



DIG4BIO consortium at the ECCE/ECAB/CIBIQ conference.

SCIENTIFIC EVENTS & OUTREACH

1 DIG4BIO AT ECCE/ECAB/CIBIQ 2025

The DIG4BIO consortium was strongly represented at ECCE/ECAB/CIBIQ 2025, held in Lisbon from 8–10 September 2025. This major international event brought together the 15th European Congress of Chemical Engineering, the 8th European Congress of Applied Biotechnology and the 3rd Iberoamerican Congress on Chemical Engineering, creating an excellent forum for scientific exchange in chemical engineering, biotechnology and bioprocessing.



ORAL PRESENTATIONS

Lara Moller — Evaluating *Vibrio natriegens* as a new host for plasmid DNA production
Catarina Pina — Optimization of lactic acid bacteria for plasmid DNA production: A CRISPR/Cas9 approach



Round Tables

Francisco Marques — AI in (bio)chemical engineering education
Fiammetta Caccavale — Innovations in (bio)chemical engineering curriculum development and Delivery



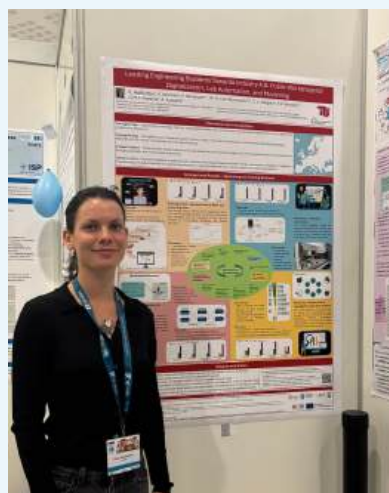
Poster Presentations

Rosa Hassfurther — Automated process development for enhanced pDNA production in *Vibrio natriegens*
Annina Kemmer — Leading engineering students towards Industry 4.0
Leonor Günderson — Mechanistic model for pDNA production through *E. coli*

DIG4BIO contributions included oral presentations, a roundtable intervention and posters from researchers across the three project beneficiaries, highlighting ongoing work on 1) plasmid DNA production in *E. coli* and *Vibrio natriegens* and CRISPR/Cas9 approaches for production in lactic acid bacteria, 2) automated process development, 3) mechanistic modelling of pDNA production and 4) AI in engineering education.

Ana Azevedo and Raquel Aires Barros also contributed to the organisation of the event, further reinforcing the project's visibility within the international scientific community.

The congress provided an excellent opportunity to disseminate DIG4BIO results, engage with researchers and industry representatives, and strengthen collaborations around digital and sustainable biomanufacturing.



DIG4BIO at the ECCE/ECAB/CIBIQ conference: (left) Rosa Hassfurther, (middle) Lara Moller, (right) Round table on AI on biochemical engineering education participants.

2 DIG4BIO AT ICB VII

DIG4BIO team members took part in the VII Integrated Continuous Biomanufacturing Conference, held in Dubrovnik, Croatia, from 5–9 October 2025. The event gathered international experts from academia and industry to discuss advances, challenges and opportunities in continuous biomanufacturing. Ana Azevedo contributed to the conference as a member of the steering committee, while Ana Rita Santos presented a poster and a poster snapshot entitled "Continuous alkaline lysis of plasmid-containing *E. coli* cells using an oscillatory flow reactor". This work explored the use of oscillatory flow reactor technology in continuous mode to enhance plasmid DNA release from bacterial cells.



DIG4BIO team at the VII ICB conference.

3 DIG4BIO AT ISPPP

DIG4BIO team members participated in the 44th International Symposium on the Separation of Proteins, Peptides and Polynucleotides (ISPPP), held in Munich, Germany, from 9–12 November 2025. The conference brought together leading researchers from academia and industry working on advanced separation technologies for a wide range of biomolecules. DIG4BIO was represented through three oral presentations by Ana Rita Santos, Ricardo Silva and Francisco Marques, covering innovative downstream processing strategies for nucleic acids and extracellular vesicles. The presented work included 3D-printed matrices for steric exclusion chromatography of plasmid DNA, single-step extracellular vesicle isolation using steric exclusion chromatography, and shRNA precipitation strategies for sustainable applications.



