

Editorial

Final words.....

We are “closing down” the CARENA project. Of course a period of intense work to finalize all the activities and reporting. And to look back on the close cooperation we had in the project. As a coordinator I look back with most pride on those results where partners jointly reassessed the priorities during the project and worked together to realize these. It is here that you really see the synergy of the different backgrounds and knowledge of the partners. Of course we look forward as well. How do we ensure the CARENA results realize their full potential? The knowledge generated and exchanged is in some cases intangible. Sometimes also very specific: the CARENA project has given 10 PhD's and 4 post-docs the opportunity to complete their work.

In the last few months we have done a lot of work to ensure results from the project will be followed-up. In some cases the partners will, jointly or separately, continue work on selected topics. In other cases new partnerships are sought. On the CARENA website you will find leaflets prepared by CARENA partners to describe some of results which need new alliances and the steps needed to bring them further. If you might be interested in cooperating with us on valorizing the CARENA results, please check our website.

Another activity we have undertaken is the successful and interactive workshop organized in Petten on the 29th-30th of April (see further on in the newsletter). 54 participants from 9 countries came together to brainstorm on follow-up projects. The five most promising project ideas have been worked out and will be further developed. Check out our website for these results as well.

As my final words in this newsletter, I would like to extend my great thanks to all the people who have worked in the CARENA project: it has been a great pleasure to work with you all!

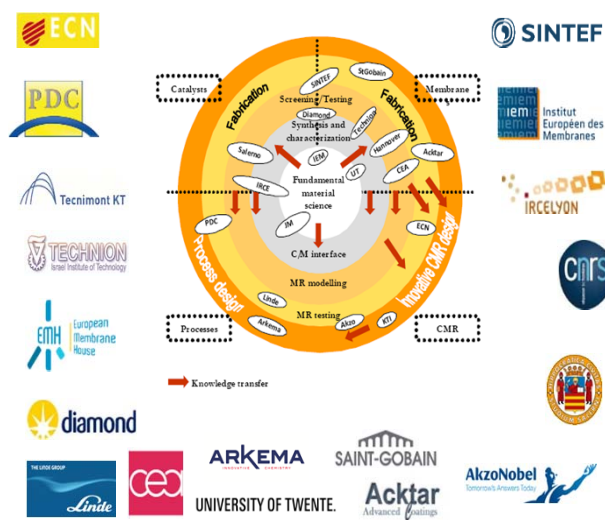
Arend de Groot,
CARENA's Coordinator



Dr. Arend de Groot

The consortium

CARENA gathers **19 partners** with high level of expertise in their fields all over Europe



CARENA

CARENA at the final stage

1- Overview of the CARENA's Project

Final Overview and Perspectives...

The Project reaches his final stage! In order to facilitate the final report to EC, a final CARENA meeting, SAB and a final dissemination workshop on Catalytic Membrane Reactors were set up in April 2015.

The final project meeting, was organized at ECN and offered an excellent opportunity to take note of the main achievements, activities and challenges over the whole 4 years of the CARENA project. 38 CARENA members were present. The different work package leaders presented their work package's activity; focus on an overview of the progresses and results per work package and per application. Key topics in CARENA: catalysts, membranes and membrane reactors were reported also per applications. In total there were 12 presentations and the coordinator's speech to explain the final report plan, deadline and guidance.

The last Strategic Advisory Board meeting was attended by 7 persons; 4 on behalf of CARENA, Arend de Groot, ECN (coordinator), Hank Vleeming, PDC (operational and exploitation manager), Gilbert Rios, EMH (dissemination manager), Laurence Bosch, EMH (communication officer) and we were grateful that 3 distinguished members joined the Strategic Advisory Board (SAB) and shared their expertise with us: Prof. Jean-Claude Charpentier (F), Prof. Miguel Menendez (ES), Ir. Peter Alderliesten (NL). The members of the Strategic Advisory Board express their positive assessment of the CARENA project achievements and results and find them of great interest. They emphasize that the broad

approach and the catalytic membrane reactor approach that is followed in CARENA offers unique opportunities.

