

Lawrence Berkeley National Laboratory

LBL Publications

Title

Improving Biofuel Production by Using Efflux Pumps to Limit Solvent Toxicity

Permalink

<https://escholarship.org/uc/item/2kv4c91q>

Authors

Dunlop, Mary J
Hadi, Masood
Ouellet, Mario
et al.

Publication Date

2009-12-10

Improving Biofuel Production by Using Efflux Pumps to Limit Solvent Toxicity

Mary J Dunlop, Masood Hadi, Mario Ouellet, **Paul D Adams, Jay D Keasling** and Aindrila Mukhopadhyay*

Presenting author: *Aindrila Mukhopadhyay – Amukhopadhyay@lbl.gov

Fuels and Technology Divisions, JBEI, Emeryville, CA

Biofuels can be produced by microbes that break down plant matter or sugars to make fuel. However, biofuel-producing microbes are limited by the intrinsic toxicity of the solvent like biofuels they are trying to produce. The more fuel the cell produces, the more toxic the surrounding environment becomes. RND efflux pumps are a class of membrane transporters that confer resistance to a wide variety of toxins, including solvents. We focus on investigating the role of native, as well as heterologously expressed, efflux pumps in *E. coli*. Targeted studies focus on the well-characterized *E. coli* AcrAB-TolC system, and efflux pumps from solvent resistant bacteria such as *Pseudomonas putida*. Because efflux pumps are likely to be specific to certain fuel molecules and stressors, a wider range of native and heterologous efflux pump systems must be tested against different fuel compound exposure, growth conditions, and in different engineered hosts. To address our broad goal of improving solvent resistance using efflux pumps, a high-throughput approach has been initiated to create a library of expression vectors representing all efflux pumps from *E. coli* as well from other organisms known to be naturally resistant to solvents.

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.

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor the Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or the Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or the Regents of the University of California.