Bioindustry 4.0 brings smart digital solutions to the European biotech industry

BIOINDUSTRY 4.0 will enable academia and industry to jointly de-risk biomanufacturing processes by developing advanced digital tools and technologies that offer smart design and control options – increasing the European biotech sector's competitiveness and attractiveness at global scale.

Biotechnology is a powerful tool that can revolutionise our economies, societies and daily lives, while addressing critical global challenges such as climate change. Industrial biotechnology is essential because it can produce fuels, cosmetics, pharmaceuticals, and vital materials (such as bioplastics) biologically rather than chemically, benefiting the environment and helping Europe achieve its goal of a carbon-neutral economy by 2050. With a gross value-added contribution of €34.5 billion and support for 230,000 jobs in 2018 alone, it is estimated that by 2030, biotech will boost the EU economy by up to €100 billion and create one million jobs.

Industrial biotechnology uses the power of microorganisms to convert biomass into applications. Unlike conventional chemical processes, the design and control of bioprocesses is complicated by the need to consider the behaviour of the biological component, in addition to physical and chemical phenomena. Recent developments in computational sciences and the fast growth of artificial intelligence provides opportunities to tackle this complexity. However, the prerequisite for this is data. To fulfil this need and spur the industry towards the adoption of advanced digital solutions fast enough for biotechnology to reach its full potential – fulfilling the fourth industrial revolution (also referred to as Industry 4.0) – professionals from a variety of academic and industrial sectors must join forces. In doing so, it will be possible to mobilize those leading technologies and infrastructures capable of providing the sustainable and smart solutions needed for EU biotech to thrive.

This is why Bioindustry 4.0 brings together 25 participating organisations from across 10 European countries, including 6 leading European research infrastructures (RIs) and key players in the biotech industry, to develop new services enabling the use of artificial intelligence and other digital technologies (digital twin and cloud technologies) in industrial biotechnology. These services will improve both (bio)process design and control throughout the R&D pipeline, making biotech processes faster, cheaper, and more sustainable. The aim is to create a more efficient and integrated system for the development of new bioproducts and optimisation of existing processes, as well as increasing the competitiveness and attractiveness of the European economy on a global scale.

Michael O'Donohue, project coordinator and director of the research infrastructure IBISBA, commented: "*BIOINDUSTRY 4.0 brings together the cutting-edge expertise of a multidisciplinary project team to focus on one of the crucial technology challenges related to the circular bioeconomy. Europe's future competitiveness in*

this area partly relies on a flourishing biomanufacturing sector". "*Enabling access to high-quality digital technologies such as computational workflows and data management tools will stimulate innovation in the European biotech sector*," added Andrew Smith, Head of External Relations of the research infrastructure ELIXIR.

At a glance:

- Bioindustry 4.0 is a Horizon Europe project launched in 2023 and scheduled to run for the next 4 years, having received 10 million Euros funding.
- The project is led and coordinated by the French National Research Institute for Agriculture, Food and Environment (INRAE) and boasts the participation of 25 public and private participating organisations from 10 European countries: France (INRAE, Bioeconomy for Change, INRAE Transfert, INSAT), Germany (DSMZ, UNI-KOBLENZ-LANDAU, LifeGlimmer, RWTH Aachen, Fraunhofer), Greece (ATHENA RC, SYMBIOLABS, NTUA), Spain (UVEG, UAB), the Netherlands (WU, KNAW), Finland (VTT, Timegate Instruments OY), Austria (BBMRI-ERIC, Biofaction), Italy (CNR), Belgium (VITO), and the UK (Siemens PSE, UNIMAN, UNINCL).
- Together the project partners represent 6 of Europe's key research infrastructures: IBISBA, ELIXIR, BBMRI, MIRRI, DSMZ and GAIA-X.
- The project's aim is to support the adoption of advanced digital tools by European biotech sector; specific goals include innovative measurement devices for online monitoring, data management tools for data quality, and AI learning to support bioprocess design.

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