ROBUSTOO: Robust industrial biocatalysts with peroxygenase, phenol-oxidase or furfuryl-oxidase activities from bacterial

Description

Industrial Biotechnology is key to maintain Europe's leading position in the global bio-based market and help the transition to a green and circular economy. Fostering investment in innovative technologies like those to be demonstrated in ROBUSTOO and supporting biotech SMEs will contribute to this endeavour. We aim to capitalise the results from previous EU projects that showed the applicability of three oxidative enzymes – non-specific peroxygenase (UPO), laccase and hydroxymethylfurfural oxidase (HMFO) – to provide new and greener production of chemicals and materials of biological origin.

To exploit their full industrial potential, we will undertake the large-scale production of the recombinant enzymes and the development of new robust variants adapted to the demanding operating conditions. We will benefit from the most advanced technologies and know-how of the ROBUSTOO consortium to conduct computational enzyme bioprospecting and design (BSC), develop microbial strains for industrial enzyme production and engineer improved enzymes, followed by optimisation and pilot demonstration of target enzymatic transformations by biotech SMEs (Metgen, Gecco, bisy, and InnoSyn), and research/technological centres (CIB, UAB, IRNAS, and FCBA), concluding with environmental & techno-economical assessment and exploitation of the developed technologies (ITB).

The new enzymes and bio-transformations will represent biotechnology breakthrough solutions for:

- Conversion of industrial lignins modified by laccase into 100% bio-basedresins as adhesives of wood panels and 3D printing additives, increasing the commercial value of existing lignin products
- Production of intermediate and fine chemicals difficult to achieve by chemical synthesis through regio-/stereo-selective oxygenationsof lipophilic

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