Talk

Biotechnological production based on bacterial biofilms

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ABSTRACT

Genetic studies for glycerol conversion to bacterial cellulose

Biofilms can be described as microbial communities embedded in an extracellular polymeric matrix that attach to both biological and non-biological surfaces. Biofilms are considered an evolutive adaptation to adverse environments that allows bacteria to outlast. This feature makes biofilm forming bacteria attractive for the industrial production of toxic compounds, for example indigo dye used for jeans staining.
In this Master degree Final Project, we are going to research the ability of Pseudomonas putida KT2442, a well-known biofilm producer, for the biosynthesis of cellulose (one of the main component of biofilm matrix) through the utilization of glycerol, a by-product from biodiesel industry as carbon source. Previous studies have shown that P. putida displays a prolonged lag phase when glycerol is the only carbon source in the growth media. This long lag phase is mediated by GlpR, the negative repressor of glp gene cluster2. The glp operon encodes for GlpF facilitator, which allows glycerol to diffuse inside the cell; GlpK, the glycerol kinase that phosphorylates glycerol to glycerol-3-phosphate; and GlpD, a glycerol-3-phosphate (G3P) dehydrogenase that transform G3P into dihydroxyacetone-phosphate. Therefore, this Master Degree Final Project has two main objectives: 1) Reduce the P. putida KT2442 glycerol growth lag phase through the deletion of glpR gen by homologous recombination; and 2) the deletion of exopolysaccharides genes of biofilm matrix, in order to only produce cellulose. This is an example of grey biotechnology and white biotechnology, because of the elimination of glycerol which is an environmental pollutant and the design of a process to produce a molecule of interest, respectively.

REFERENCES

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