The construction of in vitro synthetic enzymatic biosystem and its industrial application

Chun You

Professor

Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, 32 West 7th Avenue, Tianjin Airport Economic Area, Tianjin 300308, China

Email: you_c@tib.cas.cn

Abstract

In vitro synthetic enzymatic biosystem mixed purified/partial purified cascade enzymes and cofactors together to convert cheap substrates to value-added products in one-pot. Compared to cell-based production, in vitro biosystems exhibited several advantages such as high product yield, titer and productivity, highly engineering flexibility, and high tolerance towards toxic environments. Through the methods including pathway construction, gene mining, thermodynamic analysis and condition optimization, we developed many in vitro metabolic engineering biosystems for the production of inositol, laminaribiose, and for ATP regeneration in stoichiometric manners from cheap substrates like starch or cellulose, and the inositol production from starch has been applied in a 20 t reactor for industrial purpose. In conclusion, in vitro biosystems have emerged as an alternative approach for biomanufacturing, paralleling with traditional cell-based production.

Brief Biography

Chun You, which was recruited in national 1000 youth talent program, got his PhD degree in Fudan University, and then worked as postdoctoral in Virginia Tech from 2010-2015. He join Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences as Principal Investigator since 2016. His research focused on the construction of in vitro synthetic enzymatic biosystems and applying these biosystems in industrial scale, including improving enzyme thermostability, switching cofactor preference, constructing enzyme complex, elucidating substrate channeling mechanism, and figuring out the suitability of enzymes/modules. He has published more than 30 scientific papers in ACS Catal, Angew Chem Int Ed, Proc Natl Acad Sci USA, Biotechnol Bioeng, ACS Synth Biol, Appl Environmen Microbiol.

Brief CV

Chun You, Ph.D. Professor

Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences

Education:

2003-2009	PhD, Fudan University, Microbial Genetics, China
1999-2003	B.S. Fudan University, Biological Science, China

Professional Career:

2016.3-Present Professor, Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, Tianjin, China
2015.3-2016.3 Chief Scientist, Cell Free Bioinnovations. Inc, USA
2012.4-2016.4 Senior Research Associate, Virginia Tech, USA
2010.4-2012.4 Postdoctoral Associate, Virginia Tech, USA
2009.6-2010.4 Research Assistant, Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, Tianjin, China

Research Interests:

1. In vitro synthetic enzymatic biosystem
2. Enzyme mining and engineering
3. Enzyme immobilization

Selected publications

1. Meng, D. YOU C* et al. (2018) ***ACS Catalysis*** 8, 9550-9559.
2. Bai, X. You, C*. et al. (2019) ***Biotechnol. Bioeng.*** 10.1002/bit.27096
3. YOU C, Zhang Y-HP*. et al. (2017). ***Biotechnol. Bioeng.*** 114: 1855-1864.
4. Wei, X., You, C*. et al. (2018) ***ChemCatChem*** 10, 5597-5601.
5. YOU C, Zhang Y-HP*.(2013). ***Proc. Natl. Acad. Sci.*** 110: 7182-7189.
6. YOU C, , Zhang Y-HP*. et al. (2012). ***Angew. Chem. Int. Ed.*** 51: 8787-8790