UCLA Engineering

HENRY SAMUELI SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Chemical and Biomolecular Engineering Department

Founders Lectureship in Honor of Professor Ken Nobe

Dr. Nobe is a native of Berkeley, California and received his BS degree from Berkeley. He earned his PhD degree from UCLA where he was appointed assistant professor in the school of engineering. He advanced through the academic ranks to Professor in 1968, served as Chair of the Chemical, Nuclear and Thermal Engineering Department from 1978 to 1983, and was the founding Chair of the Chemical Engineering Department from 1983 to 1984. He is a world-renowned scientist recognized especially for his pioneering research on catalytic air pollution control of exhaust emissions from automotive and stationary sources, as well as his studies of electrochemical processes including kinetics and mechanisms of electrodissolution and electrodeposition, corrosion, electrochemical energy systems, and electrodeposited nano-sized high performance soft and hard magnetics. During his distinguished career, he has been honored with the 1962 UCLA Distinguished Teacher Award and the 1992 Linford Award from the Electrochemcial Society. As an example of his numerous contributions to the department, Dr. Nobe along with his wife Mary endowed the William F. Seyer Chair in Materials Electrochemistry at UCLA in 2000 in honor of his graduate research advisor, Dr. William Seyer.

The Founders Lectures in Chemical and Biomolecular Engineering are made possible by the Founders Lectureship Fund, established at UCLA by families, friends, and former students of Dr. Ken Nobe and Dr. Sheldon Friedlander. The objective of this lectureship is to bring to the campus world-renowned researchers in Chemical and Biomolecular Engineering or related disciplines. The lectures alternate yearly between the two series, named in honor of Dr. Nobe and Dr. Friedlander. 2008 marks the inauguration year of the Nobe lecture series.

Ken Nobe Lecture

in

Chemical and Biomolecular Engineering

GREGORY STEPHANOPOULOS
Massachusetts Institute of Technology

1:30 PM
Friday May 23, 2008

"Metabolic Engineering: Enabling Technology for the Biological Production of Fuels and Chemicals"

This lecture will be held in the Lecture Hall
of the UCLA California Nano Systems Institute (CNSI)
Refreshments served at 1:00 PM
Event Ends at 3:00PM

GREGORY STEPHANOPOULOS

Dr. Gregory Stephanopoulos received his degrees in chemical engineering (B.S.: NTU Athens, M.S.: University of Florida, Ph.D.: University of Minnesota, 1978). He taught at Caltech (1978-85) after which he was appointed Professor of ChE at MIT. He served as Associate Director of the Biotechnology Process Engineering Center (1990-97) and is also the Taplin Professor of HST (2001-), Instructor of Bioengineering at Harvard Medical School (1997-), and the W. H. Dow Professor of Chemical Engineering and Biotechnology.

Dr. Stephanopoulos' current research focuses on metabolic engineering, the engineering of microbes for the production of fuels and chemicals. He has co-authored or –edited 5 books, ~300 papers and 25 patents and supervised 50 graduate and 40 post-doctoral students. He is presently the editor-in-chief of Metabolic Engineering and serves on the Editorial Boards of 7 scientific journals and the Advisory Boards of 5 ChE departments. He has been recognized with numerous awards (Dreyfus, Excellence in Teaching-Caltech, AIChE Technical Achievement Award, NSF PYI, AIChE-FPBE Division Award, M.J. Johnson Award of ACS, Merck Award in Metabolic Engineering, C. Thom Award of SIM, the R.H. Wilhelm Award in Chemical Reaction Engineering of AIChE, and the Founders Award of AIChE). In 2002, he was elected to the AIChE Board of Directors, and in 2003 to the National Academy of Engineering (NAE). In 2005, he was awarded an honorary doctorate degree (doctor technices honoris causa) by the Technical University of Denmark.

Dr. Stephanopoulos has taught undergraduate and graduate core courses of Chemical Engineering and Biotechnology.

Metabolic Engineering: Enabling Technology for the Biological Production of Fuels and Chemicals

Gregory Stephanopoulos
Bayer Professor of Chemical Engineering
Massachusetts Institute of Technology

Abstract

Metabolic engineering is a young field, just over 15 years old. During this period, it has developed a well-defined methodology and a focused research portfolio of rich intellectual content and particular relevance to biotechnology and biological engineering. Its goal is to harness the immense potential of microorganisms for the production of useful products, in particular from renewable resources. This it does by engineering the cellular metabolism such as to favor product-forming pathways while maintaining normal cellular functions. After many successful applications, Metabolic Engineering now needs to adapt itself to rapid changes whereby we have instead of too few genes lots and lots of genes and, instead of a handful of measurements, avalanches of data. Although the focus (e.g. improving cells) and main theme (e.g. assessing cell physiology) of metabolic engineering remain the same, new tools are required to take advantage of these developments. Such tools will come from a systemic view of cellular function and will strengthen the integrating and quantifying aspects that have given this field its unique identity.

In this talk we will review how metabolic engineering, as a field, helped crystallize these concepts along with the main challenges in aligning metabolic engineering with the goals and mind-frame of the new biology. New concepts of importance in the post-genomic era will be presented that allow the engineering of cells to elicit multigenic properties, a task difficult to achieve following the usual single gene paradigm. These ideas will be illustrated with examples from applications of Metabolic Engineering to the production of chemical products and biofuels from renewable resources.