

# Lawrence Berkeley National Laboratory

## Recent Work

### Title

Towards Automated-assembly of Biological Parts

### Permalink

<https://escholarship.org/uc/item/8gd1w8tt>

### Authors

Hillson, N. J.  
Thorne, J. W.  
Hadi, Masood Z.  
[et al.](#)

### Publication Date

2009-12-15

## **Towards Automated-assembly of Biological Parts**

N.J. Hillson\*, J.W. Thorne, M.Z. Hadi, and **J.D. Keasling**

Presenting author: \*Nathan J. Hillson – [NJHillson@lbl.gov](mailto:NJHillson@lbl.gov)

Fuels Synthesis and Technology Divisions, Joint BioEnergy Institute

The production of clean renewable biofuels from cellulosic starting material requires concerted feedstock engineering, deconstruction of plant matter into simple sugars, and microbial fermentation of the sugars into biofuel. These three efforts share significant molecular biological challenges, including the construction of large enzymatic libraries (e.g. vast collections of glycosyl transferases, cellulases, and efflux pumps), the generation of combinatorial libraries (e.g. multi-functional enzyme domain fusions; variations in copy number, promoter and ribosomal binding site strength), and the concurrent assembly of multiple biological parts (e.g. the incorporation of an entire metabolic pathway into a single target vector). With these challenges in mind, we are developing hybrid multi-part assembly methodologies and translating them to robotics-driven protocols. Given a target library to construct, our vision is that the high-throughput methodology will provide automated oligo and optimal assembly process design, and robotic control of the PCR and multi-part assembly reactions. The beneficial output of this work will include reagents and resources for, and collaborations with, members of the JBEI and larger life sciences communities, reducing the time, effort and cost of large scale cloning and assembly tasks, as well as enabling research scales otherwise not feasible without the assistance of computer-aided design tools and robotics.

This work was part of the DOE Joint BioEnergy Institute (<http://www.jbei.org>) supported by the U.S. Department of Energy, Office of Science, Office of Biological and Environmental Research, through contract DE-AC02-05CH11231 between Lawrence Berkeley National Laboratory and the U.S. Department of Energy.