4 EUROPEAN RESEARCHERS' NIGHT

The European Researchers' Night has become one of DIG4BIO's flagship outreach activities. In the 2025 edition, held at the Pavilhão do Conhecimento in Lisbon, consortium members engaged hundreds of visitors through interactive demonstrations illustrating how plasmid DNA is produced and how it contributes to the development of mRNA vaccines and gene therapies. Hands-on activities, including the popular LEGO vaccine factory and the interactive "Hit the Virus" game, helped communicate complex scientific concepts to audiences of all ages. The activity also highlighted the role of digital technologies in modern biomanufacturing and their potential to support the production of next-generation biopharmaceuticals.

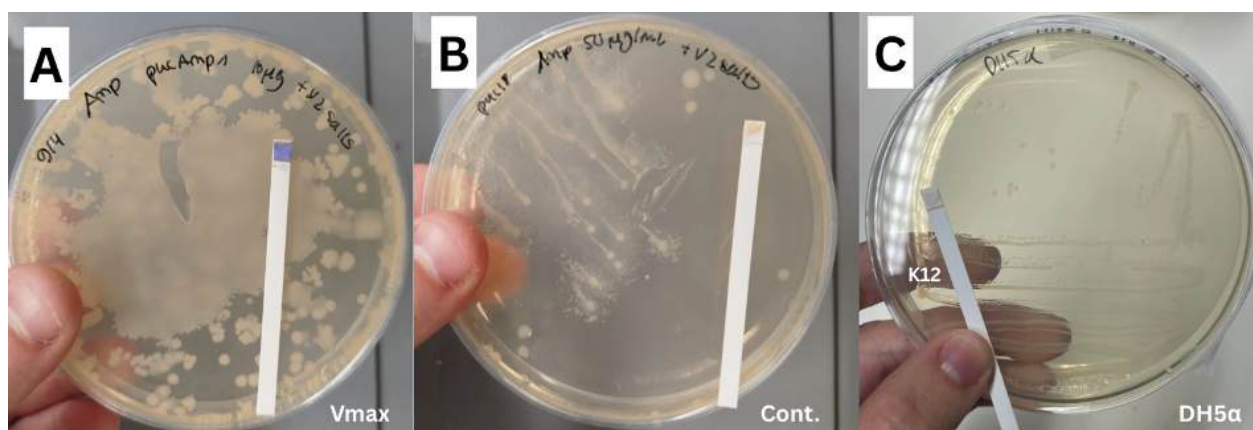


DIG4BIO team at the European's Nighth of Research at Pavilhão do Conhecimento, Lisbon.

PUBLICATIONS & ACADEMIC OUTPUTS

A rapid in-lab toolbox for the discrimination of *Vibrio natriegens* and *Escherichia coli* cultures

The DIG4BIO consortium has published a new research article in the Journal of Microbiological Methods presenting a rapid and accessible toolbox to distinguish *Vibrio natriegens* from *Escherichia coli* laboratory cultures. This work is particularly relevant for DIG4BIO, as the project is exploring plasmid DNA production not only in the classical host *Escherichia coli*, but also in *Vibrio natriegens*, a fast-growing bacterium with strong potential for biotechnology applications. Working with both organisms creates a practical need for simple and reliable tools to distinguish them in the laboratory and to detect possible cross-contamination. This research article presents a rapid in-lab toolbox combining observable culture traits with species-specific PCR. The workflow supports routine strain identification without sequencing or specialized equipment, helping to improve quality control, reproducibility, and contamination-aware process development in pDNA biomanufacturing.



Cytochrome c oxidase test on LB-V2 agar plates: *V. natriegens* Vmax (A) yields a positive result (blue strip), while both *E. coli* contaminant (B) and *E. coli* DH5α (C) are oxidase negative.



