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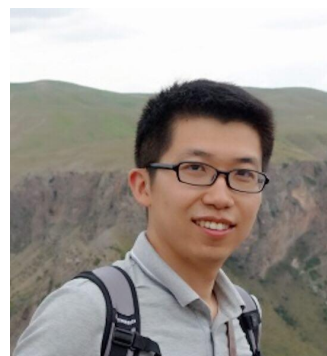
TSINGHUA FORUM ON INDUSTRIAL
BIOCATALYSIS

Accelerating microbial cell factory optimization via high-throughput genotype-phenotype associations

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报告摘要:

When we engineer microbial cell factory, the complexity of metabolic and regulatory network often results in the failure of rational design. Hence, an overview scanning the quantitative phenotype of each individual genotype is of great value to fuel the design, construction and optimization of superbugs. In this talk, I will introduce the high-throughput technologies recently developed by us to provide such global information of genotype-phenotype associations. Generally, using similar working flows based on high-throughput DNA synthesis, library screen, DNA sequencing and data mining, our methods can be adopted to engineer biological systems at different levels from one enzyme all the way up to the genome. To demonstrate this, three case studies will be presented. In the first project, we used CRISPR interference system to study the functional consequences of each individual gene silencing in bacteria. In the second part, I will introduce experimentally extracting the quantitative genome-editing activities of > 60,000 guide RNAs, based on which created the first guide RNA-activity machine learning model used in bacteria. Finally, based on the experimentally determined genotype-phenotype landscape of a genetic sensor, we successfully engineered its response curve by understanding its underlying biophysics better. Our works highlight the power of these enabling technologies to catalyze the engineering of microbial cell factories.

报告人简介:

Tianmin Wang finished his undergraduate study at the Department of Chemistry and Molecular Engineering, Peking University. He then moved to Department of Chemical Engineering, Tsinghua University to initiate his PhD study. Supervised by Prof. Xin-hui Xing, Tianmin developed novel high-throughput genotype-phenotype association technologies and downstream data mining algorithms to accelerate the construction and optimization of microbial cell factory. Dr. Wang is currently a postdoctoral research fellow at School of Medicine, Tsinghua University. In Prof. Jintao Liu lab, he is using microfluidics method to study the interaction between pathogenic biofilm and host immune system.

主办: 工业生物催化教育部重点实验室