

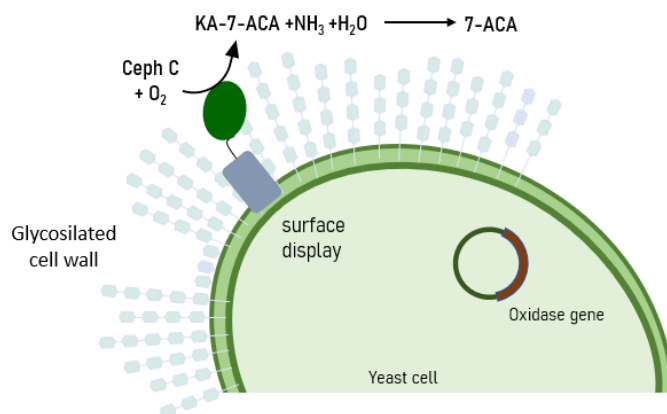
Yeast Surface Catalysis (YSC) Platform

Cephalosporin, Antibiotic production, 7-ACA, Single-pot conversion, Immobilisation, Surface Display

DESCRIPTION OF TECHNOLOGY

This technology provides D-Amino Acid Oxidase immobilized via surface display on yeast cells. It can be easily produced and used for the production of the Cephalosporin antibiotics precursor 7-ACA. No undesirable H_2O_2 is produced, and a single-pot conversion is possible saving valuable process time and production costs.

7-aminocephalosporanic acid (7-ACA) is a key precursor in the production of Cephalosporin antibiotics. In the traditional process D-Amino Acid Oxidase (DAAO) deaminates Cephalosporin C (Ceph C) under production of H_2O_2 and α -ketoadipyl-7-ACA (KA-7-ACA). H_2O_2 causes the degradation of KA-7-ACA into glutaryl 7-ACA (GL-7-ACA). GL-7-ACA Acylase (GA) transforms both compounds into 7-ACA. The main drawbacks of this process are that H_2O_2 causes undesirable byproducts and inactivates the enzymes, and a 2-3 step process is necessary.



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The D-Amino Acid Oxidase is immobilized on the surface of a yeast cell via surface display (SD). The modified yeast cells can be easily produced in large amounts and with high oxidase activity. Cells can be used for the conversion of Ceph C to 7-ACA. The yeast surface thereby catches the formed H_2O_2 and hydrolyzes it with its natural catalase. No H_2O_2 production can be detected in the process. The enzymes are stably immobilized on the cells and can easily be separated from the reaction mixture.

AT A GLANCE ...

USP

- Single-pot conversion of cephalosporin C to 7-aminocephalosporanic acid
- Instant H_2O_2 degradation by native yeast catalase
- Direct expression of enzyme in, and immediate immobilization on the surface during yeast fermentation
- Simple purification of SD cells by filtration of fermentation broth
- Stabilization of SD enzyme through immobilization
- Co-immobilization of Glutaryl 7-ACA Acylase possible

Development Status

- Proof of Concept
- Developed in cooperation with DirectSens GmbH

Patent Status

Priority application filed 2020 with the European Patent Office and PCT application 2021.

ADVANTAGES OVER THE PRIOR ART

- Single-pot conversion of cephalosporin C to 7-aminocephalosporanic acid
- Instant H₂O₂ degradation by native yeast catalase.
 - No formation of GL-7-ACA
 - No catalase or H₂O₂ addition necessary
 - No enzyme activity loss due to oxidation by H₂O₂
- Direct expression of enzyme in, and immediate immobilization on the surface during yeast fermentation.
- Simple purification of SD cells by filtration of fermentation broth
- Stabilization of SD enzyme through immobilization
- Co-immobilization of Glutaryl 7-ACA Acylase possible

STATE OF PRODUCT DEVELOPMENT

- Proof of Concept
- Developed in cooperation with DirectSens GmbH

COOPERATION OPPORTUNITIES

On behalf of University of Natural Resources and Life Sciences, Vienna (BOKU); TransMIT GmbH is looking for collaboration partners and license Agreements (exclusive/non-exclusive) worldwide.

A TECHNOLOGY OF



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