

INTERACT

R&D on **IN**nova**T**ive
Enzymes and polyionic-liquids based
memb**R**Anes as post combustion CO₂
Capture key **T**echnology

Prof. Dr.-Ing. Axel Gottschalk

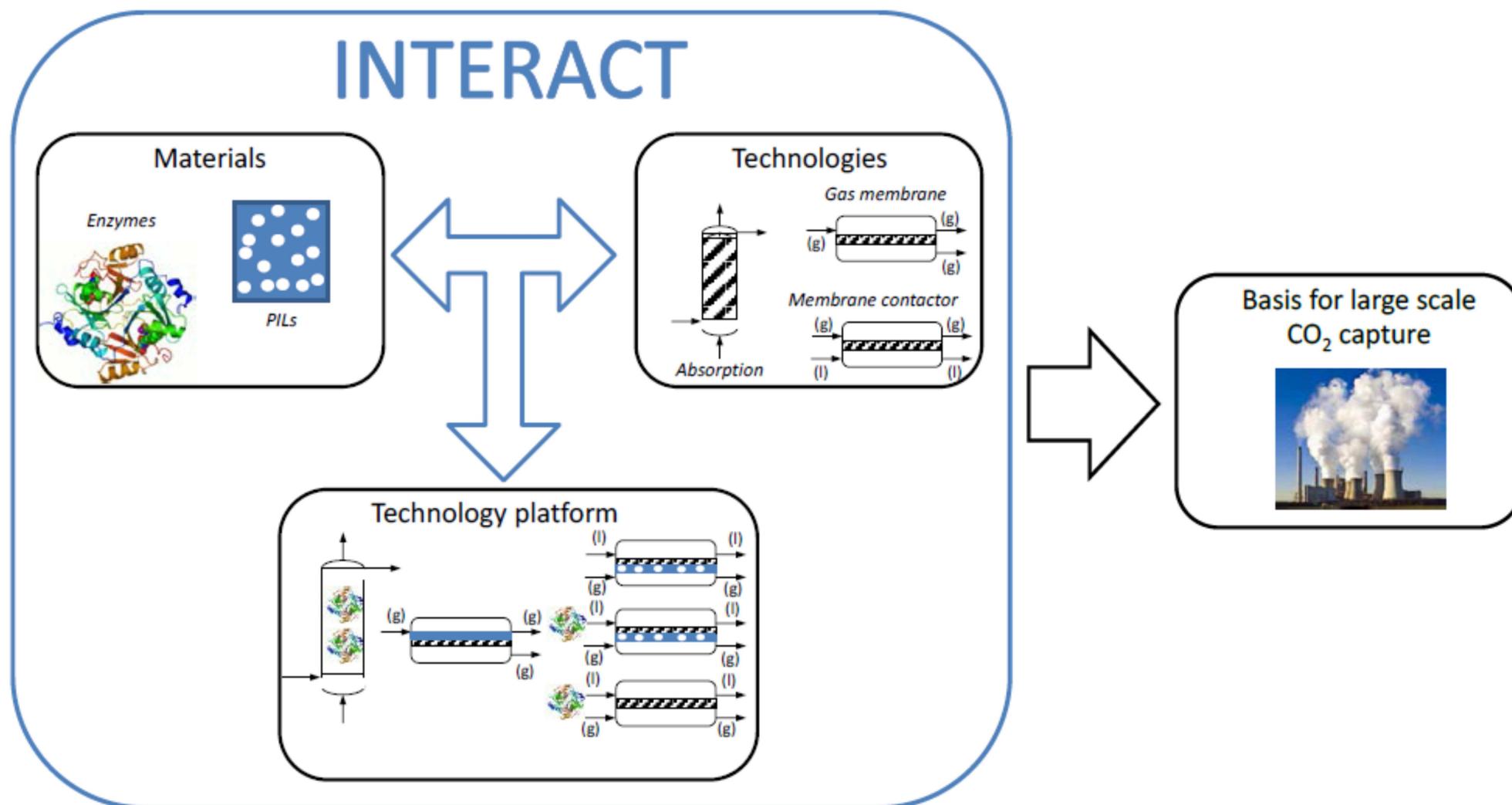
SUPREN GmbH, Dortmund, Germany
Sustainable Process Engineering

