Microbial biosynthesis of functional sugars and alcohols

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Abstract

Functional sugar and alcohol, such as D-tagatose, xylitol and D-arabitol, are important and widely used in food and therapeutics industries due to having sweetness similar to sucrose, low calorie content compared to sucrose, and capability to be absorbed slowly by the human digestive tract. In addition, functional sugar alcohol has been used as a promising feedstock for biosynthesis of some value-added products. Since the past decades, functional sugar alcohol has been biosynthesized from different biomass-derived substrates including glucose, xylose, raw glycerol, and mixed sugars obtained from biomass hydrolysates. Due to the many advantages of biosynthesis, such as economically competitive, environmentally friendly, easy to carry out, the biosynthesis of functional sugar alcohol has attracted widespread attention. In this presented study, the typical process of biosynthesis was introduced firstly, then the biosynthesis strategy based on multi-scale biocatalysis system engineering including gene/enzyme scale, cell scale, bioreactor scale, etc., were presented. Therefore, the system network can be formed on the basis of different scales engineering methods which can guide the industrialization process. In the end, the biosynthesis of D-arabitol, xylitol, D-tagatose, and 1,3-propandiol were described in details based on our previous research works.

Brief Biography

Dr. Xianghui Qi is working as a professor in the School of Food & Biological Engineering, and a director of Institute of Microbial Intelligent Manufacturing, Jiangsu University, China. Prof. Qi is a High-level Talent of Jiangsu Province. His research interests: Biosynthesis of high-value-added food additives and medicines using five/six-carbon sugars, glycerol, or biomass as substrate, such as functional sugars/alcohols, Recently, prof. Qi is mainly working on the biosynthesis of D-arabitol, xylitol, D-tagatose, D-allose, 1,3-propanediol, 3-hydroxypropionic acid, 2,3-butanediol and other high value-added foods and medicines. Till now, prof. Qi has published more than 100 papers, among of them, 8 papers are top h-index. Besides, prof. Qi has published 3 English, 1 Chinese book chapters, and more than 10 patents. At present, prof. Qi has completed 2 projects of National Natural Science Foundation of China and 1 project of “863”, and now he is presiding 2 projects of National Natural Science Foundation of China, 1 project of National Key R & D Program of China and 1 project of High-level talent of Jiangsu Province. Till now, prof. Qi has be honored with 1 first-prize and 2 second-prizes for outstanding undergraduate thesis supervisor of Jiangsu Province, and several other prizes.

Brief CV

Xianghui Qi, Ph.D., Prof., Director

School of Food & Biological Engineering, Jiangsu University, China

Institute of Microbial Intelligent Manufacturing

Education:

B.S Biology, Central South University of Forestry and Technology, China, 1998

M.S Biology, Central South University of Forestry and Technology, China, 2003

Ph.D. Microbiology, Guangxi University, China, 2006

Professional Career:

2016-2017: Yale University, US, Visiting Professor.

2015-2016: University of California, Los Angeles, US, Visiting scholar.

2009-2011: Nanjing University of Technology, China, Postdoc.

2007-2010: Jiangsu University, China, Lecturer.

2010-2016: Jiangsu University, China, Associate Professor.

2016-Present: Jiangsu University, China, Professor.

Research Interests:

1. Biosynthesis and application of functional sugars (alcohols)
2. Microorganism fermentation engineering, Pathway engineering & Biosynthesis
3. Enzyme engineering, bio-catalysis & biotransformation

Selected publications

1. Qi XH. et al. ***Renew Sust Energ Rev***, 2019, 105.
2. Qi XH. et al. ***Bioresource Technol***, 2019, 284: 188.
3. Qi XH. et al. ***J Clean Prod*****,** 2019, 226: 432.
4. Qi XH. et al. ***Food Chem,*** 2019, 299.
5. Qi XH. et al. ***Bioresource Technol***, 2018, 257:223.
6. Qi XH. et al. ***Bioresource Technol***, 2018, 257:281.
7. Qi XH. et al. ***Bioresource Technol***, 2018,247: 838
8. Qi XH. et al. ***Bioresource Technol***, 2018, 247:940.
9. Qi XH. et al. ***J Agr Food and Chem***, 2018, 66.
10. Qi XH. et al. ***Bioresource Technol***, 2017, 235: 50.
11. Qi XH. et al. ***J Agr Food and Chem***, 2017, 65.