הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

הפקולטה להנדסה כימית
ע"ש וולפסון
The Wolfson Department of Chemical Engineering

Wolfson Department of Chemical Engineering Seminar

On line seminar via ZOOM - https://technion.zoom.us/j/2418571512

Wednesday - June 24th at 13:30

Encoding decision-making functions into cell metabolism: the marriage of synthetic biology, metabolic engineering and intelligent control

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Living organism is an intelligent system encoded by hierarchically organized information to perform precisely controlled biological functions. With a better understanding of cellular regulation, biomolecular engineers have been able to engineer both the chemistry modules (the mass flow) and the control modules (the information flow) inside the cell to design intelligent cells with desired functions. Instead of programing machine language in a chemical plant, synthetic biologists rewrite the genetic software and encode logic functions in living cells to improve cellular performance. In this lecture, I will present both computational and experimental approach to unravel the design principles underlying efficient biomanufacturing platforms - YIN and Yang metabolic balance, autonomous metabolic switches, microbial social interactions for various biotechnological applications. I will present strategies to build genetic toolkits to streamline the genetic/genome modification for a promising industrial yeast *Y. lipolytica*, which allows us to harness the endogenous acetyl-CoA/malonyl-CoA/HMG-CoA metabolism to produce complex oleochemicals, terpenes, polyketides and aromatic commodity chemicals. By combining metabolic addiction with negative autoregulation, I will also present our recent effort to encode decision-making functions into cell metabolism to partition carbon flux and improve strain stability. Engineering feedback genetic circuits to encode decision-making functions into cell metabolism will present us exciting opportunities to solve the most pressing challenges in health, energy and environment in the 21st Century.