7–9 October 2013, Essen, Germany

2nd Conference on Carbon Dioxide as Feedstock for Chemistry and Polymers

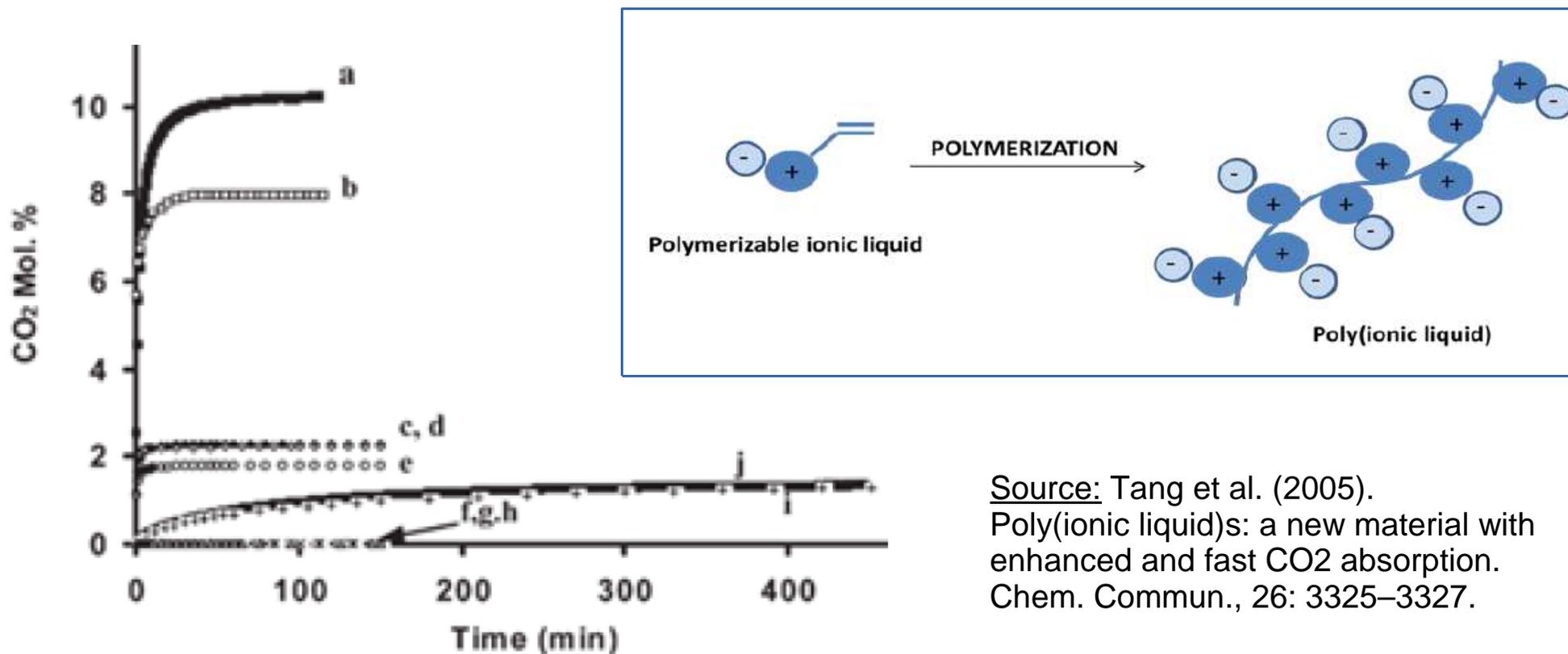
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General aim



INTERACT – Key idea #1

Poly(ionic liquid)s [PILs]



Source: Tang et al. (2005).
Poly(ionic liquid)s: a new material with enhanced and fast CO₂ absorption.
Chem. Commun., 26: 3325–3327.

