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**CA**talytic membrane **RE**actors  
based on  
**New mA**terials for **C1-C4** valorization

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

**Interview with Nieck Benes –  
Twente University, The Netherlands.**



*Nieck has a longstanding history in the field of inorganic and hybrid membranes for molecular separation under harsh conditions. He holds an MSc in Chemical Engineering from the University of Twente (The Netherlands). In 2000, he received a PhD degree with honors for work in the Inorganic Materials Science Group of the same University, focusing on irreversible thermodynamics, multicomponent mass transport in (macro-, meso-, and micro-)porous media, and in-situ characterization of thin-film silica membranes. He briefly worked for DSM Research in Geleen, and in 2003 joined the Process Design Group of the Eindhoven University of Technology as assistant Professor. In 2008, he returned to Twente University, as assistant then associate and recently as adjunct Professor, where his research activities revolve around two main interrelated research themes: Ultrathin inorganic-organic films and in-situ and operando membrane (film) characterization.*

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

I am curious by nature. I enjoy figuring stuff out and I get a thrill out of finding simple solutions for complex problems. My job essentially is to come up new ideas, and then to facilitate researchers (PhDs, PDs) to work on these. Of course I do enjoy to participate actively in their quests...

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

On an average day I have meetings with my PhDs, I give courses/lectures to BSc and MSc students, and I write paper and proposals. And I read... I read a lot of papers and other publications to be aware of what other researchers are working on, and to find leads for new and innovative research.



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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?*

The cliché is that progress can be found at the frontiers between disciplines. Many clichés hold some truth.

My educational background is Process Technology, or more precisely Reactor Technology. For my PhD I have made a switch to Inorganic Materials Science with a focus on Irreversible Thermodynamics and Multicomponent Mass Transport. Then to Process Design, with focus on high pressure systems and sonochemistry. Now I have turned back to Materials Science again, focusing on Hybrid Materials and *in-situ* characterization of thin membrane films.

*“Such multi-disciplinary discussions facilitate the birth of solutions”*

The broad scope of this background helps me to find collaborators from different fields and to discuss with them their view on the problems our group is working on. Such multi-disciplinary discussions facilitate the birth of solutions that one would never come up with when one is confined to a single discipline, or to assess the value of your own work in a realistic context.

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

The wants and needs of the industrial partners in CARENA are quite clear. The combined demands with respect to catalyst activity and stability, and membrane performance and stability, help to focus our work on relevant topics.

*“PhDs and PDs are potentially important members of their future networks”*

*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?*

The broad consortium aids the previous points. Also, the PhDs and PDs working in CARENA come into contact with people that are potentially important members of their future networks, both from the academic as well as the industrial worlds.

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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?*

For membrane technology, future generations of membranes will require simple fabrication methods that can be scaled up, and do not require solvents. In addition, the properties of the membranes should be tailored for specific applications, and performance should persist under demanding conditions. This all requires smart and elegant chemistry.

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

*"The broad scope of this background helps me to find collaborators from different fields and to discuss with them"*

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*"Such multi-disciplinary discussions facilitate the birth of solutions"*

*Interviewed by Laurence Bosch*

**CARENA in brief**

Starting date: 1st June 2011  
Project duration: 2011 – 2015  
Number of partners: 19  
Coordinator: Arend de Groot, ECN, the Netherlands  
Programme: FP7-NMP-2010-LARGE- 4  
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