

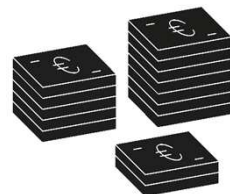
ROMEIO – Reactor Optimisation by Membrane Enhanced Operation

- Process Intensification SPIRE 05-2015
- Start/end date: 14 September 2015 – 13 September 2019

• Partners:



REACTOR OPTIMISATION BY MEMBRANE ENHANCED OPERATION



- EC funding: 6 Mio €
- Private investment: 25 €
- Leverage factor: 4 points



Project Case Study

1. The EU/ SPIRE needs

The ROMEO concept has the ability to reduce the total energy consumption of large industrial processes by up to 78%.
At the same time emissions can be reduced by up to 90%.

2. The Project Solution

Supported homogeneous catalysts maintain their catalytic abilities while the anchoring directly on or even in the membrane ensures a most efficient separation. Allowing to avoid energy consuming down stream processing.



REACTOR OPTIMISATION BY MEMBRANE ENHANCED OPERATION



4. How will this happen?

The ROMEO team develops the general technology for two case studies, as well as a toolbox. In the end, chemical producers can license the technology and then build their own processes.

3. Value to Customers

The ROMEO technology reduces energy consumption dramatically as well as reducing OPEX for the down stream process, thus, saving cost on both fix and variable costs.



What are the key expected sustainability impacts of *ROMEEO*?



Baseline: Example: Hydroformylation: Annual production ca. 10,4 Mio t C4/C5 aldehydes. Desired is to produce the same chemical from the same feedstock, but in a much more efficient (down stream) process.

Indicator	Baseline	Expected Impact
Global Warming Potential (mainly CO2 emission reduction)*	Side product disposal via incinerator (3,4 Mio t CO2/a)	More efficient process reduces side product formation and thus CO2 by 90%
Fossil energy intensity*	6,65 GWh needed for purification (distillation) of product	Omitting distillation can lead to up to 5,3 GWh (78%) energy savings
Total material consumption*	More than 11,4 Mio t feed products are needed to produce 10,4 Mio t aldehydes	More efficient ROMEEO process reduces required amount of feed by 0.9 Mio t (8%)
Economic added value e.g. Annual Operating Cost of [manufacturing plant]	Distillation column is required	Omitting distillation cuts OPEX substantially

*Core SPIRE indicator



What outputs or learning from Project ROMEO could have value for other SPIRE projects here?

- Same time catalytic synthesis and separation of desired product (e.g. Hydroformylation) can be done and results in substantial savings in resources and money.
- Chemical reactions at their equilibrium (e.g. Water-Gas-Shift reaction) can be driven to the desired product in an efficient way. Some (new) reactions might only be commercially feasible via this new way
- Modelling of membranes might help to transfer ROMEO results to other areas
- Supports and membranes can be tailored according to need, also for other reactions and process
- The ROMEO team is eager to learn about other possible applications!





Tear down the down stream!



Become a successful ROMEO user!



And Europe's people will love you!



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