

Synthetic Biology 4.0

October 10-12, 2008

ORGANIZED BY THE
BioBricks Foundation

TO BE HELD AT THE



THE HONG KONG UNIVERSITY OF
SCIENCE AND TECHNOLOGY

UCSF

University of California
San Francisco

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MIT

Massachusetts
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Technology



What is Synthetic Biology?

Synthetic Biology is a new approach to engineering biology, with an emphasis on technologies to write DNA. Recent advances make the de novo chemical synthesis of long DNA polymers routine and precise. Foundational work, including the standardization of DNA-encoded parts and devices, enables them to be combined to create programs to control cells. With the development of this technology, there is a concurrent effort to address legal, social, and ethical issues.

What are the applications?

BioEnergy. Cells are being engineered to consume agricultural products and produce liquid fuels. British Petroleum and the US DoE granted \$650 million dollars for research in the San Francisco Bay Area.

Drug Production. Bacteria and yeast can be re-engineered for the low cost production of drugs. Examples include the anti-malarial drug Artemisinin and the cholesterol-lowering drug Lipitor.

Materials. Recombinant cells have been constructed that can build chemical precursors for the production of plastics and textiles, such as Bio-PDO and spider silk.

Medicine. Cells are being programmed for therapeutic purposes. Bacteria and T-cells can be rewired to circulate in the body and identify and treat diseased cells and tissues. One such research program is the NIH-funded Cell Propulsion Laboratory at UCSF.

How is this different from genetic engineering?

Synthetic Biology builds on tools that have been developed over the last 30 years. Genetic engineering has focused on the use of molecular biology to build DNA (for example, cloning and PCR) and automated sequencing to read DNA. Synthetic Biology adds the automated synthesis of DNA, the setting of standards, and the use of abstraction to simplify the design process.

Synthetic Biology 4.0

The mission of Synthetic Biology 4.0 is to bring together researchers who are working to:

- design and build biological parts, devices, and integrated biological systems
- develop technologies that enable such work
- place this scientific and engineering research within its current and future social context

The conference will be a coordinated effort between HKUST, Hong Kong University, and Chinese University. Hong Kong provides an ideal location to explore the commercialization of Synthetic Biology in Asia as well as the launching of regional research and educational programs. Further, the meeting will facilitate connections between researchers and leaders in government, industry, and civic organizations.

It is expected that Synthetic Biology 4.0 will have 500-700 participants. An emphasis will be made on securing funding to bring students from around the world to Hong Kong.



Agenda for Synthetic Biology 4.0

October 10-11. A plenary session will be held, consisting of scientific talks from global leaders in the field. There will be approximately 24 invited speakers, including several notable student teams from the 2007 iGEM competition. These talks will be held in a large auditorium at HKUST, which can hold 450 people. During this time, there will be concurrent sessions for industrial speakers and a “SciFoo” approach pioneered at Google, where participants can sign up to lead an impromptu session. There will be space for 200+ poster presentations.

October 12. This day will be devoted to legal, ethical and societal issues involving Synthetic Biology.

Campus of Hong Kong University of Science and Technology (HKUST)



The Synthetic Biology Conference Series

The Synthetic Biology x.0 series of conferences is the flagship meeting of this field. These conferences have brought together a diverse group of participants from a variety of disciplines, including the world's leaders in biological engineering, biochemistry and biophysics, molecular and cellular biology, computer science, electrical engineering, bioethics, policy and governance, and the biotech industry. Each meeting has included approximate 30 invited speakers and 400 academic and industrial participants, including Nobel Laureates.

2004 Synthetic Biology 1.0:

Massachusetts Institute of Technology (MIT)

2006 Synthetic Biology 2.0:

University of California, Berkeley

2007 Synthetic Biology 3.0:

Swiss Federal Institute of Technology (ETH)

Past sponsors of the series:





Drew Endy, PhD

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Drew Endy, PhD, is a faculty member of the Biological Engineering Department at MIT. A Civil Engineering graduate from Lehigh, Endy earned a doctorate in Biochemical Engineering from Dartmouth. His postdoctoral research was carried out at the UT-Austin and the UW-Madison. He is a director of the Molecular Sciences Institute and co-founded Codon Devices. He serves as an advisor to the Alberta Ingenuity Fund, the Arizona BioDesign Institute, the Wellcome Trust (UK), and the Rathenau Institute (Netherlands).



Christopher Voigt, PhD

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Christopher Voigt, PhD is faculty member of the Department of Pharmaceutical Chemistry at UCSF. He holds a joint appointment with the Lawrence Berkeley National Labs. He graduated from the Chemical Engineering program at the University of Michigan and earned a doctorate in Biochemistry and Biophysics from Caltech. He has been honored as a Sloan Fellow, Pew Scholar, Packard Fellow, and received the NSF CAREER award. He serves on the SAB of Amyris Biotechnologies and is a Vice President of the Joint BioEnergy Institute.



I-Ming Hsing, PhD

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I-Ming Hsing, PhD, is Director of the Bioengineering Graduate Program and the Center for Bioengineering & Biomedical Devices and a faculty member in Chemical Engineering at HKUST. Dr. Hsing is a graduate of the Chemical Engineering graduate program at MIT. He has published over 65 peer reviewed research papers and is an expert in the areas of biology, reaction engineering, electrochemistry and microfabrication. He holds guest appointments at Sichuan University, South China University of Technology, and East China Normal University.

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The BioBricks Foundation (BBF) is a not-for-profit organization founded by engineers and scientists to encourage the development and responsible use of technologies based on BioBrick™ standard DNA parts that encode basic biological functions.

The BioBricks Foundation's goals are:

- to develop and implement legal strategies to ensure that standard biological parts remain freely available to the public
- to encourage the development of codes of standard practice
- to develop and provide educational and scientific materials to allow the public to use, improve and contribute standard biological parts

The Board of Trustees: Drew Endy (MIT), Christopher Voigt (UCSF), Thomas Knight (MIT), Randy Rettberg (MIT), and Pamela Silver (Harvard). Lauren Bic Ha is the Executive Director (bioworks@gmail.com).

To join the Biobricks Foundation, please visit:

www.biobricks.org