(a-e) CO₂ adsorption of the polymers
(f-j) their corresponding monomers

INTERACT – Key idea #2

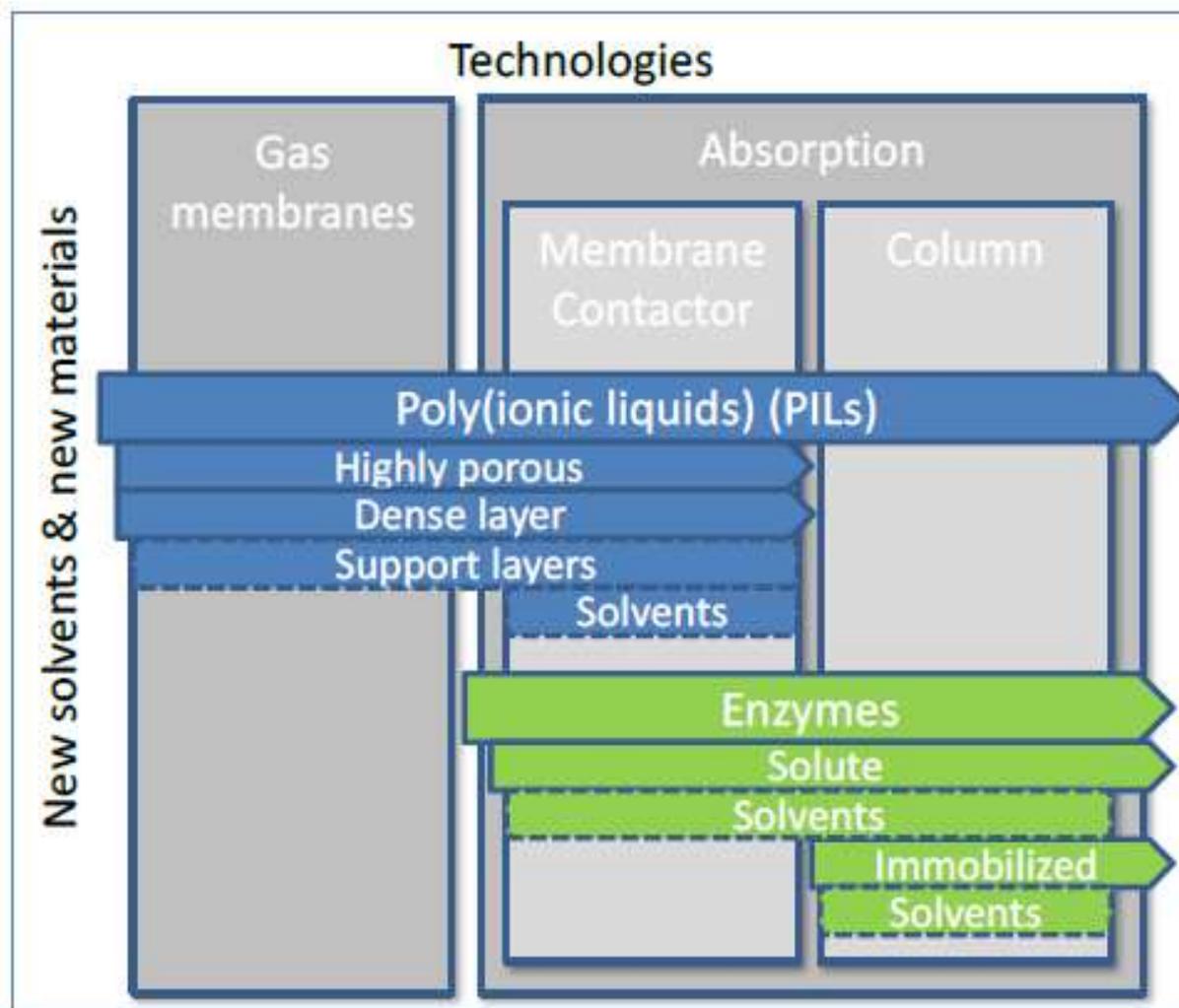
Enzymes as Biocatalyst

Carbonic anhydrase (CAN)

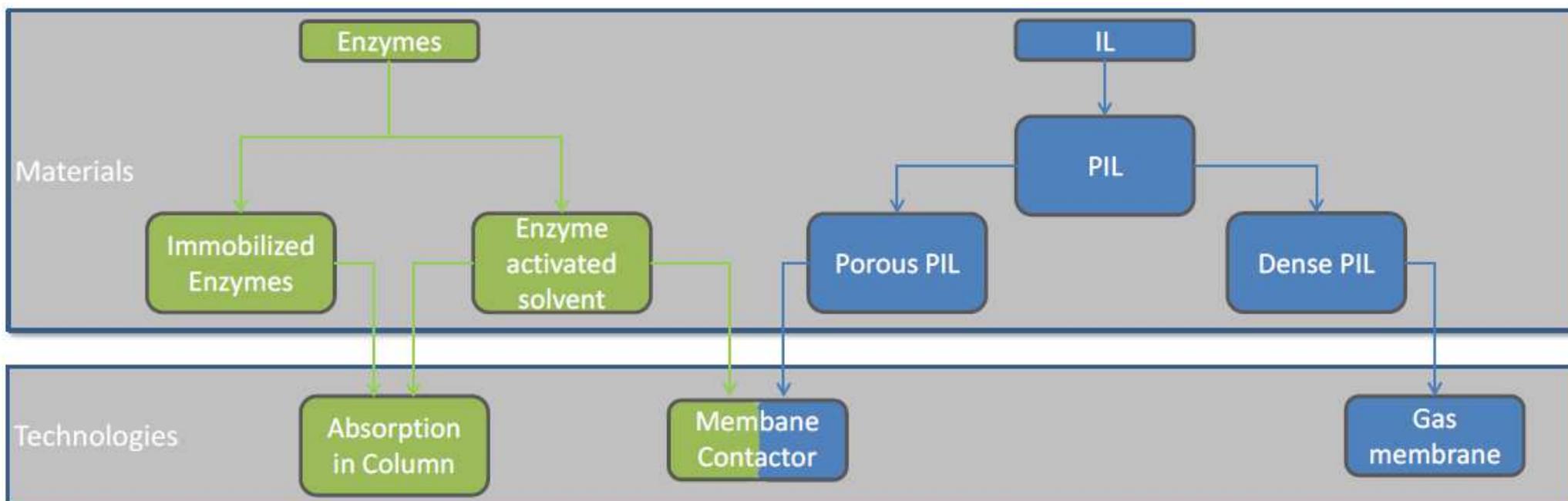
- actually handles the CO_2 in human body and other organisms
- is considered to be one of the fastest known enzymes
- carries out hydration of CO_2
- can be introduced into existing gas scrubbing systems, e.g. methyldiethanolamine (MDEA)
- significant increase in the rate of CO_2 absorption in MDEA

