吴辉

所属学院 生物工程学院

学科领域 代谢工程与合成生物学

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个人简介

工学博士，副教授。现任中国轻工业生物基材料工程重点实验室副主任，中国化工学会生物化工专委会青年学者工作委员会委员，中国生物工程学会青年工作委员会委员，上海市生物工程学会合成生物学委员会委员，生物反应器工程国家重点实验室固定人员。教育部“霍英东青年教师基金”获得者（2018）。2004 年毕业于南京工业大学生物工程系，获工学学士学位。2009 年毕业于华东理工大学发酵工程专业，获工学博士学位。同年进入中科院上海生命科学研究院植物生理生态研究所从事博士后研究工作。2011 年来到誉有“南方的哈佛”之称的美国莱斯大学生物工程系从事博士后研究工作。2014 年 9 月引进华东理工大学生物工程学院，入选华东理工大学“青年英才培育计划”（2018 A 类、2015）等。2019 年被破格遴选为博士生导师。作为负责人主持国家自然科学基金面上项目、青年项目、教育部“霍英东青年教师基金”、上海市自然科学基金等项目；作为主要研究骨干参与科技部国家重点研发计划课题、863 计划等。近年来以第一作者或通讯作者在 Metabolic Engineering，Biotechnology Advances，ACS Synthetic Biology，Biotechnology and Bioengineering 等本领域重点期刊上发表 SCI 收录论文近 40 篇。申请美国发明专利 6 项，已授权 3 项；申请中国发明专利 10 项，已授权 5 项；申请实用新型专利 1 项。获 2019 年度华东理工大学优秀研究生指导教师。指导研究生获 2018 年度“华东理工大学－东阿阿胶杰出奖学金”，华东理工大学第十三届“华陆科技 · 奋进杯”大学生课外学术科技作品竞赛二等奖；共同指导并带队本科生获 2017 年和 2018 年连续两次获得国际遗传工程机器大赛（iGEM）竞赛金奖，指导“大学生创新创业训练计划”上海市级项目。

研究方向

1. 微生物代谢工程生产平台化合物和生物活性物质

运用生物信息学及代谢工程的最新技术和方法，合理设计及重构微生物代谢途径，结合代谢调控策略，建立以可再生生物质资源（糖、甘油、乙酸、甲酸、CO2 等）为原料的新型高效微生物细胞工厂，合成多种生物基化学品与生物基材料，如丁二酸，3-羟基丙酸，丙酮，生物聚酯，氨基酸，脂肪酸及其衍生物等。

2. 合成生物学中“代谢晶体管”研究及其应用

“代谢晶体管”控制模式借鉴电子元器件“晶体管”的放大控制模式，通过调节细胞中微量关键物质的浓度，进而对整个细胞进行代谢重编程。

3. 基于微生物电化学合成的代谢工程与合成生物学

运用代谢工程与合成生物学的策略，结合电化学平台技术与方法，搭建能利用一碳资源的自养型大肠杆菌细胞工厂平台，用于生产多种生物基化合物如丙酮，异丙醇，3-羟基丙酸，丁二酸等。

研究成果及主要发表文章

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2. Guohui Li, Dixuan Huang, Xue Sui, Shiyun Li, Bing Huang, Xiaojuan Zhang*, Hui Wu*, Yu Deng*. 2020. Advances in microbial production of medium-chain dicarboxylic acids for nylon materials. Reaction Chemistry & Engineering. 5:221-238

3. Hao Yang, Can Zhang, Ningyu Lai, Bing Huang, Peng Fei, Dawei Ding, Peng Hu, Yang Gu, Hui Wu*. 2020. Efficient isopropanol biosynthesis by engineered Escherichia coli using biologically produced acetate from syngas fermentation. Bioresource Technology. 296:122337.