AUTHORS

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RESEARCH PAPER

Title: A rapid in-lab toolbox for the discrimination of *Vibrio natriegens* and *Escherichia coli* cultures

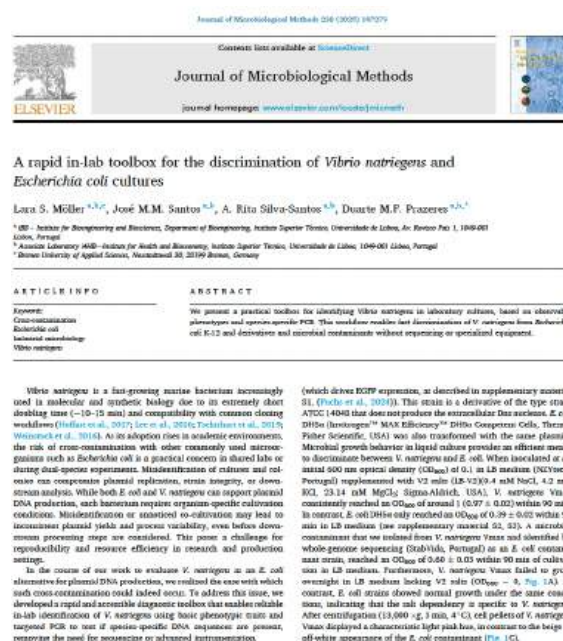
Journal: Journal of Microbiological Methods

Year: 2025

Volume: 238

Article Number: 107273

DOI: 10.1016/j.jmimet.2025.107273



MSc thesis on mechanistic modelling of pDNA production

Leonor Gundersen successfully completed her MSc thesis entitled “Mechanistic model of pDNA production through *Escherichia coli*”, developed in collaboration between IST and DTU. Her work focused on the development and analysis of a kinetic model to describe plasmid DNA production in different *E. coli* strains. By combining experimental shake flask data with model-based analysis, the thesis contributed to the establishment of a computational pipeline for model formulation, parameter estimation, identifiability, uncertainty, and sensitivity analysis. This work supports DIG4BIO’s broader goal of advancing digital tools for pDNA manufacturing and early-stage process development.



MSc Thesis in Biological Engineering

Mechanistic model of pDNA production through *Escherichia coli*



Supervisory Team

Carina Loureiro da Costa Lira Gargalo
Ana Margarida Nunes da Mata Pires de Azevedo



Examination Committee

Ana Margarida Pires Fernandes Platzgummer
Carina Loureiro da Costa Lira Gargalo
Krist V. Gernaey



Defence Date: 4 July 2025



MSc thesis on improving pDNA production in engineered *E. coli* strains

Íris Vaz de Lacerda successfully completed her MSc thesis entitled “Improving Plasmid DNA Production: Comparative Analysis of *Escherichia coli* GALG20 and MG1655 Strains”, developed at IST. Her work generated experimental data to support future kinetic modelling and digital twin development for plasmid DNA production. By comparing different *E. coli* strains under chemically defined media, the thesis showed that medium composition strongly influenced growth, acetate accumulation, pDNA yield, and plasmid quality, providing valuable insights for DIG4BIO’s digital biomanufacturing strategy.



MSc Thesis in Pharmaceutical Engineering

Improving Plasmid DNA Production: Comparative Analysis of *Escherichia coli* GALG20 and MG1655 Strains



Supervisory Team

Sofia de Oliveira Dias Duarte
Ana Margarida Nunes da Mata Pires de Azevedo



Examination Committee

Carla da Conceição Caramujo Rocha de Carvalho
Sofia de Oliveira Dias Duarte
Carina Loureiro da Costa Lira Gargalo
Cláudia Patrícia Almeida Alves



Defence Date: 4 December 2025

TRAINING EVENTS

1 AN INTRODUCTION TO AUTOMATED RESEARCH

This in-person training school aimed to introduce participants to the core principles of automated research in robotic laboratories, focusing on hypothesis-driven experimental design, high-throughput bioprocess execution, automation systems, and data-driven scientific workflows. Participants were guided through the full research pipeline, from hypothesis generation and experimental planning to robotic execution, process monitoring, laboratory analytics, and interpretation of results using the TU Berlin high-throughput infrastructure.



