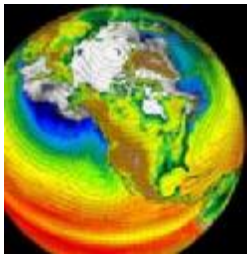
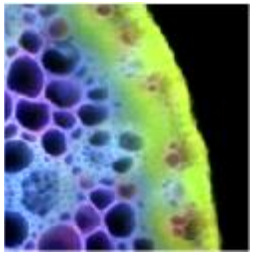



DOE Office of Biological and Environmental Research (BER)

Genomic Science Program

Biosystems Design

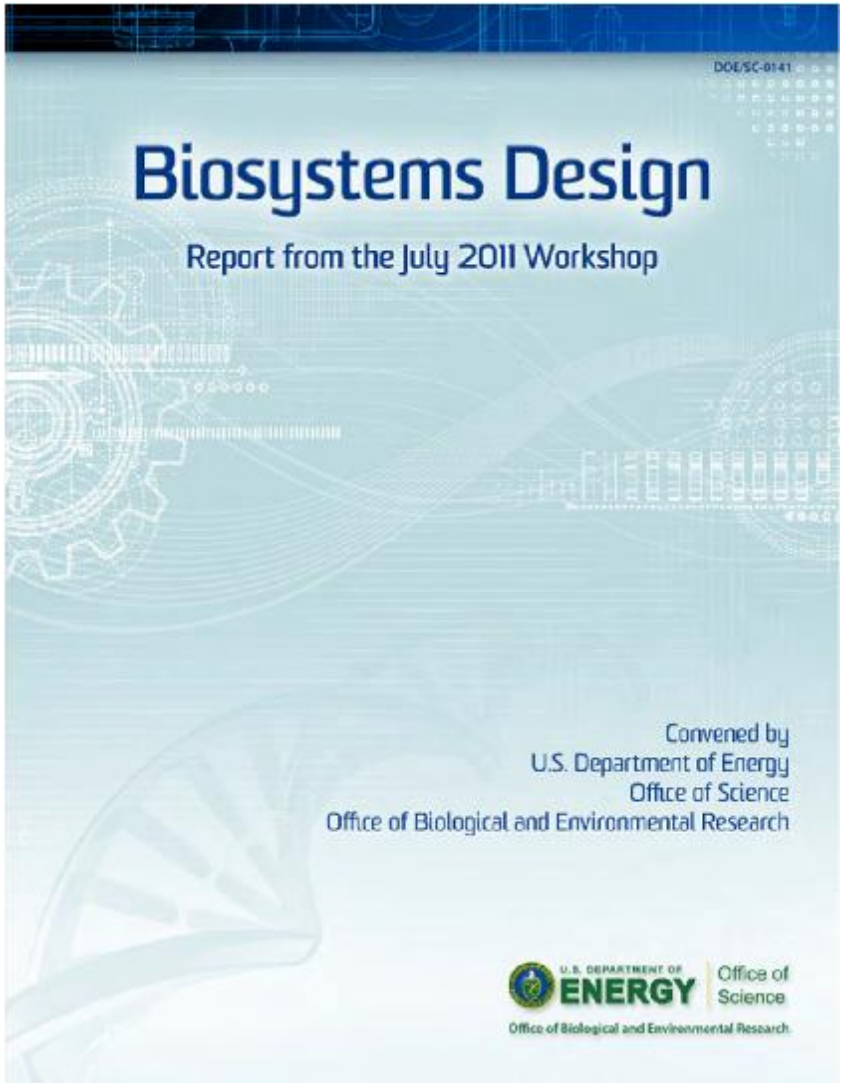
Dr. Pablo Rabinowicz
Program Manager

National Academies Forum on Synthetic Biology Meeting
October 21, 2013

Biosystems Design / Synthetic Biology

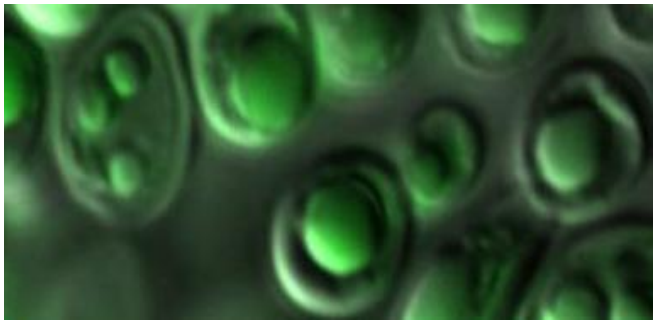
BER supports fundamental research with a mission in energy and the environment

Goal: Understand how genomic information is translated to functional capabilities, enabling the engineering and redesign of microbes and plants for sustainable biofuel production.



http://genomicscience.energy.gov/biosystemsdesign/index.shtml

Microbial Systems Design



Lead Investigator	Institution	Theme
Gregory Stephanopoulos	Massachusetts Institute of Technology	Optimizing oil production in oleaginous yeast
Ryan Gill	University of Colorado, Boulder	Genome engineering and enhanced recombineering of *E. coli*
Eric Alm	Massachusetts Institute of Technology	Engineering brown macroalgae-associated microbes to degrade cell wall carbohydrates
Andrew Allen	J.C. Venter Institute, San Diego	Genome-scale metabolic modeling and engineering of the diatom *Phaeodactylum tricornutum*
George Church	Harvard Medical School	Development of *in vivo* and *in vitro* engineering tools and resources to facilitate the manipulation and engineering of microbes important for biofuel generation

Plant Systems Design

Lead Investigator	Institution	Theme
Eduardo Blumwald	University of California, Davis	Engineering double haploid switchgrass and *Brachypodium* to facilitate breeding for drought tolerance and nutrient use efficiency in polyploid perennials
John Cushman	University of Nevada, Reno	Engineering CAM photosynthetic machinery into bioenergy crops for biofuels production in marginal environments
Clint Chapple	Purdue University	Modeling and manipulating phenylpropanoid pathway flux for bioenergy
Tom Brutnell	Donald Danforth Plant Science Center, St. Louis	Systems-level analysis of drought and density response in the model C4 grass *Setaria viridis* to engineer tolerance

- ***Office of Science Early Career Program*: Plant and microbial systems design**
- ***Bioenergy Research Centers*: Synthetic Biology efforts**

Challenges and opportunities

- **Additional platform organisms**
- **Multicellularity**
- **Microbial communities**
- **Computer modeling/design**
- **Improved DNA synthesis**
- **Biocontainment**