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Reactor Optimisation by Membrane Enhanced Operation

H2020-SPIRE-2015 - RIA n° 680395

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Delivrable

Report

Project Brochure

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Summary:

This brochure describes ROMEO's overall aim, expected impact, its two-in-one reactor and the demonstration plants. It also features the list of ROMEO's partners and a map showing which European countries the partners come from.

The readers targeted are i) any researchers and industry people coming across ROMEO who would need to understand at a glance what ROMEO is about, ii) EC staff members, ...

We have made sure to include the SPIRE logo, in addition to the European Commission's logo.

The brochure is available on ROMEO's public website.

A high-resolution printable version of the brochure is also available.

Document history and validation

| When | Who | Type |
|------------|-----------------------|---------------------------|
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| 16.12.2015 | Marc KRISTEN (Evonik) | Comments on version 1 |
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REACTOR OPTIMISATION BY MEMBRANE ENHANCED OPERATION

**EUROPEAN
RESEARCH AND INNOVATION PROJECT**

**REACTOR OPTIMISATION
BY MEMBRANE ENHANCED OPERATION**

REDUCING ENERGY CONSUMPTION

IN PROCESS INDUSTRY

Industry & academia teaming up
around a new reactor concept:
reaction and downstream processing
steps combined into a single unit.

Reducing energy consumption
by up to 80% and emissions
by up to 90% in industrial catalytic
gas-phase reactions.

Demonstrations plants
for bulk chemicals
and bioenergy applications.



ROMEO'S AIM AND IMPACT

ROMEO is a European Research and Innovation Project funded by the European Commission. It is developing a new reactor concept using homogeneous catalysis and membrane technology to carry out chemical synthesis and downstream processing in a single step. Process intensification for catalytic-driven and eco-friendly reaction systems will be brought to a new level thanks to this two-in-one reactor. ROMEO's reactor will improve efficiency and long-term sustainability for the process industry that is highly dependent on energy, raw materials and water resources.

DEMONSTRATION PLANTS

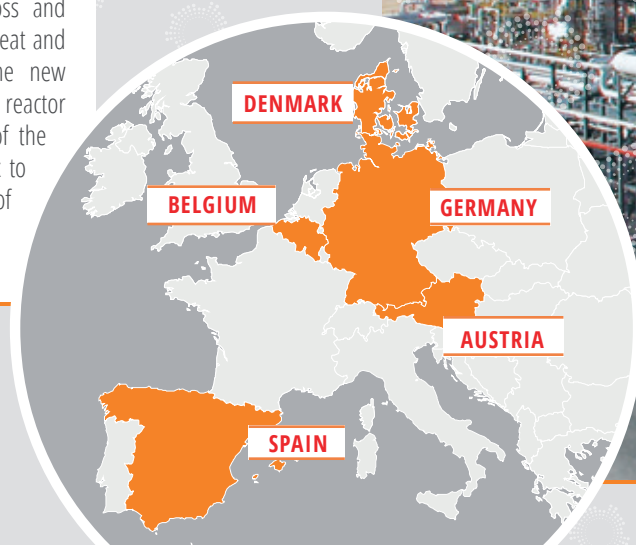
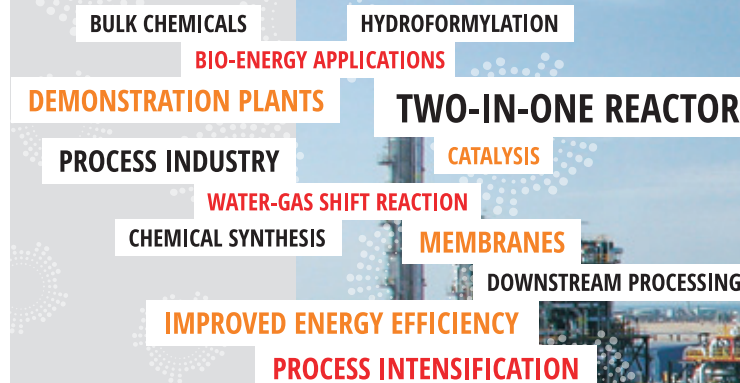
Processes for bulk chemicals and bio-energy applications have been chosen to demonstrate the efficiency of ROMEO's technology in a near industrial environment. A demo plant for hydroformylation will be built. This facility will convert olefins and syngas to aldehydes. These molecules are used as precursors for plasticizer alcohols. A demo plant for water-gas shift reaction will be built. This demo plant will use CO or CO-containing syngas derived from biomass. If successful, the ROMEO researchers will have found a way of generating hydrogen from biogenic waste materials, for example wood waste.

A TWO-IN-ONE REACTOR

ROMEO's reactor includes bundles of hollow-fiber tubes and a homogenous catalyst being fixed onto a membrane. Chemical synthesis and processing are carried out in a single step thanks to the membrane. In this "two-in-one" reactor, the product is continuously removed from the reaction mixture as soon as it is formed.

A NANO TO MACRO TOOLBOX FLEXIBLE REACTOR DESIGN METHOD

ROMEO intends to get detailed understanding of the processes involved in its new reactor, from nanoscale (catalyst phase, membrane, transport across and inside the membrane) to macro-scale (e.g. heat and mass flow, industrial process design). The new know-how will be used to develop a flexible reactor design method: a detailed understanding of the different components will allow the tool-box to be flexible and tailored for a wide range of applications.



EUROPEAN PARTNERS



Evonik - Germany
Evonik Performance Materials GmbH //
Evonik Technology & Infrastructure GmbH



FAU - Germany
Friedrich-Alexander-Universität
Erlangen-Nürnberg



RWTH - Germany
Rheinisch Westfälische Technische
Hochschule Aachen



DTU - Denmark
Technical University of Denmark



BioEnergy2020+ GmbH – Austria



LiqTech - Denmark
LiqTech International A/S



EMH - Belgium
European Membrane House



CSIC – Spain
Agencia Estatal Consejo Superior
de Investigaciones Científicas



Linde AG - Germany

www.romeo-h2020.eu

ROMEO IN A NUTSHELL

EC Call: **H2020-SPIRE-2015**

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Duration: **48 months**

EC funding: **6 millions €**

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