Department of Chemical Engineering Seminar Series

Strategies for Reprogramming Control over Engineered Signaling and Metabolic Pathways

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Lecture: 4:00-5:00 p.m.
BAGLEY 154
Reception at 3:15 p.m. – Benson Lobby

Abstract

The grand challenge of programming complex cellular behaviors such as metabolism and signal processing will require multiple tools. My lab is focusing on engineering control at multiple levels: genetic circuitry through the combinatorial expression optimization of multi-enzyme pathways, protein circuitry through the engineering of enzyme switches for rapid spatial control over enzymatic activity, and synthetic organelle construction for the insulation of engineered chemistry from the rest of the cellular milieu. Ultimately, we envision this to more adeptly mimic the impressively sophisticated natural cellular processes to take advantage of inherent advantages of microbes, namely the ability to rapidly self-replicate on inexpensive and sustainable media, catalyze difficult chemical reactions with impressive specificity, and accurately integrate multiple environmental signals.

Speaker Biography

John E. Dueber earned his B.S. in Biochemistry from the University of Delaware in 1999 where he did a senior thesis in the area of protein biotechnology with Prof. Anne Robinson. Moving across the country to the Bay area, Dr. Dueber earned his Biochemistry Ph.D. in Prof. Wendell Lim's laboratory at U.C. San Francisco. His thesis investigated how domain recombination events can be employed to build synthetic switches with novel input/output linkages. A surprisingly wide range of gated behaviors was achieved through recombining protein-protein interaction input domains to a catalytic output domain to produce switches of varying architectures. Subsequently, Dr. Dueber became a QB3 Distinguished Fellow at U.C. Berkeley with mentorship from Prof. Jay Keasling. His laboratory focused on the use of synthetic biology approaches for improved metabolic engineering performance. Modular protein-protein interaction domains were used to build synthetic scaffolds capable of co-localizing metabolic enzymes tagged with corresponding ligands for these protein-protein interaction domains. Starting in January 2010, Dr. Dueber began an assistant professorship in the bioengineering department and the Energy Biosciences Institute at the U.C. Berkeley where he continues research in synthetic biology and protein engineering.