The Interview: “We have created something extraordinary”

Vaduz, 4 March 2014 – Interview with Nunzio La Vecchia, visionary and head of development of the QUANT e-Sportlimousine equipped with nanoFLOWCELL®.

“It is simply a joy to me to be able to help drive the progress of energy technology by changing and developing a tiny detail in nano-technology.” (Nunzio La Vecchia, January 2014)

Question: How did you arrive at the nanoFLOWCELL® technology?

Nunzio La Vecchia: Through hard work and the constant drive to break down barriers. We’ve often worked in the lab till late at night. My institute for simulation technology, the nanoFLOWCELL DigiLab in Zurich has been working for many years on projects involving the quantum charge transport structures. Again and again, consistent, systematic efforts in this area brought us important, sometimes surprising progress. In the end, we had the solution: If we can use 3D simulation to push the development of quantum mechanisms in the right direction, then we could make physics follow our designs. And that is what we did. The nanoFLOWCELL® is a new, fundamental energy concept that is going to be interesting for the automobile industry as well as other areas of energy technology in the coming years. We have created something extraordinary.

Question: This is not the usual path to a solution in science, is it?

Nunzio La Vecchia: Correct. The beginning is usually always the same: You postulate the mathematical definition of your requirements and then have a look at how the results in experimental physics and chemistry line up with them. Simulation might play a supporting role somehow. In our case, the simulations were the key to everything.

Question: Is the QUANT e-Sportlimousine the first car you’ve built?

Nunzio La Vecchia: Leaving aside some sketches of an earlier concept car, the QUANT e-Sportlimousine is a completely new vehicle, a totally new development with sophisticated technical details and extraordinary design elements. It is the first prototype for a e-Sportlimousine equipped with nanoFLOWCELL®. It was designed and built from the ground up as a rolling test bed for these technologies.

Question: Will there be more prototypes?

Nunzio La Vecchia: We are planning on producing four further drivable prototypes in 2014.

Question: Will you be able to give the first prototype all the functionality needed for use on public roads?

Nunzio La Vecchia: We certainly can't manage that on our own. Luckily, we are working with very strong partners who have enormous knowhow in their specialist areas. I'd like to mention Bosch Engineering GmbH in this regard, who has worked closely with us in the layout of the electronic control system and has been highly essential in its fine tuning to perfection. Our company, nanoFLOWCELL AG in Vaduz, will continue to work intensively on all development aspects concerning the homologation of the QUANT e-Sportlimousine equipped with nanoFLOWCELL®.

Question: What is the nature of your partnership with Bosch Engineering GmbH?

Nunzio La Vecchia: In the coming months and years, we will work with our partner Bosch Engineering GmbH on further development and international homologation. Transforming an initial prototype with nanoFLOWCELL® powertrain into a series-production vehicle that can be used around the world is a big challenge. We are certain that we can manage it with this established and experienced partner.

Question: Your explanations don't explain every aspect of how the system functions, correct?

Nunzio La Vecchia: Correct. And that is intentionally so. We need to be discreet because of the complexities of the global patent system. As long as we haven't completed all the legal formalities around the world, we have to protect the exact function of our system. Our previous tests have demonstrated that the nanoFLOWCELL® system is already at a high level of perfection. We just want to keep the other details close to our chest. This will help the system more than exhaustive explanation of every detail at this stage. The young need protection from publicity, whether babies or battery systems.

Question: Can you describe the advantages of your system in just a few words?

Nunzio La Vecchia: The power density of the nanoFLOWCELL® at 600 W per kilogram or per litre is greater than any comparable system; five times greater, to be specific. That means you can drive five times further with our system than you can with a conventional battery system, including the most state-of-the-art lithium-ion batteries. The system is also extremely safe to operate and environmentally friendly. Most importantly, since there are almost no moving parts and it produces negligible waste heat, it has an efficiency of more than 80%. There has never been anything like it.

Question: How does a system like this fit into today's automotive landscape?

Nunzio La Vecchia: Many modifications will be necessary. All well-made electric cars are very different from conventional automobiles. For example, for a driving range of 600 kilometres, it is currently necessary to have as much as 400 kilograms of electrolyte on board. Conventional cars are not made to carry this much fuel; they can make do with a quarter of this tank volume. However, their powertrains easily weigh 300 kg and take up a

cubic metre of space, whilst ours is confined to four compact electric motors. The entire package is stood on its head when the nanoFLOWCELL® comes into the picture.

Question: Is the enormous tank the only interesting thing about the QUANT e-Sportlimousine then?

Nunzio La Vecchia: Not at all. The QUANT e-Sportlimousine has turned out to be a fascinating sports car, bursting with unusual solutions. These add to its charm. It is a four-seater with double gull-wing doors and a reasonable amount of space in the backseat. Every part and refinement of its styling and design are unusual down to the last detail. Up to and including touch controls mounted beneath wood veneer. We didn't hold back; we wanted to get every detail right.

Question: Are you planning for series production?

Nunzio La Vecchia: Perhaps in the future. For now, we have a lot to do to polish all the systems. The QUANT e-Sportlimousine is a vehicle for the advancement of the nanoFLOWCELL® technology. Were using it to boost our progress and accelerate our path into the future. This lets us develop the technology better than we could between the laboratory and test bed alone. Our company and our projects are there to pave the way for new and unusual technical and scientific solutions. We want to help and be part of the implementation of sustainable energy technologies and keep breaking fresh ground with the nanoFLOWCELL®. To be honest, I can't think of anything I'd rather be doing right now.

Nunzio La Vecchia is a member of the board of nanoFLOWCELL AG, as well as the mastermind behind the nanoFLOWCELL® system. The functionality of the nanoFLOWCELL® is based on designs and experiments carried out by Nunzio La Vecchia during the early phase of his scientific research. Nunzio La Vecchia also significantly influenced the design of the QUANT e-Sportlimousine, with its many revolutionary details.

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About nanoFLOWCELL AG

Founded in late 2013, nanoFLOWCELL AG is an innovative Research and Development Centre based in Vaduz, Liechtenstein. The focus of nanoFLOWCELL AG's research is on the advanced development of drive technology and the classification of flow-cell technology. In the simulation laboratory of the nanoFLOWCELL DigiLab in Zurich, mastermind and development chief Nunzio La Vecchia and his team examine important aspects of quantum chemistry on the basis of molecular engineering. For years they simulated experiments with charge transfer, then conducted trials using digital models, before finally synthesising them for further testing. The current research vehicle, the QUANT e-Sportlimousine, enables the developers to study the mechanisms of charge transfer for the innovative storage technology – the nanoFLOWCELL® – during vehicle operation, as well as to fine tune charge strategies for recuperation and further develop the regeneration of cell charging and safety as well as quality controls.