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Conceptual Approach

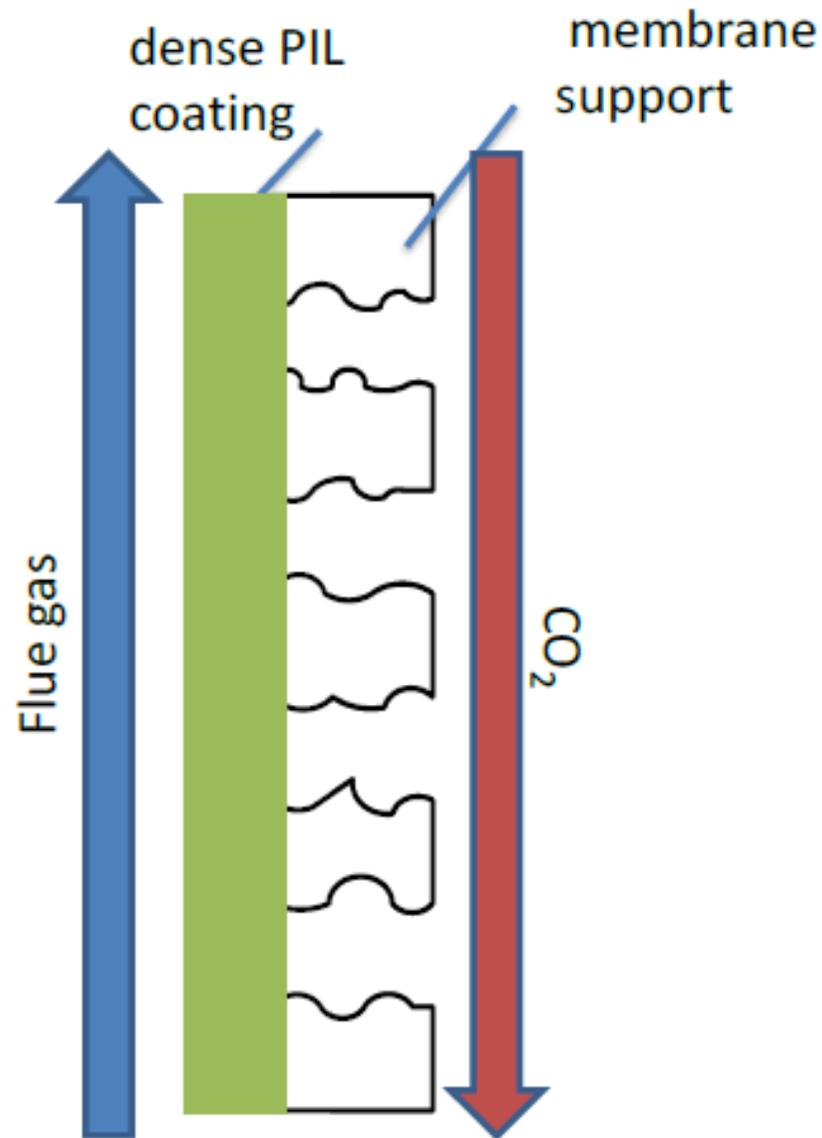


INTERACT – Synergies R&D work



Enzymes and PILs Materials and Technologies

