



Workshop Catalytic Membrane Reactors, What's Next?

INDUSTRIES
ACADEMICS
RESEARCH INSTITUTES
NETWORKS

29 April 2015: ECN, Petten
30 April 2015: STRUIN, School
The Netherlands



ISPT

Institute for Sustainable
Process Technology



WORKSHOP

Catalytic Membrane Reactors, What's Next?

SCOPE

CARENA is a large project on catalytic membrane reactors, funded by the EU in the Seventh Framework Programme. It promotes these reactors in the European chemical industry to reduce the dependency of the European community on imported oil. Unique effort is put into bringing this technology further towards implementation.

Where do we stand now?

At the end of May 2015 the CARENA project will be finalized. The project has led to successful results on many aspects of the membrane reactor technology. Next step is to put these results into a broader perspective. How does the progress of CARENA bring us towards implementation of membrane reactors in industries?

Prospects, priorities and new alliances

During the 2-day workshop a broad range of experts in membrane reactor technology and other relevant fields share the highlights of the project. Based on these, CARENA and ISPT will challenge you to jointly identify the actions needed to bring the technology to maturity and further towards implementation.

The workshop on the 30th of April will take place at the special beach side location STRUIN Paviljon near Petten.

On behalf of the Organization Committee we would like to wish you a pleasant workshop.

Arend de Groot

Organizing Committee:

Arend de Groot (ECN, CARENA) Chair & Coordinator
Hank Vleeming (PDC, CARENA)
Gilbert Rios (EMH, CARENA)
Laurence Bosch (EMH, CARENA)
Ilona Kaandorp (ECN, CARENA)
Lisa Groothuis (ISPT)

PROGRAMME

DAY 1 – APRIL 29, 2015

Location: ECN, Westerduinweg 3, 1755 LE Petten

- 09:30** Bus leaves from hotels in Alkmaar and Alkmaar Central Station
- 10:30 - 11:00** Registration + coffee
- 11:00 - 11:20** **Opening & Welcome**
Opening by workshop organizing committee
Introduction CARENA and ISPT

SESSION 1: NOVEL MEMBRANES FOR CATALYTIC MEMBRANE REACTORS

- 11:20 - 11:30** **Introduction: Overview of membrane research in CARENA**
Marie-Laure Fontaine (SINTEF)
- 11:30 - 12:10** **Highlight presentations CARENA membrane development:**
- Nieck Benes (UTwente) - Novel hybrid polyimide-POSS membranes for separation of hot gases.
 - Jürgen Caro (LU Hannover) - Separation of H₂O from other gases/liquids with zeolite membranes.
- 12:10 - 12:20** **Discussion**
- 12:20 - 13:20** Lunch

SESSION 2: NOVEL CATALYSTS FOR MEMBRANE REACTORS

- 13:20 - 13:30** **Introduction: Overview of catalyst development in CARENA**
Yves Schuurman (CNRS-IRC)
- 13:30 - 14:10** **Highlight presentations CARENA catalyst development:**
- David Farrusseng (CNRS-IRC), Maria Elena Rivas-Velazco (Johnson Matthey PLC) - Yolk-shell & zeolite membrane catalysts for selective oxidation of CO.
 - Antonio Ricca (University of Salerno) - PDH/SMR catalyst development.
- 14:10 - 14:20** **Discussion**

SESSION 3: MODELING AND DESIGN OF CATALYTIC MEMBRANE REACTORS

14:20 - 14:30 **Introduction: Overview of catalytic membrane reactor modeling and design**

Hank Vleeming (Process Design Center)

14:30 - 15:10 **Highlight presentations CARENA membrane development:**

- Raf Roelant (Process Design Center) - Methodologies for conceptual design of CMRs.
- Frans van Berkel (ECN), Emma Palo (KT) - Design and test results of Catalytic Membrane Reactors for Steam Methane Reforming.

15:10 - 15:20 **Discussion**

15:20 - 15:40 Coffee break

15:40 - 16:00 **Overview of achievements in the DEMCAMER project***

Ilaria Mirabelli (Hygear)

*FP7 Project aims to develop innovative multifunctional Catalytic Membrane Reactors, www.demcamer.org

SESSION 4: PROCESSES EMPLOYING CATALYTIC MEMBRANE REACTORS

16:00- 16:20 **Direct production of acrylic acid from propane**

Nicolas Doucet (Arkema)

16:20- 16:40 **DMC and Methanol from CO₂**

Gerhard Remmers (AkzoNobel)

SESSION 5: EXPLOITATION OF NOVEL MATERIALS AND CATALYTIC MEMBRANE REACTORS

16:40 - 17:40 **Exploitation of novel materials and membrane reactors**

Introduction to the CARENA Innovation leaflets;

Poster sessions;

Drinks.

17:45 Bus leaves for Alkmaar

19:00 - 21:00 Workshop dinner in Alkmaar at Heeren van Sonoy

(Hof van Sonoy 1, 1811 LD Alkmaar)



PROGRAMME

DAY 2 April 30, 2015

Location: STRUIN Paviljon, Heereweg 407, 1871 GL Schoorl, Camperduin

8.00 Bus leaves from Alkmaar for beach side location STRUIN
8:30 - 9:00 Registration, coffee and welcome

SESSION 1: "SETTING THE SCENE"

9:00 – 10:00 What are the value propositions? In a highly interactive session we will develop, refine and select propositions in the field of catalytic membrane reactors.
10:00 - 10:20 Coffee break

SESSION 2: "CHALLENGES"

10:20 – 11:40 Choose your proposition. In break-out sessions we enrich the project ideas and discuss the essential technological principles, technical challenges and stake holders to involve.
11:40 – 12:00 Feedback from the plenary sessions
12:00 – 13:00 Lunch

SESSION 3: "ALLIANCES AND ACTIONS"

13:00 – 14:00 Developing ideas into proposals and defining the follow-up/
14:00 - 14:15 Recap and closing
14:30 Bus leaves for hotels Alkmaar, Central Station and Schiphol

www.carenafp7.eu

www.ispt.eu



Acknowledgement: This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 263007.

