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ע"ש וולפסון
The Wolfson Department of Chemical Engineering

Wolfson Department of Chemical Engineering Seminar

Zoom Seminar

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Zoom Seminar - https://technion.zoom.us/j/94425925792

"Integrated chemical and biological engineering to optimize microbial cell factory for green manufacturing"

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Abstract

Biological process is among the most intricate and complex mystery on Earth. Biochemical engineering aims to utilize the design logic of life processes and apply chemical engineering principles to address environmental, energy, food and healthcare challenges. From mRNA vaccines to space shuttles and artificial intelligence, all involve the applications of chemical and biological engineering. Synthetic biology allows us to manipulate both the metabolic and informational flows within cells using genetic tools, and reprogram biological functions in living cells with spatial and temporal precision. This lecture will update our progress to engineer a yeast microbial cell factory for various applications, including the use of genetically-tunable nanoparticles for photocatalytic CO_2 fixation; the AI-assisted engineering and design of protein secretion tags to improve protein secretion; and the construction of efficient nutraceutical cell factory to produce natural products and anti-depression drug gastrodin; and the design of intelligent cell factories for autonomous control of cell metabolism. In addition, the application of chemical engineering analysis defines the boundary and guides how we interpret and design efficient biological engineering routes. Overall, an integrated chemical and biological engineering approach will contribute to fostering harmonious coexistence between humans and nature, and promoting sustainable social development.

Key words: Chemical engineering, Biological engineering, Microbes, Green Biomanufacturing, CO_2 fixation, Natural products, Feedback control.

Biography

Dr. Peng Xu is an Associate Professor at Guangdong Technion-Israel Institute of Technology. He received his bachelor's and master's degrees from Jiangnan University and completed his Ph.D. at Rensselaer Polytechnic Institute. He has held postdoctoral and assistant professor positions at Massachusetts Institute of Technology (MIT) and University of Maryland, respectively. Dr. Xu has received awards such as the "Professor DIC Wang Award for Bioengineering and Biotechnology," the "Outstanding Young Scholar Award in Biochemical Engineering," and the National Natural Science Foundation Outstanding Youth Fund (Overseas). He has published over 100 academic articles with over 5,970 citations. Currently, he serves as an editorial board member for "*Metabolic Engineering*" and "*Current Opinion in Biotechnology*" and is the associate editor of "*Process Biochemistry*", "*BioDesign Research*" and "*New Biotechnology*".