

Photoactivation process of copper-radical oxidase enzymes (CROs)

PATENT EP20186971

BIOPROCESSES – WHITE BIOTECHNOLOGIES – ENVIRONMENT



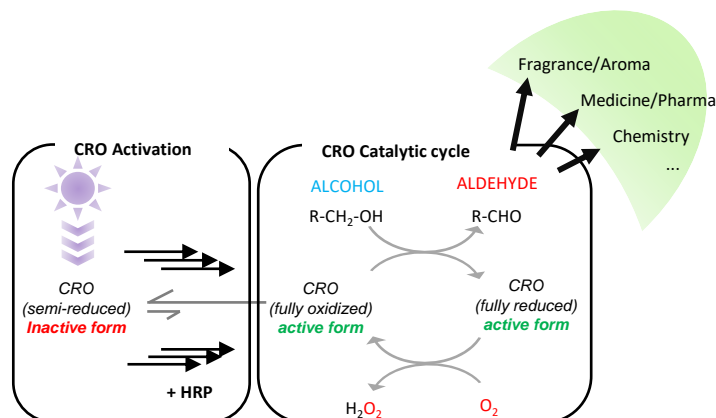
The BBF (Biodiversité et Biotechnologie Fongiques) team in collaboration with the iSm2 (Institut des Sciences Moléculaires de Marseille) team has developed a new activation process of copper-radical oxidases (CRO). These enzymes enabled to obtain **aldehydes** (products with multiple industrial applications) and the reusable **coproduct** H_2O_2 , in an environmentally friendly context, at a low cost and with an innovative and non-invasive approach.

Description of the invention

Copper-radical oxidases (CROs) can selectively catalyse a wide variety of oxidation reactions, including the oxidation of various classes of alcohols to their corresponding aldehydes, products with multiple industrial applications. CROs are competitive biocatalytic tools for the **production of aldehydes**, in the sense that they do not need expensive organic co-factors such as NAD or FAD and merely rely on the availability of O_2 . However, they do need to be activated since CROs are mainly produced under inactive form. This activation step is usually performed by the addition of Horseradish Peroxidase (HRP) or other oxidants.

Research teams have demonstrated that CROs can be **activated**, and thus controlled, by **UV-light** instead of HRP, alleviating thereby the need to add expensive and unstable exogenous redox activators.

Furthermore, all CROs also produce a common **coproduct**, namely H_2O_2 (via the reduction of O_2), which at present is not upgraded but could be used in cascade synthesis.



ADVANTAGES

A process :

- At a low cost
- Environmentally friendly
- Easy-to-implement
- Easily and non-intrusively controlled by photo-control
- Which does not need the use of exogenous activator

KEYWORDS : enzyme, copper-radical oxidases, photoactivation, aldehydes

APPLICATIONS

The first potential application is the **biocatalytic production of aldehydes** that are molecules used in many fields of application:

- fragrances and flavours by their olfactory properties ;
- in synthetic chemistry for the manufacture of bio-based materials such as bioplastics or paints ;
- for the functionalisation of biomaterials (biopolymers) ;
- in the medical field.

PARTNERSHIP / LICENSING

Collaboration / License on patent or license option agreement with an R&D validation program

TRL 1 2 3 4 5 6 7 8 9

STAGE OF DEVELOPMENT: The research team has successfully validated the proof of concept. They offer now collaboration with an industrial partner to jointly accelerate the maturation of the technology and develop the process under industrial conditions specific to a field of activity.

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