

AutoProNano – international cooperation for in vitro and in vivo diagnostics

The AutoProNano German/French collaborative project involves developing a process for the automated production of nanoparticles for in vitro and in vivo diagnostics. The project is being launched within the smart analytics cooperation network. This international initiative has been funded by the Central Innovation Programme for SMEs (ZIM) of the German Federal Ministry for Economic Affairs and Climate Action (BMWK) since May 2020, with the aim of driving forward innovative developments, both in the region and further afield. BioRegio STERN Management GmbH is coordinating activities in Germany.

For some time now, it has been predicted that biofunctionalised nanodiagnostics and nanotherapeutics will play a revolutionary role in the fight against serious diseases such as cancer in the future. In biomedicine, there is a growing demand for functional nanoparticles (NPs) with specific optical or magnetic properties, biofunctional surfaces for the detection of antigens, and/or drug loading. However, if nanoparticles are to be put into regular use as medicinal products, they need to comply with stringent requirements. It is particularly important that nanoparticles can be reliably reproduced with the exact properties required. This calls for a robust and precise production process that complies with international standards, is scalable and – ideally – cost-effective, and can be controlled at all times to ensure maximum quality.

As part of the AutoProNano German/French collaborative project, Goldfuss engineering GmbH, a systems engineering specialist based in Balingen, is working with its other German partners – nanoPET Pharma GmbH, the Fraunhofer Institute for Silicate Research ISC, and the Institute of Medical Engineering Schweinfurt (IMES) of the University of Applied Sciences Würzburg-Schweinfurt (THWS) – and its French partners – Cordouan Technologies and Poly-Dtech – to develop an adaptable, automated process for the production and analytics of diagnostically relevant NP systems. The overall aim of the project is to establish a flexible, robot-based process for the automated production and characterisation of diagnostic NPs for in vitro and in vivo diagnostics.

Fraunhofer ISC and Goldfuss engineering previously collaborated in the joint APRONA project, which was funded by the German Federal Ministry of Education and Research (BMBF), to develop the basic principle for a robotic platform for the automated production of NPs. Following the successful commissioning of the system and the first automated synthesis operations, the robotic platform is now being further developed to enable key NP synthesis processes to be performed on an automated basis by AutoProNano. This means that standardised product quality can be ensured and the relevant quality requirements can be taken into account even during the development stage. The core task involves the flexible transposition of diverse manual synthesis protocols into a continuous, controlled and efficient production process.

The AutoProNano German/French collaborative project has total funding of 1.5 million euros. The German partners receive their funding under the BMWK's ZIM programme, while the French partners are funded by Bpifrance. As Dr. Verena Grimm, who works at BioRegio STERN Management GmbH and is Project Coordinator of the smart analytics ZIM network, emphasises: "AutoProNano is an international R&D collaborative project that demonstrates the promising future potential of the automation and analytics of complex products for life sciences. Cooperation by companies and research institutes – irrespective of regional and national borders – is promoted particularly effectively by international ZIM networks."

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