On the dissemination and exploitation aspects, it proceed well with 4 patents, 5 thesis defended, 40 papers, 26 oral presentations, 22 poster presentations and 10 innovation leaflets-up to date. The innovation leaflets have been developed to present CARENA's key technology offers and needs and have been presented at the final dissemination workshop "Catalytic Membranes Reactors, What's Next?", which was organised in Petten, The Netherlands, on April 29&30, 2015. At the workshop, 54 participants over 9 nationalities responded present to share the future of the catalytic membrane reactors technology. We would like to thank the organizer ECN and CARENA partners for the very fruitful meeting and the organizing committee of the workshop for their smooth and excellent workshop in Petten. The last two events allowed to get together a 1st time for CARENA.

What is CARENA ?

The 1st of June 2011 marked the start of the CARENA project: **Catalytic Reactors based on New Materials for C1-C4 valorization**. It is an EU-funded collaborative project to create technologies enabling efficient conversion of light alkanes and CO₂ into higher value chemicals. To reduce the dependency of the European community on imported oil, the CARENA project will promote the implementation of catalytic membrane reactors in the European chemical industry.

*Collaborative Project: Large-scale integrating project
FP7-NMP-2010-LARGE-4*

48 months - Start day : 1st June 2011

www.carenafp7.eu

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2 Final CARENA meeting & Workshop in Petten, the Netherlands

Final CARENA Meeting on April 28th, 2015 at ECN
in Petten, the Netherlands.



The final CARENA project meeting was held in Petten, at ECN premises on April 28th 2015 with 38 members. This was a 1-day meeting (lectures showing achievements, highlights and challenges towards industrial applications and innovation leaflets posters). It proved a unique knowledge-sharing experience for all the representatives of the project from academia, research institutions and industrial stakeholders. Every WP leaders and present members of CARENA get together to further explore and share the latest topics in CARENA and catalytic membrane reactor technology. Feedback from the CARENA attendees was extremely positive.



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2 Final CARENA meeting & Workshop in Petten, the Netherlands

Dissemination & Exploitation workshop on April 29&30, 2015 in Petten.



The workshop “Catalytic Membrane Reactor, What ‘s Next?” was organized by CARENA and ISPT on April 29&30, 2015. This workshop was the dissemination and exploitation of EU-funded project CARENA, DEMCAMER was invited as speaker to give an overview of their achievements in their project. This was a 2-days (lectures, posters sessions and discussions) event including a visit to ECN facilities packed for an intense Dutch experience.

It proved a unique knowledge-sharing experience for representatives of academia, research institutions and industrial stakeholders. 54 participants from 9 countries get together to further explored the Catalytic Membrane Reactors achievements, challenges and perspectives.

Half of the event was hosted by ECN on the behalf of CARENA and the second day was located on the seaside at Camperduin, at the Struin’s Pavilion. Feedback from the workshop attendees was extremely positive.



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3 – Interviews with CARENA partners

Discover Arend, our Coordinator, his overview of CARENA and his famous last words.



Arend De Groot
ECN, coordinator
of CARENA

As a coordinator you have the last word. How do you look back on the CARENA project?

We have been lucky to work with a wonderful team. First of all the work package leaders, which have organized their part of the work very well. And all the partners in general, which have shown great willingness to adapt their work to the needs of the project. **This is always a challenge in European projects, where you have to plan ahead for 4 years.** Or even 5 years if you take into account the proposal phase. Often this leads to conflicts of interest when the resources and people committed originally to the project do not match the needs of the project. Therefore it is a good sign if you see that partners agree on new roles and activities during the project to address the most urgent challenges. **In the CARENA project I have seen many times this flexibility of the partners to deviate from the original plan if necessary. I think this characterizes a good project.**

The cooperation between the different nationalities is what I enjoyed above all! In the CARENA project about 30% of the people working in the project live abroad. **Working outside of your own country broadens your perspectives. I think one of the important benefits of the EU projects lies in the opportunity given to widen your horizons of working in such project. On a personal level and also professionally.**

[Read the full interviews online](#)

“The cooperation between the different nationalities is what I enjoyed above all !”