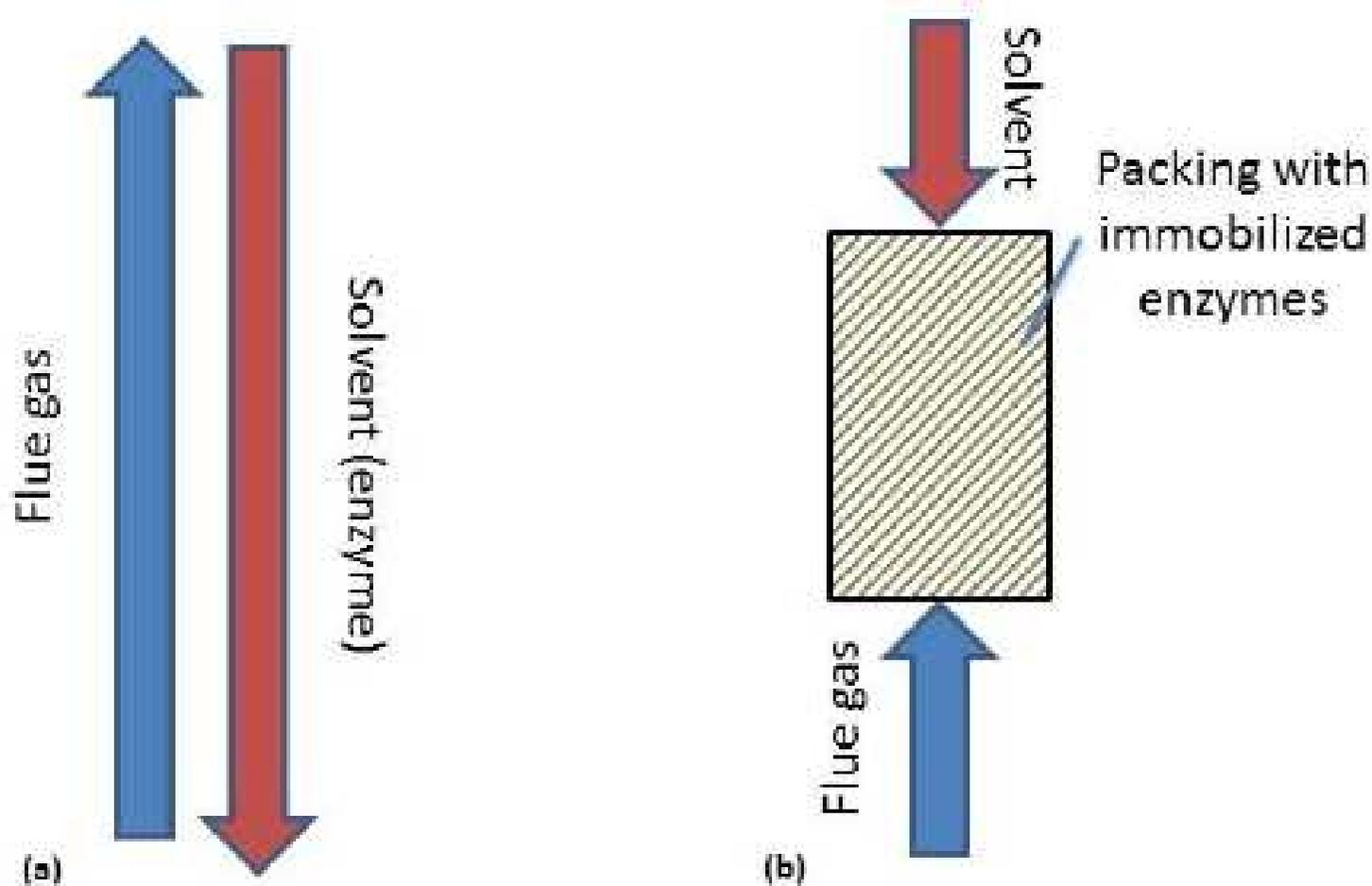
INTERACT – Technology A) Gas separation membranes



Conceptual scheme
of PILs used in
dense gas membrane

INTERACT – Technology B.1)

