A web-based application for biorefinery design and evaluation of serial biomass fermentation

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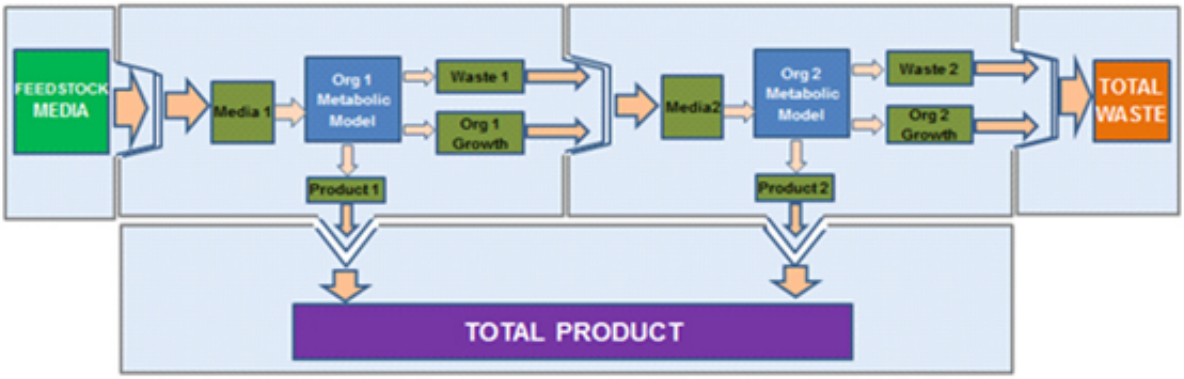

Two single computer-model modules are used by BioLEGO to characterize a two-step/two-organism fermentation process. Any two building blocks can be used, assuming they are represented in compatible model formats. The application will support more organisms over time and will also allow the exploration of genetic changes. Credit: *TECHNOLOGY*

The composition of feedstock biomass and the selection of fermenting microorganisms are critical factors in biorefinery design. Once biomass feedstock is identified, depending on local conditions, biorefinery designers need to select optimal fermenting organisms. Using organism communities has theoretical advantages but also leads to problems in the context of species competition, process design and modelling, in turn resulting in insufficient process control.

This study presents the optimization control that is possible when using a serial fermentation approach. Using one organism after the other - in serial fermentation, rather than in a community configuration allows maximal process control, while benefiting from organism diversity to maximize feedstock conversion rates. This study introduces a freely available web-based application, BioLEGO, which provides access to computer-assisted single and two-step multiorganism fermentation process design. BioLEGO also supports the evaluation of possible biomass-to-product yields for biomass mixes or general media and recommends media changes to increase the process efficacy. BioLEGO is accessible via a simple and intuitive user interface.

BioLEGO web-based application is a living on-going project developed in Computer Science Department of Technion-Israel Institute of Technology. Authors with senior contributions for this manuscript are Dr. Zohar Yakhini representing both Computer Science Department of Technion-Israel Institute of Technology and Agilent Laboratories, and Dr. Alexander Golberg from Porter School of Environmental Studies in Tel Aviv University, Israel.

More information: Edward Vitkin, Alexander Golberg, and Zohar Yakhini, *Technology* DOI: 10.1142/S2339547815400038

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