What were the most rewarding aspects of the project?

I think the interactions we had within the project and externally have been very successful. At our first annual meeting for example we organized a poster session for our PhD students and post-docs to present their work. **I remember this as a very lively event which was helpful to involve the PhD's in the project and generate interest for their work from the partners.**

The project also organized a series of very successful workshops and seminars. Especially the membrane workshop in Montpellier (2012), the two workshops on palladium membranes in Rome (2012) and Petten (2014) and the catalytic membrane reactor (2015) have been very successful.

For me personally the interaction with our Strategic Advisory Board has been very rewarding. An opportunity for me to make use of the great experience of the members of the board and their stimulating views.

And finally...the famous last words?

Not a single regret having taken on the task of coordinating the CARENA project. Of course it is sometimes hard work, but **on a personal level I thoroughly enjoyed the opportunity to work together and interact with so many people. I am truly going to miss that!**

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Learn more about our different partners and discover the strengths and diversity that make CARENA project a so fruitful experience. [Meet Caroline from Saint Gobain and Paolo from Salerno University!](#)



Caroline Tardivat
Head of CNRS-Saint
Gobain Research Unit



Paolo Ciambelli
Professor at Salerno
University

CARENA brings together Research labs and industry. How do you view research-industry collaboration within the framework of the project?

The CARENA consortium is built in a very complementary way : each partner brings in a specific skill, specific experience. **We experience very fruitful interactions with our partners**, in the framework of this project. The involvement of industrial end-users with experience in the field and in competitive technologies is also a clear advantage.

“multidisciplinary approach is probably a very strong factor of success for the project”

Last but not least, let's zoom out on broader themes. Sustainable development and environment issues are key concerns nowadays. How does membrane chemistry fit in the pattern? Would you say chemistry is going through major changes?

In order to address the predicted future global demands, and given the shortening of mineral feedstocks, **the use of alternative raw materials for chemistry will be unavoidable**. Chemists are learning to play with new building block molecules; chemical processes will need to be adapted too, and membranes may play a role.

The CARENA project has been designed with a strong emphasis on multidisciplinary approach. What progress can be expected if chemists work in closer relation with other disciplines?

I strongly **believe in multidisciplinary approach**, also due to my 20-year experience as professor of chemical engineer in a Chemistry Department, Faculty of Sciences. I headed during 5 years NANO_MATES, an interdepartmental research centre on nanomaterials and nanotechnology at the University of Salerno, gathering colleagues from 8 departments. **Competitive research today is obliged to have a multidisciplinary approach.**

“The research-Industry collaboration: it is essential.”

Membrane chemistry and, more in general, chemistry may give significant contribution to sustainable development of chemical industry with respect to production and use of energy, and environment protection. An interesting aspect is the feasibility of innovation in a scenario in which consolidated process solutions are becoming cheaper due to low price of energy and products raw sources.

[Read the full interviews online](#)

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Learn more about our different partners and discover the strengths and diversity that make CARENA project a so fruitful experience. [Meet Marianne from Linde and Gilbert from EMH!](#)



Marianne Ponceau
Chemical Engineer
at the engineering
division of Linde



Gilbert Rios
Prof. Ing. & CIO of EMH

The CARENA project has been designed with a strong emphasis on multidisciplinary approach. What progress can be expected if chemists work in closer relation with other disciplines?

Working in an interdisciplinary field is always an enrichment. It allows you to better understand different points of view. It is sometimes difficult to speak "the same language", but if you make the effort to understand the other person, you will learn a lot and it allows new perspectives.

