WiSys Ref: T190021

Engineered Bacterial Strain and Method of Use for One-Pot Vitamin C Synthesis

Background

More than 200,000 tons of vitamin C are produced annually, part of a vitamin supplement industry that tops $30 billion each year. In the 1930's the Reichstein process revolutionized industrial production of synthetic Vitamin C. For decades, this process was the gold standard for production. However, efforts to improve efficiency, decrease cost, and reduce the use of toxic chemicals led to the development of a two-step microbial fermentation process. The first step in this industrial process is the conversion of a D-sorbitol substrate to L-sorbose, and this is catalyzed by the polyol dehydrogenase (SldBA) of the bacterium G. *oxydans*. L-Sorbose is then transferred to a second fermenter where it is converted to 2-ketogulonic acid by *K. vulgare*; the resulting 2-keto-gulonic acid is then chemically converted to vitamin C. While this process is now extensively used for production, these steps take place in two separate spaces at distinct times, providing still a greater opportunity for a more efficient and less expensive process.

Technology

A researcher from the University of Wisconsin – La Crosse has created a single, engineered bacterial strain capable of oxidizing D-sorbitol to 2-ketogulonic acid, thus reducing the commercial fermentation process from a 2-pot to a 1-pot synthesis.

Research and Development Status

Laboratory tests are underway to establish and confirm the efficiency of Vitamin C synthesis in this system. Yield calculations will be made with the expectation of high conversion rates. Additionally, efforts are ongoing to enhance the robustness of this bacterial strain. WiSys is seeking a strategic partner interested in providing a route to market for the commercialization and use of this engineered organism.

Commercial Applications & Key Technical Features

T190021 provides a new platform for the synthesis of one of the most important vitamins, a platform that will support lower cost synthesis and may enable successful production of this vital compound domestically.

Key performance features of a system incorporating the engineered strain include:

- Allows one-pot synthesis of Vitamin C reducing equipment needs
- Exisiting fermentation equipment can be used with this system
- Limits the biological steps involved with Vitamin C synthesis, reducing risk
- May reduce the use of energy, solvent inputs, and production waste

Intellectual Property

A U.S. provisional patent application has been filed for this invention. For more information, please contact our licensing team at licensing@wisys.org.