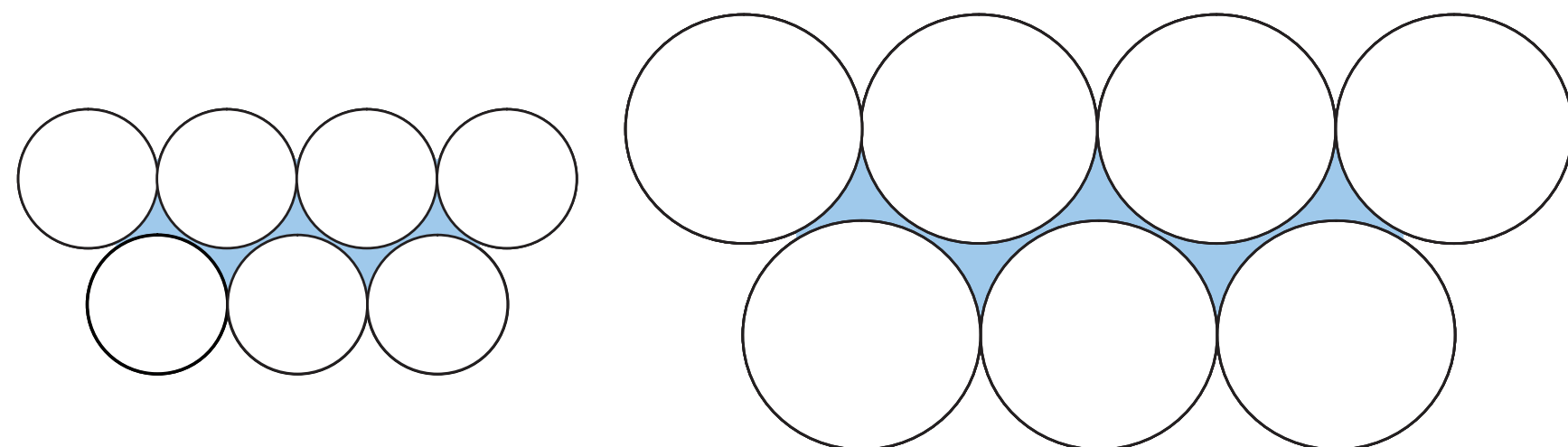


Membrane transport mechanisms

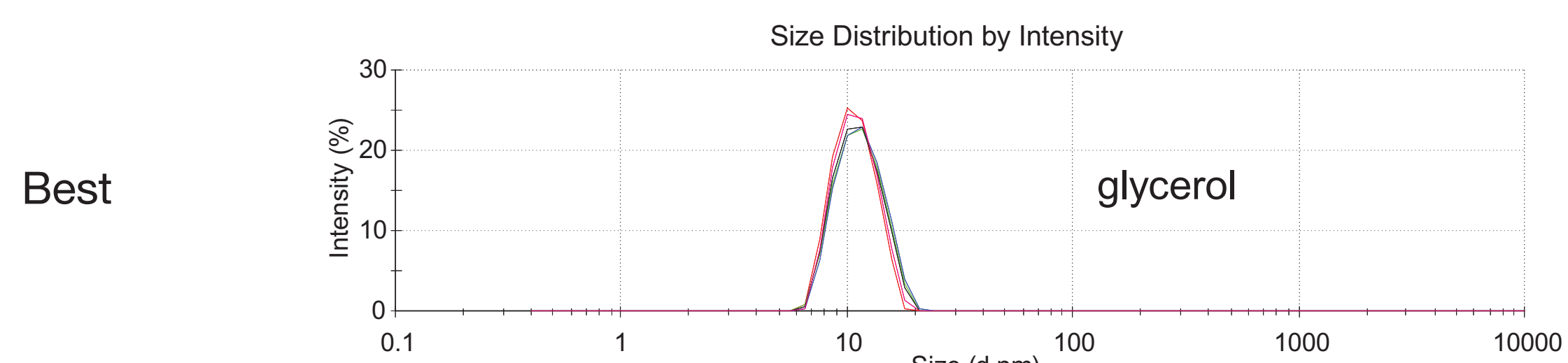


Coating and in-situ impregnation

For coating you need small particles to obtain small pores:

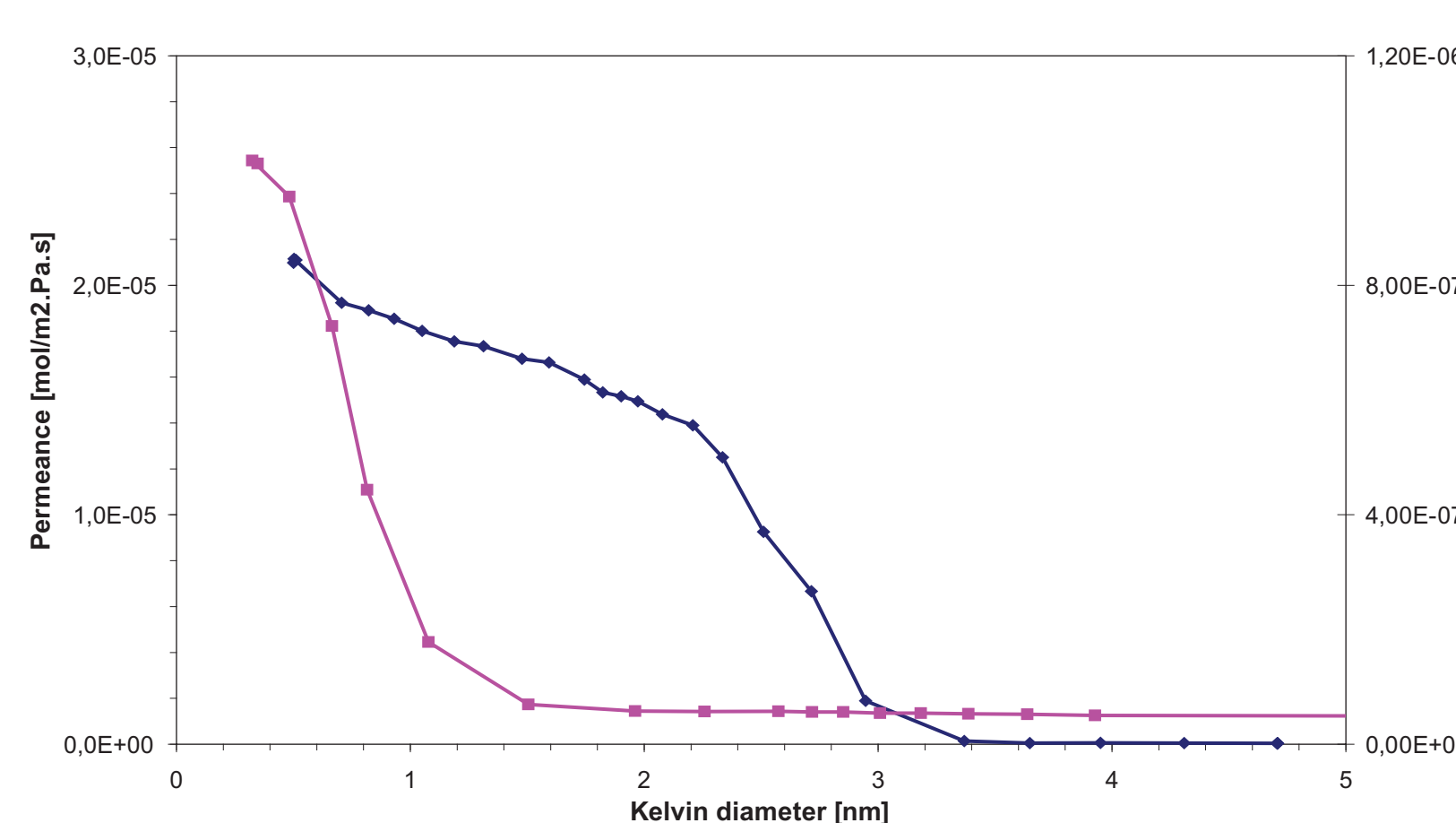
