CARENA

CAtalytic membrane REactors based on New mAterials for C1-C4 valorization

CARENA is a large-scale integrating project funded by the EC

Interview with Hank Vleeming – PDC, The Netherlands.

Dr. Hank Vleeming joined Process Design Center (PDC) in 1999 and is currently employed as Chief Technology Officer (CTO). He holds Master Degree in Chemistry from Leiden State University (1992) and a PhD degree in chemical engineering from the Eindhoven University of Technology (1997). His expertise and experience is in conceptual process design using expert systems. He worked for many industry clients and participates/participated in the setup, execution and technical management of EU-FP7 joint research projects (CARENA, F3Factory, EuroBioRef, Bisigodos, CACHET). In the CARENA project he is operational and exploitation manager, as well as work package leader of WP6, which dedicates to developing catalytic membrane reactor models and conceptual design methodologies. Before starting his career with PDC, Hank Vleeming worked with Technip/KTI, The Netherlands, and Institut Français du Pétrole (IFP) in France.

PDC

What made you opt for a career as a researcher? How would you define your job?

Ever since secondary school I am fascinated by chemistry and physics, especially because of the combination of theoretical and experimental work. This is also the reason why I started a study in chemistry followed by a PhD in chemical engineering and a one-year post doc at IPF's research and pilot facility in Lyon. Today in my job I am no longer directly involved in experimental laboratory or pilot work, which I find a pity. However, in return I get a lot of satisfaction from translating research work into industrial process designs. The experience I have in laboratory work helps me a lot in understanding researchers.

We'd like to catch a glimpse of your daily activities. What is an average day (or week) for you?

My daily work concentrates on setting up and executing conceptual process design projects together with PDC colleagues. Most of the time I work from our office in Breda, but from time to time I have meetings outdoors with consortia and clients. This can be inside, but also outside Europe. Besides technical work I am involved in management tasks. In CARENA I deal with exploitation and technical management, together with the coordinator Arend de Groot.

SEVENTH FRAMEWORK PROGRAMME

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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?

It is understandable that chemists in their daily work are primarily focused on their specific task. However, they should realize that their development is going to be part of an integrated design: a catalytic membrane reactor or complete process including separations.

"the benefit is that the consortium brings together partners with various expertise needed"

It is therefore very important to consider the other design elements in the work of chemists and to work together with chemists of other disciplines as well as process engineers. This is why in the CARENA project there is a cross-linkage between the work packages. In this way we make sure that development of catalyst, membrane, catalytic membrane reactor and process design are well aligned. Optimizing the individual performance of membrane and catalyst does not make sense if in the end it is not possible to combine them in a catalytic membrane reactor, for example because the operating windows do not overlap.

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

In CARENA I observe a very good interaction between research and industry. On the one hand this is caused by the project structure with cross-linkage between the 'industry' work packages WP1 to 3, which focus on catalytic membrane reactor and process development, and WP 4 to 6, which develop catalyst, membrane and process design tools. But I think that even more important is that from the start all parties in CARENA have a clear ambition to work closely together. They realise that they need each other for specific competences and that together they can achieve more than individually.

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?

For us, the benefit is that the consortium brings together partners with various expertise needed to develop catalytic membrane reactors. This allows us to develop a novel methodology for conceptual design of catalytic membrane reactors as an extension of our tools.

PDC office

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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?

The idea behind combining membranes with reactors is that it intensifies the chemistry by improving the reaction performance, such as a shift in equilibrium. Often it becomes feasible to work at lower temperatures, which leads to energy savings. Also, it may enable to use different feedstock. This makes the process more sustainable and environmentally friendly.
In CARENA one of the objectives is shifting to cheaper and more abundantly available raw materials. At PDC we clearly notice a change in our process design work over the past ten years towards bio-based chemistry.

"The idea behind combining membranes with reactors is that it intensifies the chemistry by improving the reaction performance, such as a shift in equilibrium"

Is there anything else you would like to add to your interview?

I must say that I really enjoy working together with the partners in CARENA. The project is now in its final phase and I look forward to the outcome, but also what will happen with the results afterwards.
Finally, I would like to thank EMH for their excellent work in disseminating the CARENA ideas and results. It is good to see that this newsletter still arrives until the very end of the project!

Thank you Hank for answering my questions, and all the best for CARENA and the other projects you are involved in.

Interviewed by Laurence Bosch

CARENA in brief

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