The ROBUSTOO Newsletter
With the contribution of:
Consorzio Italbiotec

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OXIDATIVE BIOCATALYST BULLETIN

Looking back, moving forward: ROBUSTOO's journey so far

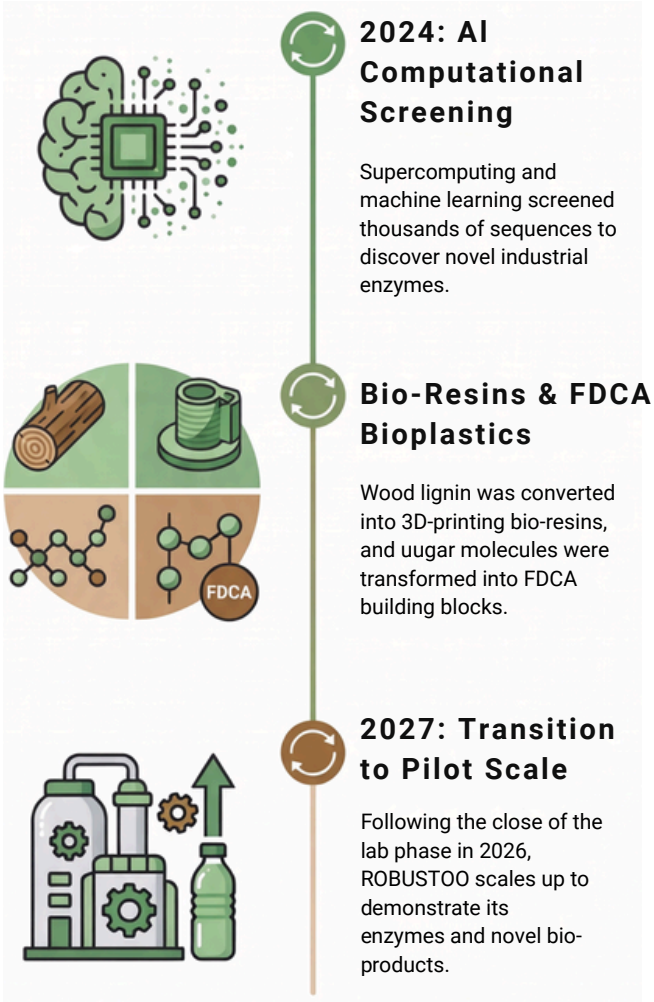
Welcome to the seventh issue of the ROBUSTOO newsletter!

Dear readers,

One year ago, on 22 October 2025, we published the first editorial of this newsletter. Since then, we have taken you inside the science of **ROBUSTOO**, from the role of enzymes in Europe's green transition to the protein engineering behind laccases, HMFOs and UPOs. Now that the project has almost concluded its third year, we want to pause, look back at the road travelled, and share what lies ahead. This time, with fewer formulas and more news.

Where we stand

Since January 2024, the ten partners of our consortium have been working along a shared path. In the first 18 months, supercomputing and machine learning tools screened thousands of natural sequences to find promising new enzymes, while partners tested bacteria, yeasts and fungi as microbial "factories" to produce them. The enzymes were then made tougher to withstand industrial conditions and tested on real raw materials: lignin from wood, fatty acids and vitamins, and sugar-derived molecules. Over the past year, the work has moved closer to real applications. The best enzymes for each process are being selected and their production is being further improved. Lignin from wood has been turned into bio-based resins, recently tested in the first 3D printing trials, while a new two-enzyme route converts most of a sugar-derived molecule into FDCA, a building block for bioplastics. The first scale-up tests for high-value compounds, such as vitamin derivatives, are underway, and data collection has started to assess the environmental and economic sustainability of the new processes. By the end of 2026, the laboratory phase will close, and in 2027 ROBUSTOO will move to pilot scale to demonstrate its enzymes and new bio-based products.



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News from the consortium

The past few months have been busy. **CSIC-CIB** and **InnoSyn** represented ROBUSTOO at **OxiZymes 2026** in Bochum (Germany), with a poster on the project's research activities and two oral presentations: *Screening* and *Engineering of FAD-Dependent Oxidases for FDCA Production from HMF* and *Optimisation, Scale-up and Evaluation of Oxidative Enzyme Reactions*.
Italbiotec also took part in **IFIB2026** in Rome, where key stakeholders from industry, research and innovation gathered to discuss the latest developments, opportunities and challenges in the bioeconomy and industrial biotechnology. In July, the consortium met in Groningen (NL) for its 30-month progress meeting, hosted by Gecco.



OxyZymes,2026, Bochum



IFIB, 2026, Rome

Our results so far

ROBUSTOO's work is already producing tangible outputs. Three scientific articles have been published so far, sharing the project's findings with the research community.

1. *Deciphering the distribution and types of Multicopper oxidases in Basidiomycota fungi* (Link)
2. *The role of bio-based constituents in additive manufacturing with thermosetting polymers and vitrimers: a review* (Link)
3. *Immobilized Hydroxymethylfurfural Oxidase Enables Robust Biocatalytic Production of 2,5-Furandicarboxylic Acid from Crude 5-Hydroxymethylfurfural* (Link)

Alongside the science, the consortium released its first policy brief, "Regulatory Barriers and Recommendations for Enzymes and Microbial Hosts in Industrial Biotechnology", which examines the regulatory hurdles that can slow the uptake of industrial enzymes and microbial production hosts in Europe and suggests how to address them. A second, more comprehensive edition will follow at the end of the project, summarising all the evidence generated along the way to support a final set of recommendations. These and other project outcomes are available on our website.
See you in the next issue with more insights!

In case you missed them

All our previous editorials are available on LinkedIn and on our website, where you can also download them.

- *Enzymes at the heart of Europe's green transition*
- *From Enzymes to Bio-based Value Chains*
- *Building the Next Generation of Industrial Enzymes*
- *More value from lignin with enzyme-based technologies*
- *Sugar's hidden potential: engineering robust HMFOs for next-generation biorefineries*
- *UPOs: small enzymes, big chemistry*

See you in the next issue with more insights!

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