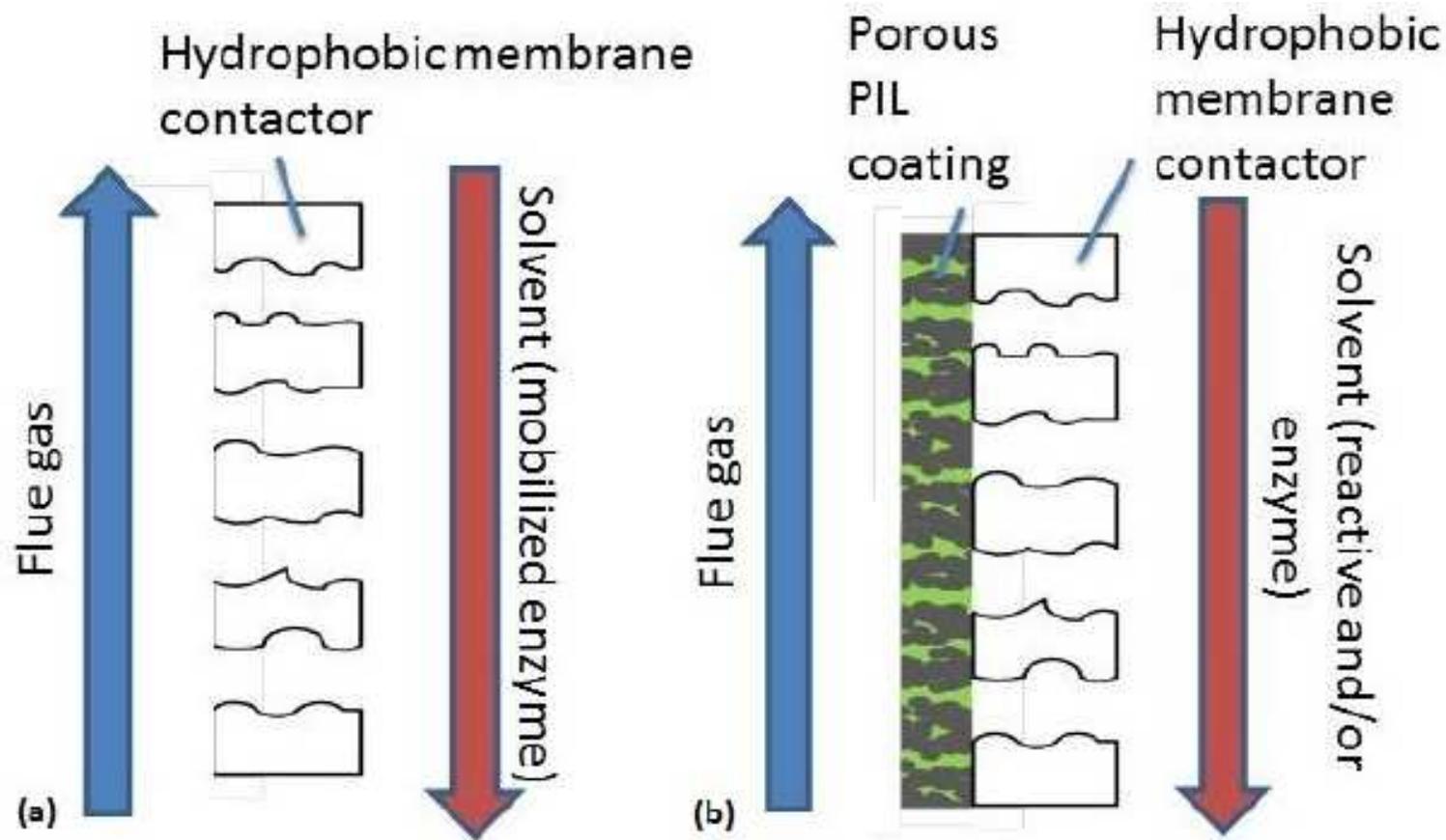
Absorption Columns



- (a) enzymes as solvent activator
- (b) enzymes immobilized in / on packings

INTERACT – Technology B.2)

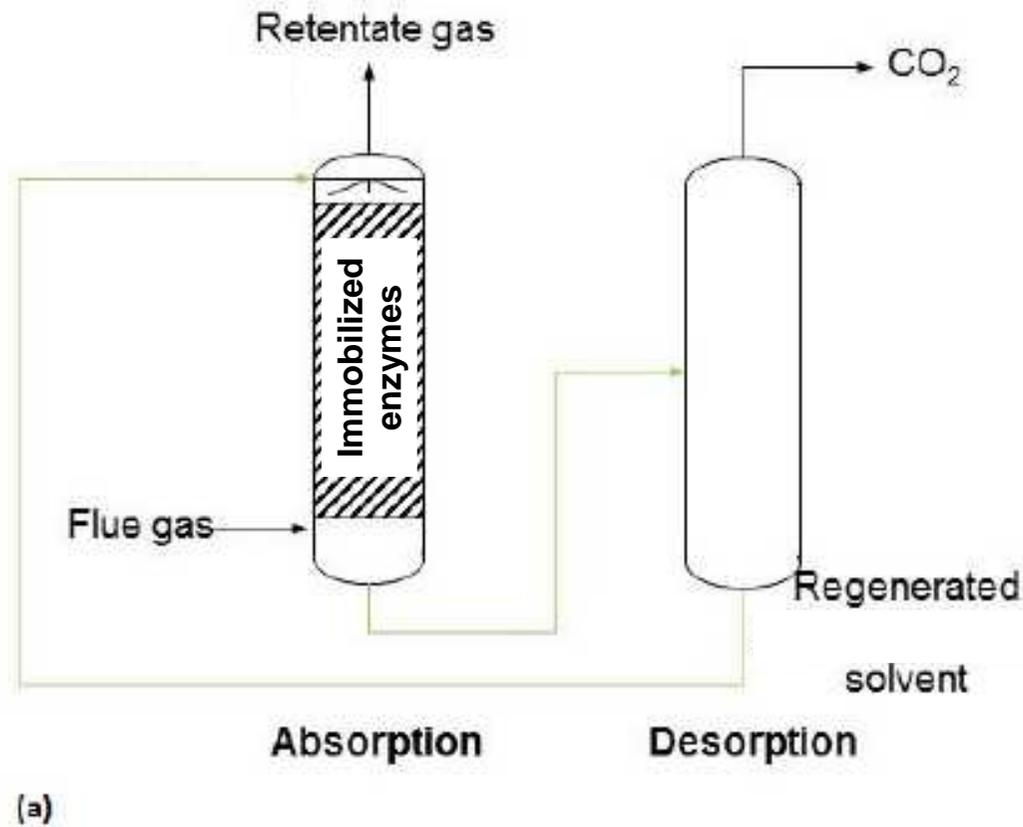
Absorption Membrane Contactors



- (a) enzymes as solvent activator
- (b) membranes based on PILs

INTERACT – Solvent recovery C.1)

