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EDITORIAL

Food synthetic biology special issue: editorial introduction

Synthetic biology advances future food production

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With environmental pollution and population growth, the traditional food industry faces enormous challenges regarding a safe, nutritious, and sustainable food supply. Therefore, it is crucial to urgently solve how to develop novel resources to provide healthier and sustainable human food. The emergence of synthetic biology has brought a turning point toward solving the above issues. Synthetic biology refers to the rational design, modification, or even de novo synthesis of biological systems with specific goals guided by engineering ideas to break through the limitations of original biological systems.

The effective combination of food science and synthetic biology, which can be termed "food synthetic biology," is not only an important technology to break through the existing problems of food safety and nutrition, but also the primary method to overcome the unsustainability problems challenging to be solved by the traditional food technology. Food synthetic biology allows us to produce foods or improve their function using programmed food cell factories, engineered microbial consortia, or the cell-free biosynthesis platform. This technology will be a potential solution to mitigate the problems in the traditional food industry, such as severe environmental pollution, unstable food supply and quality, and precarious food safety and nutrition.

In this special issue, a series of articles by senior experts in this field are presented, providing a state-of-the-art view of synthetic biology for food or food ingredients. Particularly, this issue begins with the selection and design of chassis cells (contributed by Xiaoyuan Wang's and Xiulai Chen's Laboratories) and introduces related metabolic engineering (contributed by Yongjin Zhou's and Volker Wendisch's Laboratories) and food enzyme engineering (contributed by Song Liu's Laboratories). Next, the role and application of synthetic biology in producing food or food ingredients are discussed (contributed by Amit Rai's, Liming Zhao's, Aravind Madhavan's, and Zhaofeng Li's Laboratories). Finally, the application prospect of synthetic biology in food fermentation was prospected (contributed by Carlos Ricardo Soccol's Laboratory), and how to engineer and utilize microalgae as the next-generation foods were pointed out (contributed by Kashyap Kumar Dubey's Laboratory). In conclusion, the latest advances in food synthetic biology are highlighted in these articles. On behalf of the journal editors, we hope that this special issue will become an essential resource for future research and that you will enjoy this special issue.

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