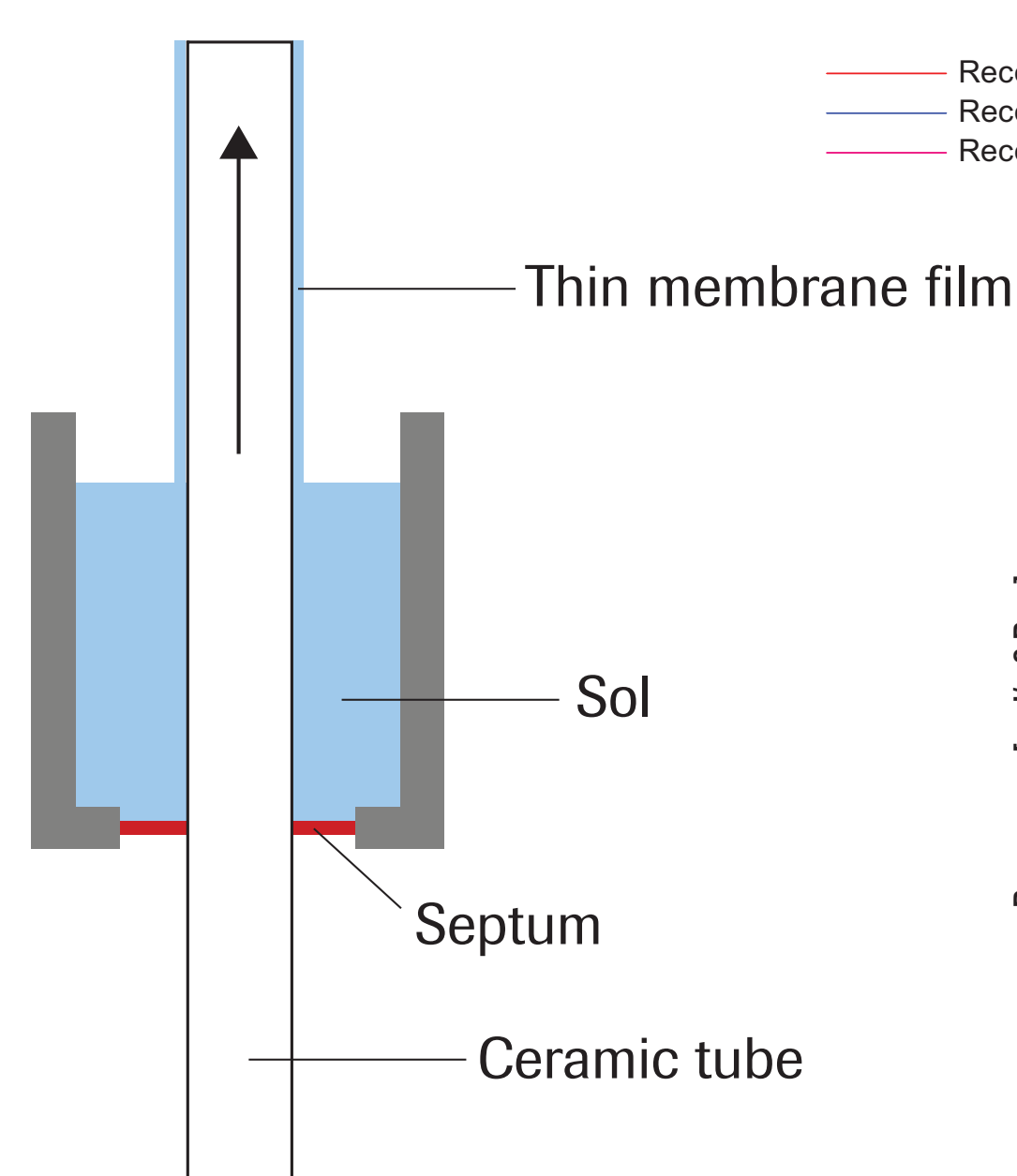