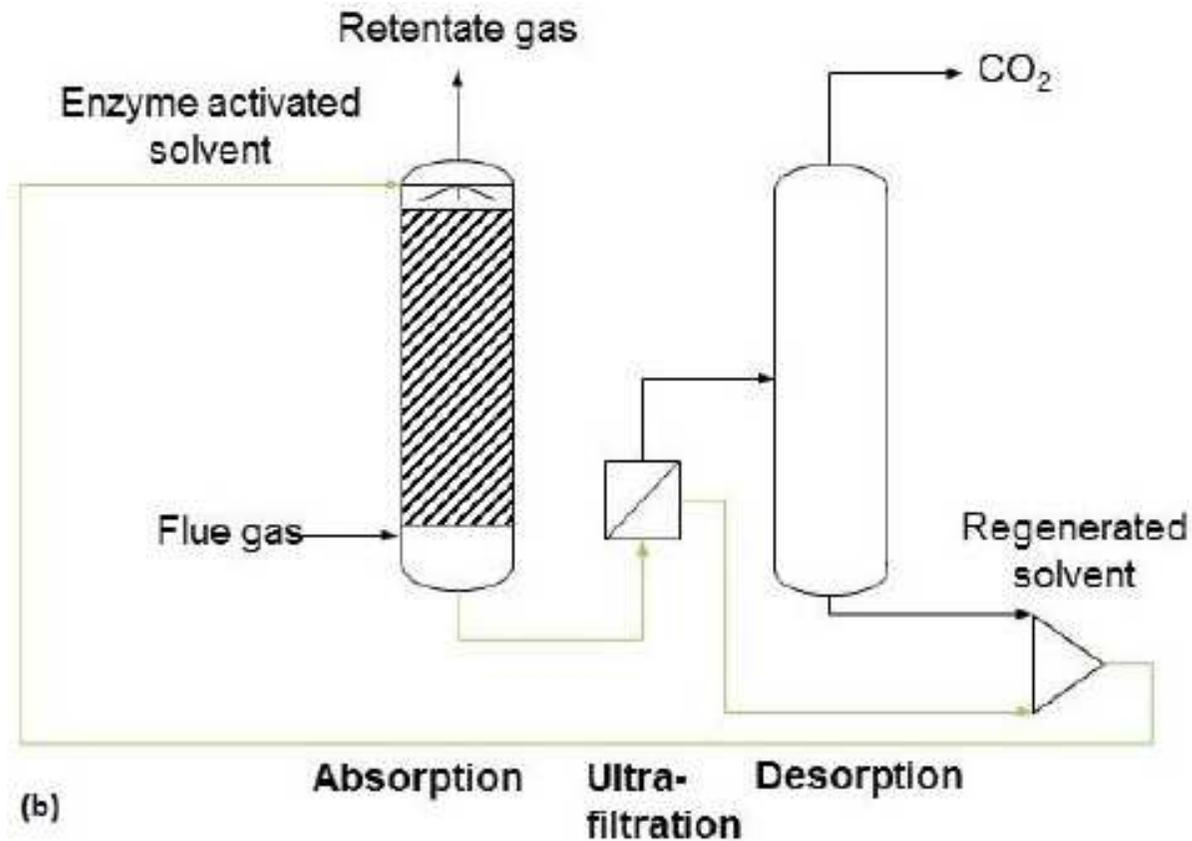
Absorption / Desorption Unit



(a) immobilized enzymes

INTERACT – Solvent recovery C.2)

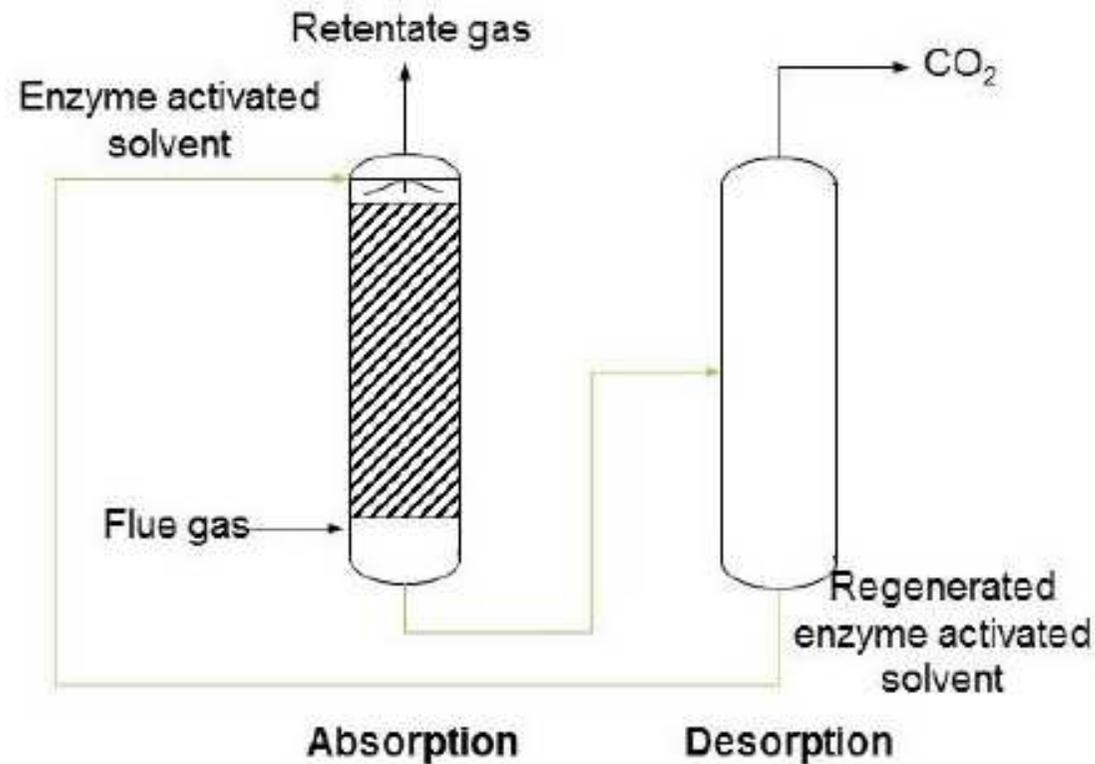
Absorption / Desorption Unit



(b) enzymes recovery

INTERACT – Solvent recovery C.3)

