DELTA LACTONES THROUGH ENGINEERED PKSS

Tech ID: 31941 / UC Case 2020-122-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

The biological production of complex chemical building blocks offers a sustainable alternative to traditional synthetic chemistry. UC Berkeley researchers have engineered the lipomycin polyketide synthase—a modular biological assembly line—to produce triketide lactones. The team achieved this by performing precise genetic swaps within the synthase modules. Specifically, they executed an acyltransferase swap in the first module and a reductive loop swap in the second module using specialized genetic components. By further refining these swaps, the researchers created a programmable platform capable of producing non-methylated delta lactones. This engineering approach allows for the "plug-and-play" synthesis of specific lactone structures, which are valuable components in various industrial and pharmaceutical applications.

SUGGESTED USES

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Flavor and Fragrance Industry: Producing bio-based delta lactones, which are key aromatic components in food products and perfumes.

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Pharmaceutical Manufacturing: Generating complex chiral intermediates and precursors for the synthesis of new antibiotics or anti-cancer drugs.

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Sustainable Specialty Chemicals: Creating renewable alternatives to petroleum-derived lactones for use in industrial coatings and solvents.

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Bio-Polymers: Developing monomer building blocks for the production of biodegradable plastics and advanced materials.

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Agricultural Chemistry: Synthesizing natural-product-like compounds for use in environmentally friendly pesticides or pheromone traps.

ADVANTAGES

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Programmable Synthesis: The modular nature of the engineered polyketide synthases allows for the specific targeting and production of desired chemical structures.

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Environmentally Friendly: Utilizes biological fermentation processes instead of harsh chemical reagents or high-energy petrochemical methods.

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OTHER INFORMATION

CATEGORIZED AS

» **Biotechnology**

» Industrial/ Energy

» Other

» **Engineering**

» Engineering

» **Materials & Chemicals**

» Chemicals

» **Research Tools**

» Expression System

RELATED CASES

2020-122-0

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High Stereo-Precision: Biological catalysts naturally produce highly specific mirror-image forms of molecules, which is often difficult to achieve in a lab.

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Reduced Waste: Engineering the metabolic pathway within a cell reduces the number of purification steps and chemical byproducts associated with traditional synthesis.

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Scalable Production: The platform can be integrated into standard microbial fermentation workflows for large-scale industrial manufacturing.

RELATED MATERIALS

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