

Enhancing production of cellulosic enzymes by the filamentous fungus

Trichoderma reesei using artificial transcription factors

Xinqing Zhao

Professor

State Key Laboratory of Microbial Metabolism, School of
Life Science and Biotechnology

Shanghai Jiao Tong University

Shanghai 200240, China

Email: xqzhao@sjtu.edu.cn



Abstract

Lignocellulosic biomass is the most abundant renewable source for biofuels and biochemical, and bioconversion of lignocellulosic biomass helps to alleviate the environmental stress for sustainable development. However, great challenge remains for generating fermentable reducing sugars from lignocellulose, and economic lignocellulosic biorefinery is suffering from the costly and inefficient production of lignocellulolytic enzymes. The filamentous fungus *Trichoderma reesei* is widely used to produce lignocellulose-degrading enzymes, but related synthetic biology studies are still limited. We have used an artificial zinc finger protein library (AZFP) to obtain *T. reesei* strains with improved cellulase production, and have identified several AZFPs that work under different mechanisms. In addition, transcriptomic analysis identified putative targets including endogenous transcription factors and transporters. Future prospects on novel both strain development of *T. reesei* by synthetic biology design are provided.

Brief Biography

Xinqing Zhao is Professor in School of Life Sciences at Shanghai Jiao Tong University, China. Her research interests are genetic diversity and functional genomics of industrial microbial strains for various industrial applications, with particular interest in metabolic engineering of stress tolerance of the budding yeast *Saccharomyces cerevisiae* for bioproduction. She is also leading the research on the molecular mechanisms of microbial cell flocculation for low cost cell recovery. Her research also includes metabolic engineering of filamentous fungi, especially *Trichoderma reesei* for enzyme production and biorefinery of lignocellulosic biomass.

Brief CV

Xinqing Zhao, Ph.D.

Dept. of School of Life Sciences and Biotechnology, Shanghai Jiao Tong University

Education:

- B.S Biology, Northeast Normal University, China, 1993
M.S Genetics, Northeast Normal University, China, 1996
Ph.D. Microbiology, Myongji University, South Korea, 2006

Professional Career:

2007-2009: University of Tuebingen, Germany, Postdoctoral Fellow, supported by Alexander von Humboldt Foundation.

1998-2005: Dalian University of Technology, China, Assistant Professor.

2006-2010: Dalian University of Technology, China, Associate Professor.

2011-2014: Dalian University of Technology, China, Professor.

2014-Present: Shanghai Jiao Tong University, China, Professor.

Research Interests:

1. Microbial Gene Regulation
2. Microbial Systems and Synthetic Biology
3. Biofuels production and enzyme production

Selected publications

1. Li, J. et al. ***Bioresour Technol***, accepted, 2019, ePub online.
2. Zhang, MM. et al. ***Biotechnol Biofuels***, 2019, 12: 116.
3. Xia, J. et al. ***Biotechnol Bioeng***, 2018, 115(11): 2714-2725.
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7. Zhang, MM. et al. ***Bioresour Technol***, 2017, 245: 1461-1468
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10. Li, Q. et al., ***Metabolic Eng***, 2012, 14: 1-8.