

Biotechnology in China III: Biofuels and Bioenergy

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Preface

Fueled by rapid economic growth, China's crude oil consumption has increased drastically, from 217 million tons (Mt) in 2001 to 423 Mt in 2010, making it the second largest oil consumer in the world, only after the United States. Since the domestic oil production has only increased slightly during the same period of time, from 164 to 184 Mt, there is a continuously increasing gap which must be filled by imported oil. Taking into account the trend of economic growth, China's strong dependence on foreign oil cannot be mitigated in the future without developing self-dependent alternatives, which not only secure the sustainability of its own economy, but also affect the rest of the world.

China is also one of the main grain producers in the world, producing more than 500 Mt of grain per year, and correspondingly generating 600–700 Mt agricultural residues. Due to the lack of economically viable technologies for their utilization, most agricultural residues are burnt in the field by farmers, which pollutes environments and even presents public hazards such as the disruption of air transportation by smoke clouds in the sky. Producing biofuels, bioenergy and bio-based chemicals through the refinery of lignocellulosic biomass has been acknowledged worldwide as an alternative to the oil refinery since the oil crisis occurred in the 1970s. It has also recently been highlighted again because of high oil prices and global climate change caused by the over-consumption of petroleum-based products, particularly vehicle emissions. Without doubt, the successful development of biomass refineries in China will help it to sustain its own economy, and in the meantime contribute to the whole world.

Driven by these imperatives, governmental funding for R&D of biomass refineries has increased significantly during the 11th-Five Year Economic and Social Development of China from 2005 to 2010. This momentum is expected to be maintained for a long term to make such a pathway economically competitive. We are honored to be invited by the Series Editor Professor T. Scheper and Springer to edit the consecutive volume on "Biotechnology in China", with a focus on biofuels and bioenergy to present major progress achieved by Chinese scientists and challenges to be addressed collectively by international communities.

The sugar platform is the prerequisite for the bioconversion of lignocellulosic biomass, and high efficient and low cost cellulases are the bottleneck. This is therefore addressed first by Professors X. Fang and Y. B. Qu. The major part of this volume is on liquid transportation fuels, including bioethanol, biodiesel, biobutanol and branched-chain higher alcohols, which are presented by Professors F. W. Bai, N. Y. W. Ho, D. H. Liu, J. Xu, Y. Li and Q. H. Wang. Meanwhile, biogas, which has been well established in China, as well as emerging biohydrogen and microbial fuel cells are addressed by Professors H. Q. Yu, A. J. Wang and G. P. Sheng. Finally, fuels and chemicals from hemicellulose sugars that are less efficiently converted by native, even genetically modified microorganisms are discussed by Professors H. Huang and G. T. Tsao. We expect that this special volume to be a window for international colleagues to learn the current R&D progress in biofuels and bioenergy in China.

On behalf of my co-editors Professors H. Huang and G. T. Tsao, I express our sincere thanks to all authors and reviewers for their dedication, contributions and valuable comments, Professor T. Scheper and Dr. M. Hertel for their encouragement, Ms. K. Bartsch for her delicate coordination and Dr. C. G. Liu for his assistance in the art work. Also, I greatly appreciate the generosity of my institute Dalian University of Technology (DUT), my colleagues and graduates at DUT and my family for all their support.

Dalian, China

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