"CARENA offers a very interesting panel of universities and industries."

Last but not least, let's zoom out on broader themes. Sustainable development and environment issues are key concerns nowadays. How does membrane chemistry fit in the pattern? Would you say chemistry is going through major changes?

Sustainability is indeed a key factor nowadays. Membrane chemistry is a very interesting field that allows higher selectivity and hence higher efficiency, due to the targeted substrate delivery or product removal. **Research in this field has the potential to improve existing technologies or to find more efficient alternatives in the future.**

What is the added-value of an EU project such as CARENA compared with other partnerships on the same topic you may be involved in?

A good access to a large funding and a broad network ...

You were a member of the organizing committee of the join Reforcell, DEMCAMER, Comethy and CARENA workshop on Pd Membrane (20-21 November 2014, Petten, The Netherlands). Could you tell us your feeling, feedback... ?

The renewed interest of finding new synergy....

Isn't "natural" that membrane, as a basic concept/tool of life since billions of years, may serve sustainable development and environment.. I do not want to discuss about chemistry or biochemistry... I leave that to specialists...

[Read the full interviews online](#)



4 – News

Release of one publication from our Partner Anne Julbe in the “Top 25” of Elsevier separation & membranes sciences journals.

February 2015: Released of the "New and Hot Articles" top 25 most downloaded Articles by Elsevier's separation & membranes Science Journals

Since 1 October 2014, in a quarter of 2014, Elsevier's separation & membranes technology journals published over 400 articles! Among them, a list of 25 most downloaded articles was established.

Anne Julbe 's article (reference below) is one of them! Congratulations to her and her team in Montpellier (IEM-CNRS) to be in the top 25 of Elsevier separation & membrane technology journals! [Discover now the top 25 hot articles](#)

An innovative approach for the preparation of confined ZIF-8 membranes by conversion of ZnO ALD layers, M. Drobek, M. Bechelany, C. Vallicari, A. A. Chaaya, C. Charmette, C. Salvador-Levehang, P. Miele, A. Julbe, *Journal of Membrane Science*, 475 (2015) 39–46.

5 – CARENA's Thesis

The 4th year of the project has been successfully rewarded with new Doctors,

Congratulations to our New Doctors in CARENA!!!!

Marie Rochoux (Octobre 2014, 24), Claudia Salvador Levehang (December 2014, 10), Nanyi Wang (April 2015) and Shiwen Li (May 2015, 5) for their defence!

... and more defence to come

Michiel Patrascu : July 2015 (Technion, Israel Institute of technology)

Michiel Raaijmakers: October 2015, 2nd (Twente University)

Harro Mengers: October 2015, 22nd (Twente University)

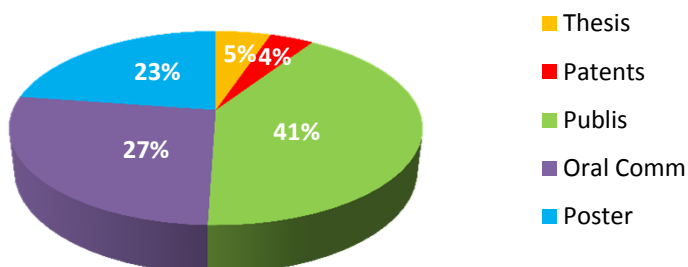


6 – Publications // June 2011- May 2015

The PhDs and senior researchers are active and participate to several national and international conferences and meetings in order to communicate the CARENA's results. They have reported several scientific publications in peer-reviewed journals .

Please find more details *via* this link :
<http://www.carenafp7.eu/index.php/Publications/Publications.html>

Overview of the communication supports



Miscellaneous

- **12th International Conference on Catalysis in Membrane Reactors, ICCMR 12, Szczecin (Poland), 22-25th June 2015.** <http://www.iccmr12.zut.edu.pl/>
3rd February 2015: Deadline for Abstract Submission
1st April 2015: Deadline for Early Bird Registration

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