



# iNOVA4Health

## - Seminar -

**04<sup>th</sup> April 2025, 12h00**

ITQB NOVA Auditorium, Oeiras

**Host: Manuel Carrondo**

## Tuned Microbial Expression Systems for Highly Engineered Biologics



### Thomas Sauer, PhD

Head of Microbial Platform  
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### Daniel Degreif, PhD

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Microbial Platform USP Development  
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### Abstract:

Microbial expression hosts, including bacteria and yeasts, serve as vital platforms for industrial production of a wide range of biomolecules including biopharmaceuticals. With a new generation of highly engineered biologics entering CMC (Chemistry, Manufacturing, and Control) development, new requirements are set to expression systems to fulfil CMC needs such as manufacturability, high product quality standards, environmental and sustainability aspects and attractive COGS (cost of goods sold). At Sanofi, we are addressing these challenges by precise optimization of our microbial host organisms. We recently developed and introduced new CRISPR gene editing toolkits for *E. coli* and *K. phaffii* that allow tailoring the genome specifically to address challenges in CMC development. Such targeted genome modifications enable both general improvements to reduce process-related risks, as well as harnessing synthetic biology to introduce entirely new strain capabilities and features. Nevertheless, the intricate process of identifying production strains that meet the diverse requirements poses a challenge for strain development, typically demanding efficient workflows to screen and select for strain showing the required profile in conditions representative for large-scale manufacturing. Therefore, we combine highly efficient gene-editing toolkits with automation-supported strain screening. This enables iterative design-build-test-learn cycles of genome editing, clone selection and performance testing under process-like conditions. These innovations dramatically enhance our capabilities to generate microbial host strains, which leverage the power of synthetic biology for biopharmaceutical innovation and enable the robust, safe production of next-generation optimized biologics. We will present selected examples on how new technologies paving the way to introduce next generation microbial cell factories to produce biologics.

### Short Biographies:

Thomas Sauer is heading the Microbial Platform within Sanofi's Global CMC development. In this function he is accountable for the process development of next generation microbially expressed Biologics like NANOBODY® and SYNTHORIN™ molecules.

Thomas has more than 30 years of experience in different areas of biotechnology. Coming from a strong background in physiology and bioprocess engineering, he took key functions in Sanofi's large investments programs for insulins and monoclonal antibodies, was part of the Genzyme industrial integration team and more recently significantly contributed to the design and development of the company into biologics. Thomas is actively engaged in biopharmaceutical industry peer groups to push our industry standards to the next level to better serve our patient's needs.

Thomas joined Sanofi more than 25 years ago holding positions with increasing responsibility in process development, tech transfer, manufacturing, industrialization and as head of industrial product management for specialty care. A few years ago, he moved back to R&D where he oversaw Sanofi's biologics CMC project management, before he assumed accountability to build the Microbial Platform. Prior to his career at Sanofi, he was working with Chiron Behring in vaccine development and F. Hoffmann-La Roche in vitamin research. Thomas obtained his PhD degree from the University of Bonn in Germany.

Daniel Degreif is section head in charge of Microbial Strain Engineering in Thomas' team. His group is focused on the development of commercially viable strains both with yeast and bacterial strains. Daniel joined Sanofi in 2018. He earned his Master and PhD degree at the University of Darmstadt, Germany and has performed part of his thesis in the lab of Jay Kiesling at UCB (CA, USA).