Control and Real-Time Optimisation of Intensive Polymerisation Processes

Fact Sheet

Project Information

COOPOL

Grant agreement ID: 280827

Project closed

Start date
1 March 2012

End date
28 February 2015

Funded under
Specific Programme "Cooperation": Nanosciences, Nanotechnologies, Materials and new Production Technologies

Total cost
€ 4 584 445,67

EU contribution
€ 3 392 800,00

Coordinated by
UNIVERSITY OF WARWICK
United Kingdom

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RESEARCH*EU MAGAZINE

Polymers and composites rise to new challenges

15 June 2016

Objective

Transition of processing industries towards a more sustainable model of manufacturing is one of key priority topics for European Research Area. This transition requires adoption of novel reactor technologies, greener reactions and the increase in the use of intelligent systems in processing industries. The latter means improving processes through use of real-time information and ability to affect processes in real time. The long-term vision of COOPOL is to develop new methods and tools for modeling and control, based on real-time sensing, which will facilitate the development of a new paradigm of processes: intensive, low-impact, sustainable chemical technologies. The COOPOL consortium is focusing on one of the key areas of interest to European Chemical Industries, namely the polymer industry. Within the chemicals sector polymer production plays a significant role, with European market share of 25% and providing employment to 1.6 million people within EU27.
Many polymer products are manufactured using batch and semi-batch reactors. In most cases the process parameters, such as temperature profile, feeds, etc follow a specific time schedule, which has been fixed after an expensive period of product and process development. This tight recipe schedule is sensitive against disturbances e.g. unexpected variation in operating conditions, variation in feed purity etc., which inevitably leads to variations in polymer structure and to inter-batch variability and off-spec products. Furthermore, the use of empirically determined recipes with fixed-time controls does not allow intensification of the process which

requires time-varying feeds and reactor temperature to run the reaction faster and hence closer to its limits, and also to switching from a semi-batch to other reactor or process types.
COOPOL addresses the complex issues of real-time process control based on advanced models and on-line sensors, to develop a generic basis for widely applicable sustainable intensified processes. COOPOL will develop a new process control approach, linking molecular level information and understanding of the reaction chemistry with real-time sensing, rigorous modeling based on first principles, subsequent model reduction and non-linear model-predictive control (NMPC) with economic objectives, called dynamic real-time optimisation (DRTO). The approach of COOPOL is to develop robust real-time optimisation-based control and sensing methodologies and through their application to achieve, in parallel, the intensification of (i) the existing processes, and (ii) the development of novel intensive 'smart-scale' processes. The approach of COOPOL will deliver significant advance in the state-of-the-art in model-based predictive control and at the same time produce tangible and exploitable benefits for European industry in the short, medium and long-term.

Fields of science (EuroSciVoc)

natural sciences > chemical sciences > **polymer sciences**

engineering and technology > electrical engineering, electronic engineering, information engineering > electronic engineering > **sensors**

social sciences > economics and business > business and management > **employment**

Programme(s)

FP7-NMP - Specific Programme "Cooperation": Nanosciences, Nanotechnologies, Materials and new Production Technologies

Topic(s)

NMP.2011.3.2-1 - Modelling and control of intensified process systems

Call for proposal

FP7-NMP-2011-SMALL-5
See other projects for this call

Funding Scheme

CP-FP - Small or medium-scale focused research project

Coordinator

UNIVERSITY OF WARWICK

EU contribution

€ 708 095,60

Total cost

No data

Address

KIRBY CORNER ROAD UNIVERSITY HOUSE
CV4 8UW COVENTRY
United Kingdom

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation | Website
Participation in EU R&I programmes
HORIZON collaboration network

Participants (8)

UNIVERSITAET HAMBURG

Germany

EU contribution

€ 600 320,00

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MITTELWEG 177
20148 HAMBURG

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN

Germany

EU contribution

€ 668 000,00

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TEMPLERGRABEN 55
52062 Aachen

Region

Nordrhein-Westfalen > Köln > Städteregion Aachen

Activity type

Higher or Secondary Education Establishments

Links

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Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

VYSOKA SKOLA CHEMICKO-TECHNOLOGICKA V PRAZE

Czechia

EU contribution

€ 376 040,00

Address

TECHNICKA 5
166 28 Praha

Region

Česko > Praha > Hlavní město Praha

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

CYBERNETICA AS

Norway

EU contribution

€ 499 996,00

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LEIRFOSSVEIEN 27
7038 Trondheim

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

BASF SE

Germany

EU contribution

€ 307 274,00

Address

CARL BOSCH STRASSE 38
67063 Ludwigshafen Am Rhein

Region

Rheinland-Pfalz > Rheinhessen-Pfalz > Ludwigshafen am Rhein, Kreisfreie Stadt

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

CHEMISTRY INNOVATION LIMITED

United Kingdom

EU contribution

€ 20 152,00

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BURLINGTON HOUSE PICADILLY
W1J 0BA LONDON

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

THE CHANCELLOR MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE

United Kingdom

EU contribution

€ 157 722,40

Address

TRINITY LANE THE OLD SCHOOLS
CB2 1TN Cambridge

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

KNOWLEDGE TRANSFER NETWORK LIMITED

United Kingdom

EU contribution

€ 55 200,00

Address

52 UPPER STREET SUITE 218 BUSINESS DESIGN CENTRE ISLINGTON
N1 0QH London

Region

London > Inner London — West > Camden and City of London

Activity type

Other

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

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