

EXECUTIVE SUMMARY [NON-CONFIDENTIAL, NON-TECHNICAL ABSTRACT FOR PUBLIC INFORMATION OR PROGRAM PROMOTION]: State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project relevant to California. Do not include proprietary or confidential information. This may be distributed before the funding decision has been finalized.

In order to improve the levels of production of a valuable by-product of a microorganism, strategies of strain improvement are employed. Metabolic engineering is the targeted redirection of carbon through non-native pathways in a cell to result in an alteration of metabolic products. The redirection requires genetic manipulation of the organism. To test the success of a genetic alteration in a microbe, the organism should be grown in a small-scale bioreactor that can simulate the industrial process. The control of the process can make or break the ability of the organism to produce a product. Mathematical models are often used to facilitate both process control and efficient strategies of genetic manipulation of a microorganism. This project will involve the development of a model for a thermophilic, methylotrophic organism that shows great potential for use as an industrial host organism. Initial experiments will be carried out including growth in a bioreactor under steady state and transient conditions. Measurements of methanol uptake, oxygen uptake and carbon dioxide evolution, as well as elemental analysis of the bacterial composition and analysis of by-product formation will be carried out. This data will be used to modify a model developed for a similar organism to describe the kinetics of *B. methanolicus*.