4．Yunpeng Yang#, Nannan Lang#, Lu Zhang, Hui Wu, Weihong Jiang*, Gu Yang*. 2020. A novel regulatory pathway consisting of a two-component system and an ABC-2 type transporter controls butanol tolerance in Clostridium acetobutylicum. Applied Microbiology and Biotechnology. DOI: 10.1007/s00253-020-10555-6

5．Jiawei Li, Xiaoyan Zhang, Hui Wu, Yunpeng Bai*. 2020. Transcription factor screening and engineering for metabolic engineering and production of organic acids: an overview. Frontiers in Bioengineering and Biotechnology. 8:98

6．Qiaofei He, George N. Bennett, Ka-Yiu San, Hui Wu*. 2019. Biosynthesis of medium-chain ω-hydroxy fatty acids by AlkBGT of Pseudomonas putida GPo1 with native FadL in engineered Escherichia coli. Frontiers in Bioengineering and Biotechnology. 7:273.

7．Hao Yang#, Bing Huang#, Zhimin Li, Qin Ye, Hui Wu*. 2019. Metabolic engineering of Escherichia coli carrying the hybrid acetone-biosynthesis pathway for efficient acetone biosynthesis from acetate. Microbial Cell Factories. 18:6

8. Jingxian Lu, Zhimin Li, Qin Ye, Hui Wu*. 2019. Effect of reducing the activity of respiratory chain on biosynthesis of poly(3-hydroxybutyrate-co-lactate) in Escherichia coli. Chinese Journal of Biotechnology 35(1):59-69.

9．Boliang Gao, Li Li, Hui Wu, Du Zhu, Min Jin, Wu Qu, Runying Zeng*. 2019. A novel strategy for efficient agaro-oligosaccharide production based on the enzymatic degradation of crude agarose in Flammeovirga pacifica WPAGA1. Frontiers in Microbiology.10:1231.

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11．Jiapeng Tang, Zhenqing Qian, Hui Wu*. 2018. Enhancing cordycepin production in liquid static cultivation of Cordyceps militaris by adding vegetable oils as the secondary carbon source. Bioresource Technology. 268:60-67.

12．Bing Huang, Hao Yang, Guochen Fang, Xing Zhang, Hui Wu*, Zhimin Li*, Qin Ye. 2018. Central pathway engineering for enhanced succinate biosynthesis from acetate in Escherichia coli. Biotechnology and Bioengineering. 115:943-954.

13．Wei Li#, Hui Wu#, Mai Li, Ka-Yiu San*. 2018. Effect of NADPH availability on free fatty acid production in E. coli. Biotechnology and Bioengineering. 115:444-452.

14．Han Liu, Guochen Fang, Hui Wu*, Zhimin Li*, Qin Ye. 2018. L-cysteine production in Escherichia coli based on rational metabolic engineering and modular strategy. Biotechnology Journal. 13:e1700695.

15. Feng Li#, Yuanxiu Li#, Liming Sun, Xiaoli Chen, Xingjuan An, Changji Yin, Yingxiu Cao, Hui Wu, Hao Song*. 2018. Modular engineering intracellular NADH regeneration boosts extracellular electron transfer of Shewanella oneidensis MR-1. ACS Synthetic Biology. 7(3):885-895.

16．Qing Li#, Bing Huang#, Qiaofei He, Jingxian Lu, Xun Li, Zhimin Li, Hui Wu*, Qin Ye. 2018. Production of succinate from simply purified crude glycerol by engineered Escherichia coli using two-stage fermentation. Bioresources and Bioprocessing. 5:41.

17. Jiaqi Jiang, Bing Huang, Hui Wu*, Zhimin Li*, Qin Ye. 2018. Efficient 3-hydroxypropionic acid production from glycerol by metabolically engineered Klebsiella pneumoniae. Bioresources and Bioprocessing. 5:34.

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19．Xing Zhang#, Hui Wu#, Bing Huang, Zhimin Li*, Qin Ye. 2017. One-pot synthesis of glutathione by a two-enzyme cascade using a thermophilic ATP regeneration system. Journal of Biotechnology. 241:163-169.

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25．Dezheng Wang, Cheng Wang, Hui Wu*, Zhimin Li*, Qin Ye. 2016. Glutathione production by recombinant Escherichia coli expressing bifunctional glutathione synthetase. Journal of Industrial Microbiology and Biotechnology. 43:45-53. (*Co-corresponding)

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