Chemical Engineering Thesis Defense

Experimentally Determined Steady State Biomass Flux Constraints for Flux Balance Analysis of the Fast-Growing Cyanobacterium Synechococcus sp. PCC 11901

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Abstract

The recently discovered fast growing cyanobacterium Synechococcus sp. PCC 11901 has high industrial potential due to its quick doubling time, ability to grow on various carbon substrates and unique metabolism. Since its discovery, little work has been done to model the metabolic pathways present in the organism. In order to accurately model such an organism, experimentally determined steady state biomass flux constraints are necessary. These constraints will influence the design of a flux balance analysis model & provide realistic restrictions on the model's outputs.

The construction of such a metabolic model will assist metabolic engineers in their genetic design. By modeling the thousands of reactions and each metabolite present in the organism, engineers can gain deep insights into the complex nature of metabolism. By designing new reaction pathways, and changing the model, metabolic engineers can use this work to predict the result of various genetic manipulations on the organism. This serves as the experimental basis for building such a model.

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