TU Graz Bundles Its Strengths in Biotechnology and Artificial Intelligence

In a multidisciplinary research project, researchers from the biosciences, process engineering and computer science want to massively increase efficiency in the development of new enzymes and process optimization. This should even enable the breakdown of forever chemicals.

Philipp Jarke

Graz University of Technology (TU Graz) is funding a new lead project called DigiBioTech, in which 17 scientists and ten doctoral students from the fields of biotechnology, biotechnological process engineering and computer science are working closely together to significantly improve the predictability and control of biochemical reactions and processes. By merging biotechnology, data science and artificial intelligence, the project team aims to efficiently produce novel enzymes. They will not only enable sustainable production processes, but some of these enzymes should be able to break down persistent environmental toxins such as perfluorinated and polyfluorinated alkyl compounds (PFAS). TU Graz is funding this fundamental research with 1.96 million euros over an initial period of three years. Funding can be extended after an interim evaluation.

SIGNIFICANT LEAPS IN EFFICIENCY EXPECTED

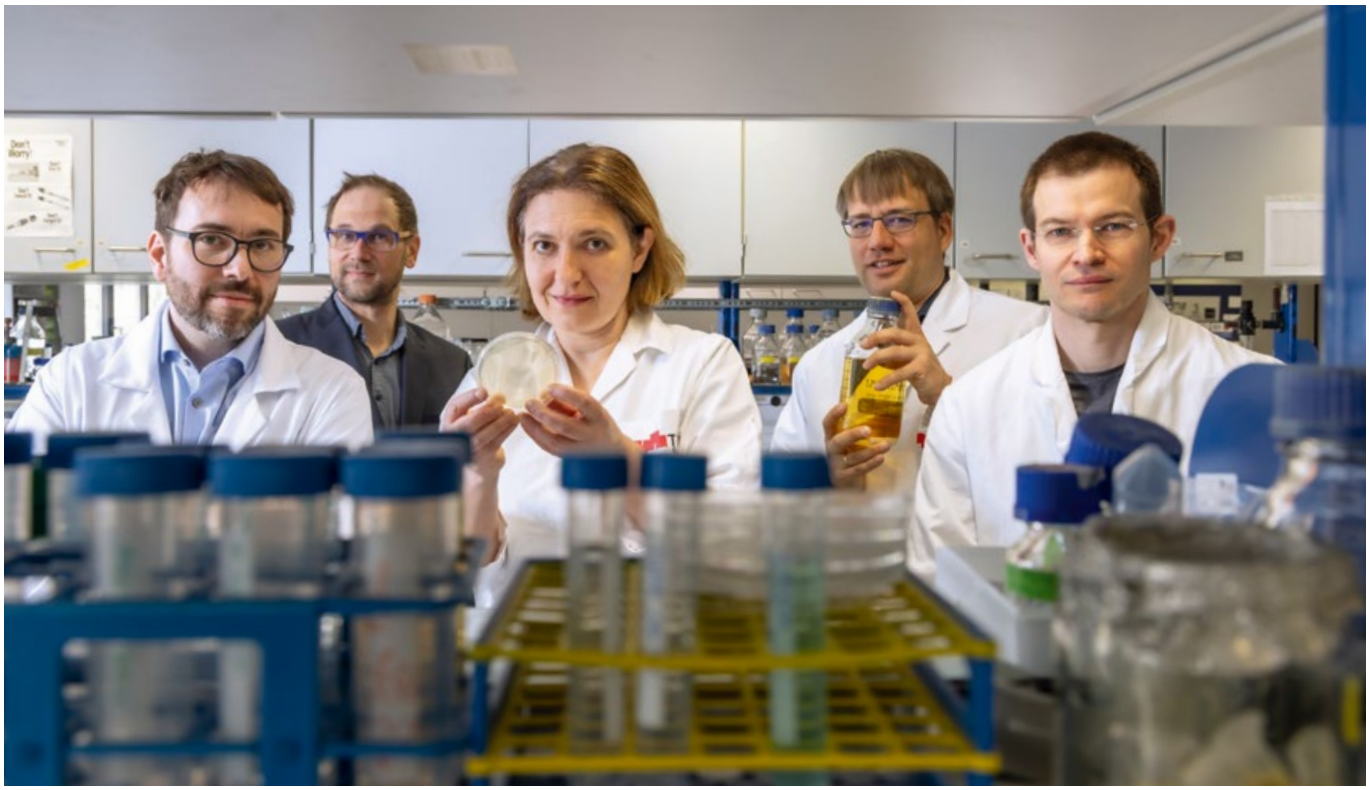
“Biotechnology can make our society considerably more sustainable. To do this, we need to optimise biological systems, which we will be able to do much better and more reliably by integrating artificial intelligence,” says Robert Kourist from the Institute of Molecular Biotechnology, who heads the DigiBioTech project. If, for example, you want to change the reaction centre of an enzyme in several places at the same time to improve its efficiency, the resulting number of variants to test in the laboratory quickly exceeds a million.“

A digital twin of biological and biochemical processes is also to be created in order to predict all processes in all their complexity and enable targeted process engineering.

Various machine learning methods, which are being developed and improved in the project, are suitable for analysing the respective experimental data.

PUBLICLY ACCESSIBLE DATA

“We are faced with the challenge that there are few publicly accessible data sets for enzyme activities and biotechnological process control,” says Gustav Oberdorfer. “We therefore have to generate these ourselves through experiments and keep the parameters absolutely constant so that they are as suitable as possible for the used machine learning models.” The data obtained within the framework of DigiBioTech will all be made publicly available. “With this project, we also want to contribute to democratisation in this area of biotechnology,” emphasises Gustav Oberdorfer. ■



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