6 participants



Day 1: Stating a hypothesis.
Day 2: Experimental preparation and SOP finalization.
Day 3: High-throughput experimental execution.
Day 4: Experimental outcome evaluation.



Peter Neubauer (TUB, Kiwi-Biolab)
Nicolas Cruz (TUB, Kiwi-Biolab)
Rosa Haßfurth (TUB, Kiwi-Biolab)
Annina Kemmer (TUB, Kiwi-Biolab)



The program combined theoretical sessions, laboratory tours, SOP discussions, script preparation for automated platforms, hands-on cultivation of *Vibrio natriegens* in the 2mag system, and post-experimental data analysis.

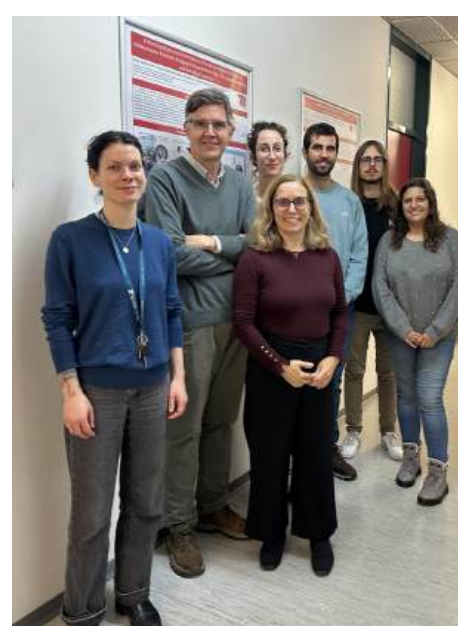
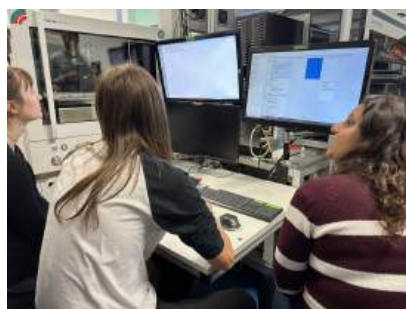


Photo gallery showing some of the hands-on activities performed during this training school.

2 DESIGN AND OPERATION OF EXPERIMENTS IN PARALLEL SYSTEMS

This 2-day online workshop held on 1-2 October 2025 provided a comprehensive overview of the design and operation of experiments in parallel systems and their application in high-throughput bioprocess development. Participants were introduced to open-source computational tools, workflow management systems, and statistical methodologies for the design, optimization, and execution of experimental campaigns in automated parallel laboratory environments. Through theoretical sessions, guided practical exercises, and collaborative design-space evaluation using tools such as Google Colab and pyDOE, participants gained practical understanding of how digital tools can support the planning, optimization, and operation of robust high-throughput experimental workflows.



22 participants



Day 1: Introduction to design for high-throughput experiments

Day 2: Definition of design space for joint high-throughput experiments.



Nicolas Cruz (TUB, Kiwi-Biolab)
Rosa Haßfurth (TUB, Kiwi-Biolab)
Annina Kemmer (TUB, Kiwi-Biolab)
Christoph Lange (TUB, Kiwi-Biolab)
Martin Luna (INGAR)



3 CODING4BIO

DIG4BIO expanded its digital training portfolio through the international Coding4Bio Kaggle competition, a large-scale gamified learning initiative focused on Raman spectroscopy transfer learning for bioprocess monitoring. Running from June to September 2025, this challenge invited global participants to develop machine learning models capable of predicting glucose, acetate, and magnesium sulfate concentrations from more than 2,500 Raman spectra collected across eight different spectrometers, while addressing the real-world challenge of cross-instrument generalization. With 172 participants worldwide, Coding4Bio successfully introduced students and researchers to advanced AI applications in biotechnology, spectroscopy, and instrument-agnostic analytics. Beyond its educational value, this competition demonstrated the potential of open innovation and data-driven challenges to stimulate methodological advances in bioprocess monitoring and data-driven biomanufacturing.

