TRIACETIC ACID LACTONE PRODUCTION BY THIOLASE BKTB FROM BURKHOLDERIA

Tech ID: 32953 / UC Case 2023-032-0

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO 2024/107539	05/23/2024	2023-032

BRIEF DESCRIPTION

BACKGROUND:

Triacetic acid lactone (TAL) is an important building block for a diverse set of chemicals and plastic polymers. Native pathways using microbes can serve as an environmentally-friendly and renewable source of TAL production. However, microbial production of TAL is limited to a few platform microbes. Further, native pathways using platform microbes such as *E. coli* show toxicity to TAL, which reduces its production. Therefore, there is a need for thiolases that provide higher yield and can be used in additional microorganisms.

TECHNOLOGY OVERVIEW:

Researchers at the Joint BioEnergy Institute (JBEI) have discovered novel thiolases for production of Triacetic acid lactone (TAL) via platform microorganisms. The discovered thiolases achieved production of 2.77 g/L of TAL when expressed in *E. coli,* which is the highest titer production reported using *E. coli*.

The discovered thiolases were identified from homologs of *Cupriavidus necator,* and their TAL production was verified by *in vitro* and *in vivo* testing. Unlike the energetically expensive native TAL-producing enzyme 2-pyrone synthase, the discovered thiolases utilize acetyl-CoA instead of malonyl-CoA as an extension unit.

The *Burkholderia* thiolases identified by the researchers can be engineered to further boost production of TAL in existing platform microorganisms such as *E. coli*, as well as other microorganisms such as yeasts.

DEVELOPMENT STAGE:

Validated system

SUGGESTED USES

- Production of triacetic acid lactone (TAL), a precursor for commodity chemicals, using carbon feedstocks in industrial fields
- TAL is a precursor for many pharmaceutical drugs and an alternative to petroleum for production of plastic polymers

ADVANTAGES

Superior titer, rate, and yield, and titer production of TAL than current thiolases and enzymes

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

- **Materials & Chemicals**
  - Biological
  - Chemicals
  - Polymers
- **Medical**
  - Therapeutics
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