Many solvents and dispersants have been tried:

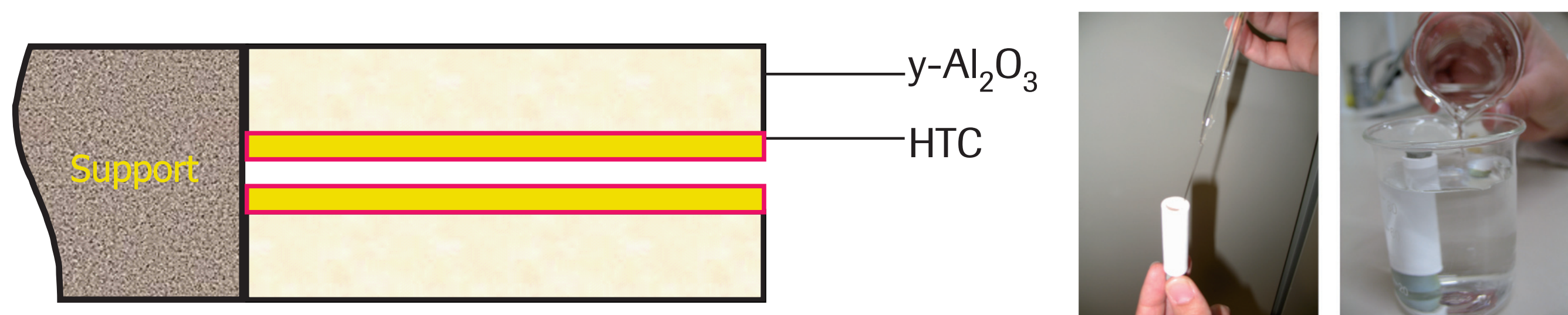


Best

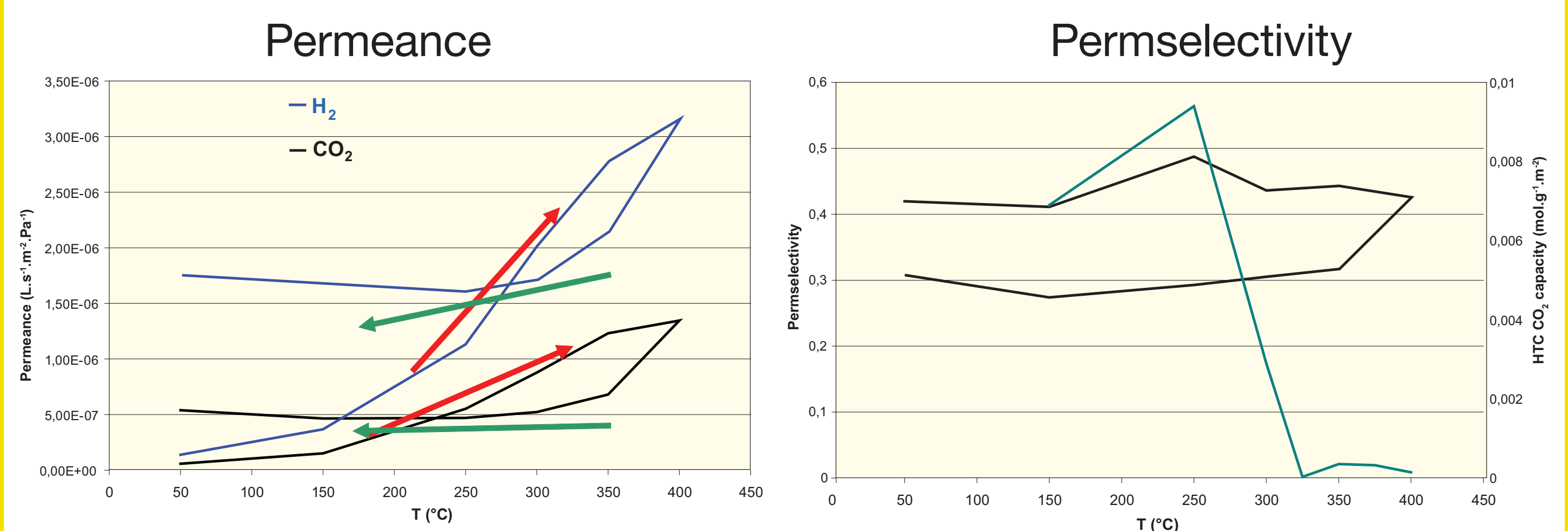
Record 697: HTC-Gly-RT-proper-1min- filtered
Record 698: HTC-Gly-RT-proper-1min- filtered
Record 699: HTC-Gly-RT-proper-1min- filtered
Record 700: HTC-Gly-RT-proper-1min- filtered
Record 701: HTC-Gly-RT-proper-1min- filtered



For in-situ impregnation, with or without promoter K₂CO₃, the synthesis takes place inside the pores:



Results



Membrane	CO ₂ /H ₂	CO ₂ /He	CO ₂ /N ₂
Coated	0.43		
<i>In-situ</i>	0.53	1.3	1.7
<i>In-situ</i> promoted	0.6		

Conclusions

- Very small particles of hydrotalcite are produced without aggregates with a size of about 15 nm.
- A hydrotalcite defect-free layer was obtained by coating.
- The results obtained from the 1st experiments show affinity for CO₂ but the selectivity is still far from the target.
- K₂CO₃ promotion increases the selectivity.
- Strong indication for affinity based separation, to be confirmed with mixed gas measurements.
- Support and coating procedures have to be optimized.

Acknowledgement:

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