Dig4Bio Raman Transfer Learning Challenge

Predict analyte concentrations from Raman spectra across different set-ups using machine learning and transfer learning techniques.



4 GRANT WRITING FOR RESEARCHERS

DIG4BIO organised the 5-day online workshop “Grant Writing for Researchers” as part of WP2 activities. The workshop provided practical training on how to prepare competitive grant proposals, with a focus on proposal structure, alignment with funding priorities, and clear communication of research ideas. Through interactive sessions and hands-on exercises, participants strengthened their grant writing skills and gained practical tools to improve future funding applications.



88 participants



Mariana Santa-Marta, Sofia Martins, Marta Candeias (IST/IST-ID)



virtual



14 – 18 July 2025

5 BUDGET AND LEGAL ASPECTS OF HORIZON EUROPE

As part of WP2 activities, DIG4BIO organised the online workshop “Budget and Legal Aspects of Horizon Europe”, focused on key financial and legal principles for managing European-funded projects. The session provided participants with practical guidance on Horizon Europe budget preparation, eligible and non-eligible costs, personnel costs, subcontracting, financial reporting, grant agreement obligations, and supporting documentation. The workshop also addressed common legal and administrative challenges in Horizon Europe projects, helping researchers and support staff better understand the requirements for compliant and efficient project implementation.



24 participants



Sofia Martins (IST-ID), Charles Lawrence (DTU) and Sara Correia (IT)



virtual



14 – 18 July 2025

6 PROJECT MANAGEMENT TOOLS

DIG4BIO organised the hybrid workshop “Project Management Tools”, held on 9 and 14 October 2025 as part of WP2. The two-day workshop introduced key project management methodologies, including PMI and the EU-specific PM² approach, with a focus on their application to EU-funded projects. Participants explored practical aspects of EU project implementation, including deliverables and milestones, reporting periods, project management plans, risk management, communication and dissemination, IP management, and financial reporting. The workshop also addressed common challenges and frequent mistakes in EU project management through practical examples and discussion.



27 participants



Philipp Wasserscheidt (TUB), Margarida Suárez (IST), Catarina Madeira (ColabTrials)



hybrid



9 & 14 October 2025

7 PROJECT MANAGEMENT MADE SIMPLE

Also as part of WP2 activities, DIG4BIO organised the online workshop “Project Management Made Simple” on 21 November 2025. The session provided Early-Stage Researchers and Experienced Researchers with an accessible introduction to project management procedures, key steps, and terminology. The workshop was designed to strengthen collaboration between researchers and Research Managers, while enhancing the operational project-management skills of researchers and support staff involved in Horizon Europe and other competitive funding schemes. It focused specifically on the post-award phase, addressing what happens after a project is approved and how to ensure a smooth transition from grant agreement preparation to effective project implementation.



18 participants



Margarida Suárez (IST), Sofia Duarte (IST-ID), Teresa Esteves (IST-ID)



virtual



21 November 2025

SHORT VISIT TO DTU

Marta Candeias and Rute Martins visited DTU from 19 to 20 November 2025 for a two-day staff exchange under the DIG4BIO project, strengthening collaboration between IST and DTU in research support and Horizon Europe management. The programme included meetings with DTU’s Research Office and support units, covering research support structures, pre- and post-award processes, strategic funding intelligence, Open Science, research integrity, financial workflows, and support for European proposals. This knowledge-exchange visit contributed to strengthening research management capacity within DIG4BIO and reinforced the shared commitment to building efficient and internationally competitive research support ecosystems.



Marta Candeias, IST-ID
 Rute Martins, IST-ID
 Charles Lawrence, DTU
 Lone Falsig Hansen, DTU
 Mette Lang, DTU
 Johannes Lundin Brockdorff, DTU
 Jitka Hansen, DTU
 Simon Elben Hertig, DTU
 Leah Katherine Strauss, DTU
 Ditte Rytter Peasah Krofa, DTU
 Emily Riley, DTU
 Beatrice Waldorff, DTU
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