XERIC

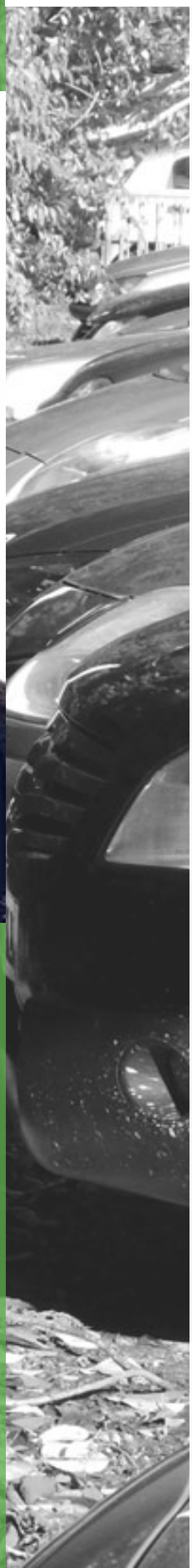
INNOVATIVE CLIMATE-CONTROL SYSTEM TO EXTEND RANGE OF ELECTRIC VEHICLES AND IMPROVE COMFORT

European Research & Innovation Project
Innovative climate-control system to extend range of electric vehicles and improve comfort

Interview with Sabine PAULUSSEN

Researcher at VITO, Belgium

Dr. Sabine PAULUSSEN joined VITO's plasma technology group in 2001. She is in charge of technology development in the field of multifunctional coatings. Sabine has coordinated several European R&I projects. She brings into XERIC her expertise on plasma technology.



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

What I particularly like about research is the chance to do things nobody has ever done before. It brings a certain excitement to wait for the outcome of experiments, or to obtain unexpected results. On the other hand I also like to analyse problems to find a solution or to set up a research proposal out of a specific case, bringing together different research areas to achieve a specific goal. All of this is part of my job at VITO.

We'd like to catch a glimpse of your daily activities. What is a typical day like for you?

My job is very diverse and it is difficult to define a typical day. Sometimes, I spend the whole day in the lab, for example together with customers attending trials. Other days I work in my office writing proposals or reports. Very often we also visit or invite companies to demonstrate and discuss our technology with the aim of setting up collaborations.

VITO developed an innovative plasma technology at normal atmospheric pressure to permanently change the surface of materials. What are plasma and plasma technology? Why is it interesting for industry? Can you give us a sample of industrial applications?

Plasma is actually the 4th state of matter, besides the solid, liquid and gas states. It is an ionized gas meaning that the molecules in a gas are further split into, amongst others, radicals, ions and electrons, by adding energy

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to the gas. A plasma can be generated by heating, but also for example by applying an electric field, which is what we do in the lab. We make use of the energetic species in the plasma to modify the surface of materials, without altering the bulk properties of a material. For example polymer fibers are often rather hydrophobic. By plasma treatment of such fibers, we can improve the strength of composite materials that are produced from the fibers, due to a better compatibility between the fibers and the matrix in which they are embedded. A similar effect could be obtained with wet chemical coatings but materials are often not compatible with water or solvents. From an environmental point of view, plasma technology has a lower environmental footprint than alternative technologies.

You coordinated the NANOPUR European-funded project. This 3-year project ended in 2015. It dealt with nano-structured membranes for water treatment. Has the project achieved its objectives?

The objective of the NANOPUR project was to create membranes for water purification that use less energy than conventional membranes and are capable to combine high flow rates and high retention of micro-pollutants. In a first research path, membrane preparation was optimized to in order to achieve a higher flux through the membranes and to make them less susceptible to fouling and easier to clean. In a second track, affinity ligands able to capture pollutants and pathogens were synthesized and immobilized on the membranes.

This way we managed to develop nano-structured membranes that possess a higher permeability than current ultra-filtration (UF) membranes while being capable of removing viruses, endocrine disrupting compounds, antibiotics and bacteria toxins from water. While some of the new developments within NANO-PUR are already being implemented in industrial processes, more research and (cost-) optimization is needed to reach this level for other innovations resulting from the project.

You're participating in RAPID, an Initial Training Network funded by the European Commission. RAPID hired 15 PhD students and postdoc researchers. Can you tell us more about this project?

The RAPID project groups 10 European universities and research institutes renowned for their work in the field of atmospheric plasma technology and 10 companies interested in the technlogy. The aim is to achieve transfer of knowledge to the industry and penetration of atmospheric plasma technology in industrial processes by educating PhD students on the subject. This is not only achieved by hosting PhDs but also by dedicated training courses for the students involved and by mobility of the students through internships in the different institutes and companies. Atmospheric plasma technology is an interdisciplinary topic at the intersection of chemistry, physics and engineering and the exchange within the group of students and their mentors is very vibrant and motivating.

Let's talk about XERIC now! Why is it interesting for you to participate in XERIC?

We have a very challenging task within XERIC. Our job is to make the new separator membranes that are being developed more hydrophobic by applying a plasma coating. We made hydrophobic coatings for other applications, but for XERIC the stability requirements are much more challenging and already at this stage we learned a lot. I also particularly like the idea that we contribute to a project which is driven by industry, and the outcome of which may have an environmental and societal impact.

XERIC brings together research labs and industry. Given your experience at VITO, which positions itself as an innovation partner for industry, how do you view the future of research: will most research be carried out via public-private collaborations?

From my point of view it is essential to involve industry from the beginning onwards in new application-oriented R&D tracks. This way the relevance of the work is assured and new developments can be tailored towards the needs of the industry, as such being more efficient, not only technologically but also financially.

Thanks for answering my questions Sabine and all the best for XERIC!

Sabine's skills

Plasma - Materials Science - Chemistry
Polymers - Chemical Engineering
Nanotechnology - Technology Transfer
Innovation Management

VITO, a partner in the XERIC project

VITO is the Flanders' research and technology organisation on cleantech and sustainable development. With approx-imately 750 researchers and supporting staff, VITO is one of the largest European research institutes active in the fields of energy, environment and materials. VITO's plasma technology group is made up of 18 staff members. They work on process and equipment development with a strong focus on industrial implementation and transfer of knowledge.

XERIC in brief

XERIC is a European Research & Innovation Project

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