Absorption / Desorption Unit

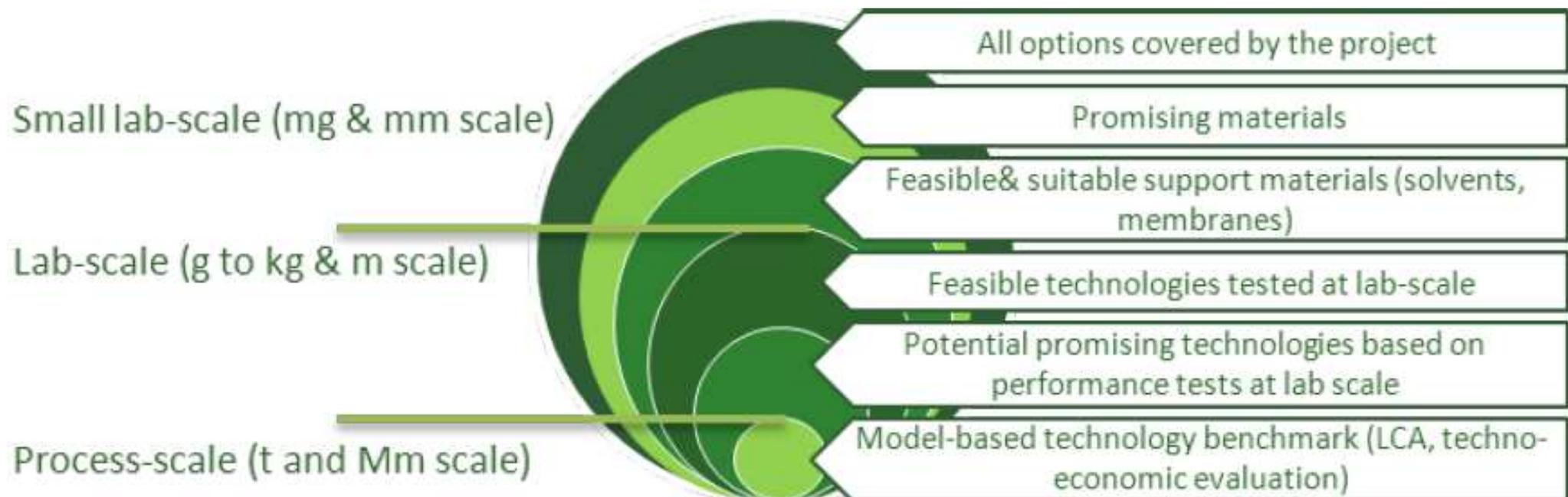


(c)

(c) thermally stable enzymes

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Approach and scaling



INTERACT – The Project Administrative Information



Start: 1st September 2013

Duration: 42 Month

Total Cost: 6,2 Mio EUR

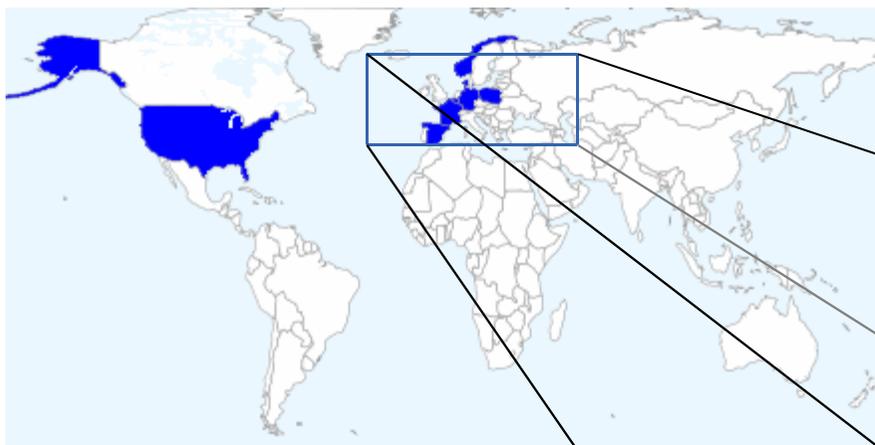
EC-Contribution: 4,8 Mio EUR

Coordinator: Technische Universität Dortmund

Website: www.interact-co2.eu

INTERACT – The Project

8 Partners countries



Belgium
Denmark
France
Germany
Norway
Poland
Spain
USA

INTERACT – The Project 10 Partner Organizations



Technical University
of Denmark



INTERACT – The Project Acknowledgments



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