Value-added Products from Ethanol Industry: Production of Cyanophycin from Thin Stillage

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Objective (1): Evaluate Acinetobacter sp for cyanophycin production using synthetic defined medium
Objective (2): Develop recombinant E.coli microbial system for cyanophycin production using synthetic medium
Objective (3): Develop fermentation process for cyanophycin production using thin stillage as substrate and the best strain from the above objectives

Recent Publications:


Statement of Problem:
When starting from crude oil, the synthesis of functionalities into derived bulk chemicals requires considerable amounts of energy and catalysts. The biorefinery concept is aiming at the integral use of all components of agricultural crops. In addition to the main product such as starch or oil, other side stream like stillage, which is a byproduct remaining after alcohol distillation from a fermented cereal grain mash can also has high potential to be utilized. It contains 20–30% crude protein, and it can possible be used as a substrate for microbial fermentation to produce Cyanophycin.

Cyanophycin can be produced by most cyanobacteria in nature, the polymerization reaction are catalyzed by only one enzyme –cphA. However, cyanobacteria are not suitable for large-scale production of cyanophycin because of the low polymer content and the slow growth.

It is reported that some bacteria also harbor the cphA genes, namely, Acinetobacter sp. strain ADP1 and Bordetella bronchiseptica strain RB50 and so on. The cphA genes can be expressed in several bacteria and plants. E.coli is one of the most commonly used bacterial hosts for the production of recombinant proteins. The recombinant culture has the ability to produce comparably large amounts of cyanophycin in a much shorter period of time as compared to cyanobacteria.

Current Activities:
The overall goal is to produce cyanophycin using thin stillage as substrate and the best strain of the Acinetobacter sp, or the recombinant E. coli.
Current activities include searching the existing literatures relevant the Acinetobacter sp, and the DNA recombinant technique. Laboratory experiments are being planed.